EMC²

TECHNICAL NOTES

EMC® Secure Remote Support
Release 2.28

Technical Description

Rev 02

June 17, 2014

This EMC Secure Remote Support (ESRS) technical description contains information on the following topics:

Introduction

EMC maintains a strong commitment to protecting your information infrastructure through the 24x7 availability of remote technical support resources and automated secure remote support solutions. The EMC® Secure Remote Support (ESRS) provides a secure, IP-based, distributed remote service support solution that provides command, control, and visibility of remote support access.

ESRS expands and improves the EMC Secure Remote Support portfolio with the following features:

Consolidation — ESRS consolidates access points for EMC support by providing a uniform, standards-based architecture for remote access across EMC product lines. The benefits include reduced costs through the elimination of modems and modem lines, controlled authorization of access for remote support events, and consolidated logging of remote access for audit review.

Security — ESRS fulfills requirements for authentication, authorization and auditing with a secure, highly scalable, fault-tolerant solution. This IP-based, firewall-friendly remote access architecture initiates all connections from your site. ESRS security features include:

Comprehensive digital security — ESRS security includes SSL data encryption, TLS v1.0 tunneling with Advanced Encryption Standard (AES) 256-bit data encryption SHA-1, entity authentication (private digital certificates), and remote access user authentication verified through EMC network security.

Authorization controls — Policy controls enable customized authorization to accept, deny, or require dynamic approval for connections to your EMC information infrastructure at the support application and device level.

Secure remote access session tunnels — ESRS establishes remote sessions using secure IP and application port assignment between source and target endpoints.

Auditing support — ESRS Policy Manager logs all remote access connections, all remote access connection termination, diagnostic script executions, and support file transfer operations (callhomes) by the ESRS Clients, and access to and administration actions performed on the Policy Manager. All log files are controlled and managed by you to enable auditing of remote support activities executed by EMC.

Description

This section provides a detailed description of ESRS.

Remote support benefits

The EMC remote support strategy delivers immediate response to product event reports such as error alerts, which can greatly increase the availability of your information infrastructure. When a support event occurs, EMC provides rapid remote support through two phases: first, through automated recognition and notification from your site to EMC (or recognition by EMC, in the case of connectivity loss), and second, through interpretation and response from EMC. In many cases this support can eliminate the need for an on-site support visit.

EMC's immediate and interactive remote support provides:

- Improved service levels
- Increased protection of information
- Simplification of complex environments
- Reduced risk
- Improved time-to-repair

ESRS augments the EMC secure remote support portfolio, which includes phone-based modems, WebEx, and e-mail.

Solution security

ESRS design acknowledges that the heart of any well-designed distributed system is security, and thus it incorporates the industry-recognized "3 As": authentication, authorization, and audit logging. ESRS employs multiple security layers to ensure that you and EMC can use the system with confidence.

From an applications architecture perspective, ESRS is an asynchronous messaging system in which all communications are initiated from your site. All communications between ESRS at your site and the EMC Enterprise servers use the HTTPS protocol with end-to-end SSL tunneling with strong encryption.

ESRS uses a firewall-friendly, IP-based communication technology over SSL VPN gateway tunnels. Customer-controlled ESRS Clients negotiate the secure exchange of information between EMC devices behind your internal firewall and the EMC Customer Support Center. All communication between your site and EMC is initiated by an ESRS Client at your site. Using industry standard Secure Sockets Layer (SSL) encryption over the Internet, and EMC-signed digital certificate authentication, your administrators need only enable outbound communication over SSL default ports 443 and 8443.

IMPORTANT

Port 8443 is not required for functionality, however without this port being opened, there will be a significant decrease in remote support performance, which will directly impact time to resolve issues on the end devices.

ESRS is designed to be scalable and fault-tolerant, and to provide you with the authentication, authorization, and audit logging control you require to meet your security needs and to support your environment. ESRS remote access to your EMC storage devices is secured using a session-based IP port-mapping solution. Service notification file transfers from the managed devices are always brokered through the ESRS Client to ensure secure encryption and audit logging.

ESRS comprises a suite of software products that securely link your EMC storage devices to the EMC Global Services support application systems. This distributed system provides you with the commands and controls to authorize and log EMC support actions such as remote access connections, file transfers, diagnostic script executions, and system updates.

The following security features are used in ESRS:

- TLS v1.0 tunneling with Advanced Encryption Standard (AES) 256-bit SHA-1 data encryption
- RSA SecurID 2 Factor Authentication of digital certificate request
- RSA SecurID 2 Factor Authentication of digital certificate registration
- X.509 digital certificates generation
- ESRS Client authentication based on digital certificate at EMC

- EMC-issued RSA SecurID Authenticators for digital certificate registration
- Secure remote application path using IP and port-mapping
- Dynamic device-level customer authorization control using a Policy Manager
- Logging of EMC-requested actions at the customer site
- Access is restricted to authenticated and authorized EMC personnel
- EMC-issued RSA SecurID for user authentication

ESRS Control

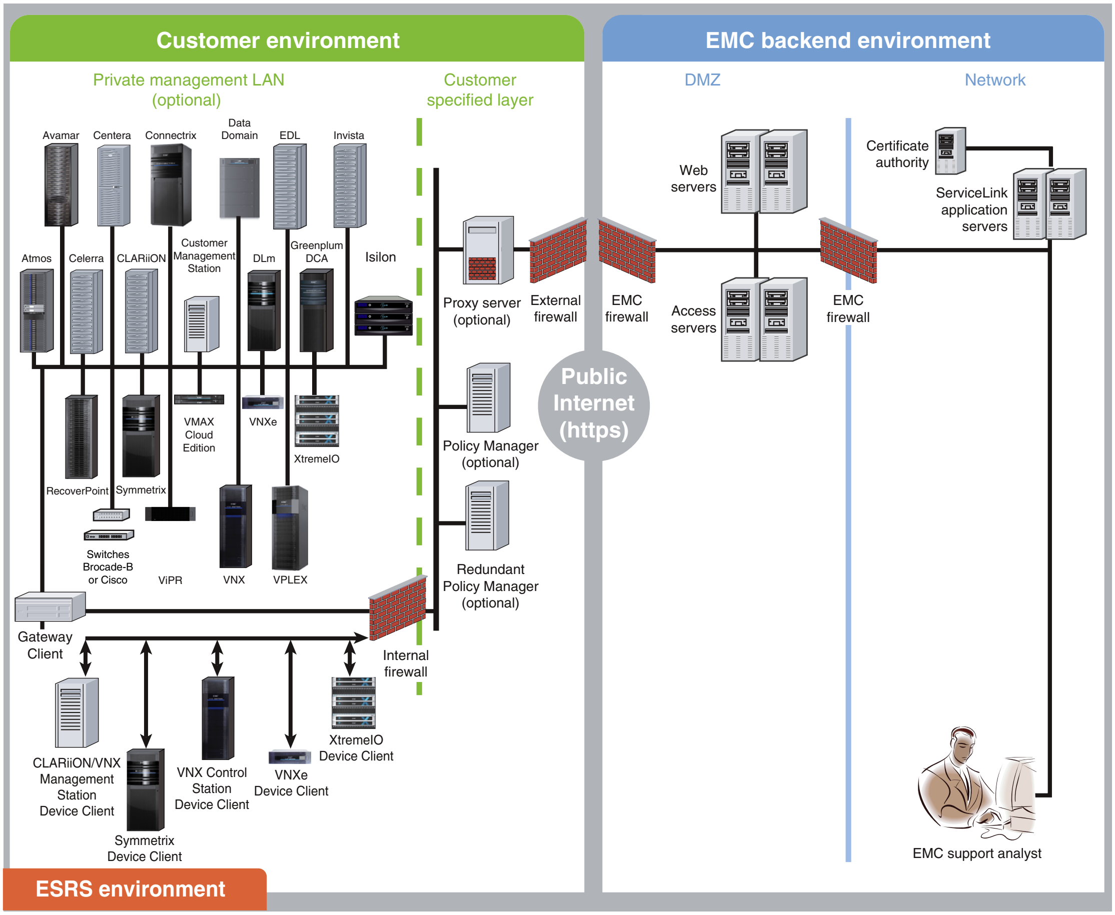
You control all EMC remote support access to the ESRS-managed products through the ESRS Client and its associated Policy Manager software. Connections with EMC storage devices and EMC at the ESRS-managed site originate from, and are managed, by the ESRS Client (or Clients) and the Policy Manager.

You set the policies of the ESRS Policy Manager, which controls ESRS remote access for support events. The Policy Manager can be set to accept, ask for approval of, or deny remote support connection requests.

At EMC, a distributed EMC Enterprise suite is the processing core of ESRS. The EMC Enterprise provides the mechanism for remote access activities from EMC Global Services.

Architecture

The ESRS application architecture is a secure, asynchronous messaging system designed to support the functions of secure encrypted file transfer, monitoring of device status, and remote execution of diagnostic activities. This distributed solution is designed to provide a scalable, fault-tolerant, and minimally intrusive extension to your system support environment. Figure 1 on page 6 illustrates the processing components and their interconnections.



GEN-002137

Figure 1 ESRS architecture

Customer site components

This section describes the ESRS components at the customer site:

ESRS Client

The ESRS Gateway Client is the remote support solution application that is installed on a customer-supplied dedicated server, or servers, as follows:

> **Gateway Client(s) —** This ESRS software component is installed on a customer-supplied dedicated server or VMware instance. It can also be installed on multiple servers (two or more servers are preferred for high availability). The servers act as the single point of entry and exit for all IP-based remote support activities and most EMC callhome notifications.
>
> **Embedded ESRS Device clients —** This ESRS software component is integrated on some EMC Products and utilizes the same technology as the ESRS Gateway Client. If the Embedded ESRS Device Client is utilized, the device is not managed by the ESRS Gateway Client. The Embedded ESRS Device Client can also use the same or a different Policy Manager as an ESRS Gateway Client, and it enforces the policy and audits just like an ESRS Gateway Client, but only on that specific device.

The ESRS Clients function as communications brokers between the managed devices, the Policy Manager, and the EMC Enterprise. All communication with EMC initiates from the ESRS Client on port 443 or 8443 outbound. The ESRS Clients are HTTP handlers. All messages are encoded using standard XML and SOAP application protocols. ESRS Client message types include:

- Device state heartbeat polling
- Data file transfer (connect homes)
- User authentication requests
- Device management synchronization

Each ESRS Client acts as a proxy, carrying information to and from managed devices. ESRS Clients can also queue session requests in the event of a temporary local network failure.

The ESRS Clients do not have their own user interface, and are run as Windows services. All ESRS Client actions are logged to a local runtime file.

Policy Manager

(Optional: Required for Access Control and Auditing) The Policy Manager enables you to set permissions for devices being managed by the ESRS Clients. The ESRS Client polls the Policy Manager, receives the current policies, and caches them locally. During the periodic poll, the ESRS Client posts all requests and actions that have occurred. These are written to the Policy Manager database and the Policy Manager audit log files. When the ESRS Client retrieves a remote access request from the EMC Enterprise, the access is controlled by the ESRS Client, which enforces the policy set by the Policy Manager.

The Policy Manager software may be on a standalone server (preferred method), on another application server (for example, a Navisphere Management Station), or co-located on a non-high-availability Gateway Client server (recommended for test purposes only).

Proxy server

Network traffic can be configured to route from the ESRS Clients through proxy servers to the Internet. Such configurations include support for auto-configuration, HTTP, and SOCKS proxy standards with or without proxy server authentication.

Application installation

A Provisioning Tool is provided on a CD or can be downloaded from the EMC Online Support Site (support.emc.com). The tool is used to initiate the installation process and download the most recent versions of the ESRS Client application from EMC.

Deployment and configuration

ESRS provides a Configuration Tool that is used after software installation for various activities including:

- Viewing connectivity status between the ESRS Client and EMC
- Viewing connectivity status between the ESRS Client and Policy Manager
- Viewing connectivity status between the ESRS Client and Managed Devices
- Initiating device deployment requests
- Initiating device removal requests
- Processing managed device update requests
- View history of Deployment/UnDeployment or edit requests of devices
- Configuring or changing the ESRS Client for use with a Proxy Server

- Configuring communication between the Policy Manager and the ESRS Client
- Configuring or changing the ESRS Client for Proxy Server for the Policy Manager (if needed)
- Viewing status of Watchdog, ESRS Gateway Client, Listener Services, and SRS Gateway Proxy Services
- View only of active Remote Access Connection thru the ESRS Gateway Client
- View ESRS Gateway Client Configuration Tool (CT) logs

Note: The Windows version uses a Graphical User Interface (GUI), the Linux version is command line only.

Security enhancements

ESRS provides the enhanced security practices and encryption technologies, including:

- Certificate protected by RSA Lockbox Technology
- Advanced Encryption Standard (AES), SHA-1, 256-bit encryption between the Gateway Client and EMC
- Bilateral certificate authentication for all communication between the Client and EMC
- Configurable security between ESRS components

Requirements

Table 1 on page 10 shows the ESRS Gateway and Policy Manager server hardware and operating system requirements.

Table 1 ESRS Gateway and Policy Manager server requirements (page 1 of 2)

Type	Requirements	EMC provided software	Notes
Gateway Client server	**Processor** — One or more processors, each 2.1 GHz or better. **Free Memory** — Minimum 1 GB of RAM, preferred 2 GB RAM.(If the Gateway Client and Policy Manager are on the same server, the minimum RAM is 3 GB.) **Network Interface Cards (NIC)** — Two 10/100 Ethernet adapters (NIC cards) are recommended (1 GB preferred). You may choose to use a third NIC card for data backups. **Free Disk Space** — Minimum 1 GB available for installation. (A 40 GB or larger storage device is recommended.) **Microsoft .NET Framework** Version 2.0 with SP1 (minimum) or Microsoft .NET Framework 3.5 is required. NOTE: Microsoft .NET Framework 4.0 is not compatible at this time. **Microsoft Visual C++ 2005 SP1 Runtime Library** **Operating Systems** — any of the following (U.S. English only): • Windows Server 2003 R1, 32-bit or 64-bit, SP1, SP2 or SP3 • Windows Server 2003 R2, 32-bit or 64-bit, SP1, SP2 or SP3 • Windows Server 2008 R1, 6.0, 32-bit or 64-bit, IIS 7.0, SP1 or SP2 (IIS 6 Compatibility) • Windows Server 2008 R1, 6.0, 32-bit or 64-bit, IIS 7.0, SP1 or SP2 w/ IIS 7.5 FTP Add-in • Windows Server 2008 R1 Enterprise, 6.0, 32-bit or 64-bit, IIS 7.0, SP1 or SP2 (IIS 6 Compatibility) • Windows Server 2008 R1 Datacenter, 6.0, 32-bit or 64-bit, IIS 7.0, SP1 or SP2 (IIS 6 Compatibility) • Windows Server 2008 R2, 6.1, 64-bit only, IIS 7.0/7.5, SP1 or SP2 • Windows Server 2008 R2 Enterprise 64-bit IIS 7.0/7.5, SP1 or SP2 • Windows Server 2008 R2 Datacenter 64-bit IIS 7.0/7.5, SP1 or SP2 • Windows Server 2012 R1 Foundation 64-bit IIS 8.0 • Windows Server 2012 R1 Standard 64-bit IIS 8.0 • Supported French OS (Windows 2008 R1 and R2), IIS requirements as above, with English language pack • Supported Japanese OS (Windows 2008 R1 and R2), IIS requirements as above, with English language pack • Red Hat Enterprise Linux 6.2 (32-bit) • CentOS release 6.4, 32-bit • Hyper-V and VMware ESX 2.5.x or above running these operating systems: – Windows Server 2008 Standard 32-bit – Windows Server 2008 Enterprise 32-bit – Windows Server 2008 Datacenter 32-bit – Windows Server 2008 R2 Standard 64-bit – Windows Server 2008 R2 Enterprise 64-bit – Windows Server 2008 R2 Datacenter 64-bit – Red Hat Enterprise Linux 6.2 (32-bit) – CentOS release 6.4, 32-bit	Gateway Client	The Gateway Client requires a site-supplied dedicated server. Two or more servers are required for a High Availability configuration. One Gateway Client server can support up to 250 devices. **Note:** Support for ESRS Gateway on Windows Server 2003 will be deprecated in the near future. **Note:** Windows Server 2012 must be GUI mode to install the ESRS Gateway. **Note:** Linux Gateways are command line only. No GUI.

Table 1 ESRS Gateway and Policy Manager server requirements (page 2 of 2)

Type	Requirements	EMC provided software	Notes
Policy Manager server (optional)	**Processor** — One or more processors, each 2.1 GHz or better. **Free memory** — Minimum 2 GB of RAM. (If the Gateway Client and Policy Manager are on the same server, the minimum RAM is 3 GB.) **Network Interface Cards (NIC)** — Two 10/100 Ethernet adapters (NIC cards) are recommended (1 GB preferred). You may choose to use a third NIC card for data backups. **Free Disk Space** — Minimum 2 GB available (preferably on a storage device of 80GB or larger) **Microsoft .NET Framework** Version 2.0 with SP1 (minimum) or Microsoft .NET Framework 3.5 is required if you are using the Customer Environment Check Tool (CECT) to validate that the PM server is setup correctly to install the PM software. NOTE: Microsoft.NET Framework 4.0 is not compatible at this time. **Operating Systems** — any of the following (U.S. English only): • Windows XP, SP2 or later • Windows Vista • Windows 7 • Windows 8 • Windows Server 2003 R1, 32-bit or 64-bit, SP1, SP2 or SP3 • Windows Server 2003 R2, 32-bit or 64-bit, SP1, SP2 or SP3 • Windows Server 2008 R1, 6.0, 32-bit or 64-bit, SP1 or SP2 • Windows Server 2008 R1, 6.0, 32-bit or 64-bit, SP1 or SP2 • Windows Server 2008 R2, 6.1, 64-bit only, SP1 or SP2 • Supported Japanese OS (Windows 2008 R1 and R2) with English language pack • Windows Server 2012 R1 Foundation 64-bit IIS 8.0 • Windows Server 2012 R1 Standard 64-bit IIS 8.0 • Redhat 6.4 (32-bit and 64-bit) • CentOS 6.4 (32-bit and 64-bit) • SUSE Linux Enterprise 11 SP2 (64-bit)	Policy Manager	A Policy Manager is optional, but highly recommended. Policy Manager requires a site-supplied server. Policy Manager supports up to three Gateway Client servers or pairs. One Policy Manager server can support up to 750 devices. **Note:** Support for Policy Manager on Windows XP and Windows Server 2003 will be deprecated in the near future due to declaration of End of Life/End of Service Life by Microsoft.
Managed devices	**EMC information infrastructure products** — You must provide required networking (or VLAN) from the managed devices to the ESRS Client servers. Refer to *EMC Secure Remote Support Site Planning Guide.*		

Note: For additional information about Policy Manager requirements, refer to the *EMC Secure Remote Support Policy Manager Operations Guide.*

Communication to EMC

All communication between the customer’s site and EMC is initiated outbound from the customer’s site by the ESRS Clients. Using industry standard Secure Sockets Layer (SSL) encryption over the Internet and EMC-signed digital certificate authentication, the ESRS Client creates a secure communication tunnel.

ESRS Clients use industry-accepted bilateral authentication for the EMC servers and the ESRS Clients. Each ESRS Client has a unique digital certificate, which is generated and installed during the ESRS Client installation and activation, and is verified by EMC whenever an ESRS Client makes a connection attempt. The ESRS Client then verifies EMC's server certificate. Only when the mutual SSL authentication passes does the ESRS Client transmit messages to EMC, securing the connection against spoofing and man-in-the-middle attacks.

The ESRS Clients use the SSL tunnel to EMC to perform the following functions:

- Heartbeat polling
- Remote notification
- Remote access

Each function relies on the SSL tunnel. However, communication processes and protocols within the tunnel vary by function. Each function is described in the following sections.

Heartbeat polling

Heartbeat polling is described in the following sections:

- Heartbeat to EMC by the ESRS Client
- Heartbeat to EMC devices managed by the ESRS Client

Heartbeat to EMC by the ESRS Client

The Heartbeat is a regular communication, at a default interval of 30 seconds, from the ESRS Clients to the EMC Enterprise. Each heartbeat contains a small amount of data that identifies the ESRS Client and provides the EMC Support Center with status information on the health of the EMC storage devices and the ESRS Client.

Note: This is a non-persistent connection and is established for each heartbeat to EMC.

EMC servers receive the data in XML format and acknowledge the receipt of data using SOAP (Simple Object Access Protocol) commands. The ESRS Client terminates the connection once it receives the acknowledgement response.

Figure 2 on page 13 provides an illustration of the heartbeat communication paths.

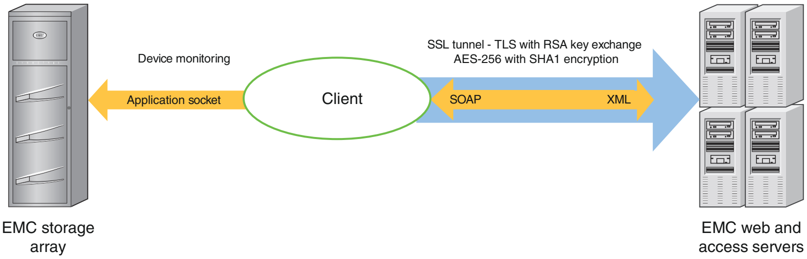

Device monitoring
Application socket
Client
SSL tunnel - TLS with RSA key exchange
AES-256 with SHA1 encryption
SOAP
XML
EMC storage array
EMC web and access servers

Figure 2 **Heartbeat communication**

Heartbeat to EMC devices managed by the ESRS Client

Once every 60 minutes the ESRS Client determines if each managed device is available for service. It does this by making a socket connection to the device on one or more of the primary support application ports and verifying that the service application(s) are responding. The information is recorded by the ESRS Client. If a change in status is detected, the ESRS Client notifies EMC over the next heartbeat.

The heartbeat is a continuous service. EMC monitors the values sent and may automatically trigger service requests if an ESRS Client fails to send heartbeats or if the values contained in a heartbeat exceed certain limits.

Remote notification (Connect Home)

The ESRS Client serves as a conduit for EMC products to send remote notification event files to EMC. EMC hardware platforms use remote notification for several purposes. Errors, warning conditions, health reports, configuration data, and script execution statuses may be sent to EMC. Figure 3 on page 14 provides an illustration of the remote notification communication paths.

When an alert condition occurs, the storage system generates an event message file and passes it to the ConnectEMC service on the device to format the file and request a transfer to EMC. ConnectEMC uploads the file to the ESRS Client, where it is received by one of the following local listener services on the ESRS Client:

- HTTPS, if a device is qualified to send files using HTTPS
- Passive FTP

When an event file is received, the ESRS Client compresses the file, opens the SSL tunnel to the EMC Enterprise, and posts the data file to EMC and deletes the file(s) from the Gateway listener directory. At EMC, the file is decompressed and forwarded to the Customer Relationship Management (CRM) systems.

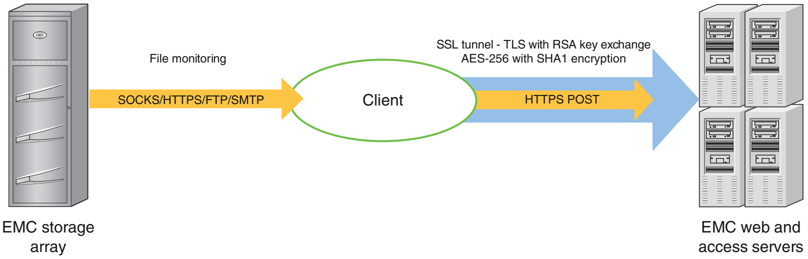

File monitoring
SOCKS/HTTPS/FTP/SMTP
Client
SSL tunnel - TLS with RSA key exchange
AES-256 with SHA1 encryption
HTTPS POST
EMC storage array
EMC web and access servers

Figure 3 Remote notification communication

Remote access

To establish an EMC Global Services remote access session, ESRS uses asynchronous messaging to ensure that all communication is initiated from the customer’s site.

After being properly authenticated at EMC, an EMC Global Services professional makes a request to access a managed device. The remote access session request includes a unique identifier for the user, the serial number of the managed device, the name of the remote application to be run on the managed device, and the service request number if available. The remote access request is queued at EMC until an ESRS Gateway that manages the device in question sends a heartbeat to EMC and retrieves the work request.

In response to the Heartbeat XML message, the EMC Enterprise sends a special status in the SOAP response. This response contains the request information as well as the address of the Global Access Server and a unique session ID that the ESRS Client would use to connect. The ESRS Client uses its local repository to determine the local IP address of the managed device. It then checks with the Policy Manager to see if the connection is permitted. If the connection is permitted, the ESRS Client establishes a separate persistent SSL connection to the Global Access Server for the specific remote access session.

This secure session enables IP traffic from the EMC Global Services professional to be routed through the ESRS Client to the managed device. IP socket traffic received by the Global Access Server for this session is established, wrapped in a message, and sent to the ESRS Client. The ESRS Client unwraps the SOAP object and forwards the traffic to the IP address and port of the end device for which the session was established. SOAP communication flows between the ESRS Client and the Global Access Server through this tunnel until it is terminated or times out after a period of inactivity. Figure 4 on page 15 provides an illustration of the remote access communication paths.

As the result of an application remote access session request, the ESRS Client forwards traffic to the specific ports at the IP address that is associated with the registered serial number of the device at time of deployment.

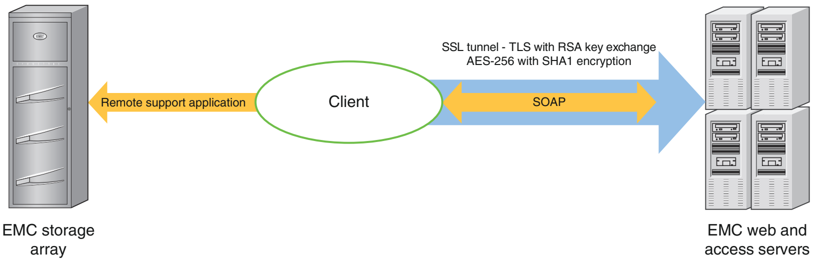

SSL tunnel - TLS with RSA key exchange
AES-256 with SHA1 encryption
Remote support application
Client
SOAP
EMC storage array
EMC web and access servers

Figure 4 Remote access communication

Table 2 on page 15 shows the products that use the remote notification and remote access features of ESRS.

Table 2 Product use of ESRS (page 1 of 2)

Product	Remote notification to EMC through ESRS	EMC remote access to device through ESRS
EMC Atmos®	Yes	Yes
EMC Avamar®	Yes	Yes
EMC Celerra®	Yes	Yes
EMC Centera®	Device does not send Connect Homes through the ESRS Client	Yes
EMC CLARiiON®	Yes	Yes

Table 2 **Product use of ESRS (page 2 of 2)**

Product	Remote notification to EMC through ESRS	EMC remote access to device through ESRS
EMC Connectrix®	Yes	Yes
Customer Management Station	Device does not send Connect Homes through the ESRS Client	Yes
EMC Data Domain®	Device does not send Connect Homes through the ESRS Client	Yes
EMC DL3D	Device does not send Connect Homes through the ESRS Client	Yes
EMC DLm	Yes	Yes
EMC EDL	Yes	Yes
EMC Greenplum® Data Computing Appliance (DCA)	Yes	Yes
EMC Invista®	Yes	Yes
EMC Isilon®	Yes	Yes
EMC RecoverPoint	Yes	Yes
Switch-Brocade-B	Yes[a]	Yes
Switch-Cisco	Yes[b]	Yes
EMC Symmetrix®	Yes	Yes
EMC ViPR®	Yes	Yes
EMC VMAX® Cloud Edition (CE)	Yes	Yes
EMC VNX®	Yes	Yes
EMC VNXe®	Yes	Yes
EMC VPLEX®	Yes	Yes
EMC XtremIO®	Yes	Yes

[a] By Connectrix Manager, Connectrix Manager Data Center Edition, or Connectrix Manager Converged Network Edition.

[b] By Fabric Manager or Cisco Data Center Network Manager .

Configuration

This section provides details on the configurations of ESRS.

Server Client configuration

ESRS Client servers can be implemented in one of several configurations to meet your network and security requirements. See Figure 1 on page 6 for a sample configuration.

EMC recommends that the operating systems of your ESRS Client and Policy Manager servers be hardened before installing the ESRS Client and Policy Manager software. The preparation and hardening of servers is your responsibility.

There are no technical restrictions on the network location of the Gateway Client server. It must connect to your devices, to Policy Manager, and to the EMC Enterprise. EMC strongly recommends that you use a firewall to block network ports not required by ESRS.

Virtual Environments (VMware and Hyper-V)

ESRS is qualified to run on a virtual machines. VMware/Hyper-V support enables customers to leverage their existing virtual infrastructure to benefit from the security features of ESRS without adding hardware.

Note: VMware VMotion functionality also enables the Policy Manager, when installed in a virtual machine, to be moved from one physical server to another with no impact to remote support.

Note: The ESRS Client cannot be moved with VMware VMotion due to RSA Lockbox restrictions.

The absolute minimum requirements for VMware/Hyper-V support are as follows:

- VMware ESX 2.5.2 or later
- 15 GB partition
- 2.2 GHz virtual CPU

- 512 MB memory allocated minimum (1 GB recommended, 2-3 GB preferred
- SMB modules optional

Note: EMC Strongly recommends that virtual machines (VMware and Hyper-V) meet or exceed the same "hardware" and OS requirements as physical hardware to help assure there is no performance impact.

Note: Care should be taken to NOT over provision the underlying infrastructure of the virtual environment as this may result in significant performance impact to the ESRS solution.

If you want to run ESRS on a VMware/ Hyper-V virtual machine:

- When running Peered HA Gateway Client servers on VMWare/Hyper-V, each client must be located on different physical hardware.
- Do not place VMware/Hyper-V images or storage files on EMC devices managed by ESRS.
- Installation, configuration and maintenance of the VMWare/Hyper-V instance and operating System(s) are the customer's responsibility.

Note: Care should be taken to NOT severely over provision the underlying infrastructure of the virtual environment as this may result in significant performance impact to the ESRS solution.

High Availability Gateway Cluster configuration

To enable maximum remote access availability, EMC recommends deployment of a High Availability Gateway Cluster server configuration to eliminate single point of failure. A Gateway Cluster refers to the relationship created on the EMC ESRS Enterprise between two or more Gateway Clients.

Gateway Client servers, in a High Availability configuration, are active peers. Each server in the cluster manages the same set of devices without awareness of, or contention with, the other cluster Gateway Clients in the cluster(s). There is no direct communication between the Gateway Clients within the cluster.

In the High Availability configuration, the Policy Manager software cannot be co-located on a Gateway Client server. It must be installed on a separate server.

Synchronization of Gateway Client clusters

Gateway Client server device management is synchronized by the EMC Enterprise servers during polling cycles so that changes to the configuration on one Gateway Client in the cluster are automatically propagated to the other(s). When there is an addition, removal, or edit of a device on the managed devices list for any Gateway Client in a High Availability Gateway Cluster configuration, the EMC Enterprise sends a synchronization message to all clustered Gateway clients.

When the other Gateway Client(s) in the cluster receives the device management transaction information, it updates its list of managed devices. If that Gateway Client is not currently available during a synchronization attempt, the EMC Enterprise queues the transaction. Synchronization of the Gateway Cluster occurs upon the next successful poll message received from the previously unavailable Gateway Client.

Installing a High Availability Gateway Cluster

To implement a High Availability Gateway Cluster configuration, your EMC Global Services professional will create the cluster relationship from within the EMC Enterprise.

When a cluster is created, a cluster name must be assigned. The default name is the organization name followed by the words “HA Gateways.” Other names can be assigned, but no two clusters can have the same name.

The High Availability Gateway Cluster will take on the devices managed by the *first* Gateway Client enrolled into the cluster. When additional Gateway Clients are added to the cluster, they will begin managing the cluster’s devices.

Note: The first Gateway Client used to create a High Availability Gateway Cluster may have managed devices. Any additional Gateway Clients enrolled in a High Availability Gateway Cluster must not be managing devices at the time of enrollment. An error message will result if the additional Gateway Clients are managing devices. The managed devices must be unmanaged from the Gateway before the Gateway can be (re)deployed.

Configuration Tool

The Configuration Tool in the Windows version of the ESRS Client-provides a Windows GUI application that is used to perform the following tasks:

- Configure and manage the ESRS Clients and connectivity to the Policy Manager
- Identify EMC storage devices and switches to be managed by the ESRS Client.

Note: The term *manage* means that a device is monitored and can use the ESRS Client to establish remote access connections. Connect home capability through the Gateway Client is configured at the device and should be in place (if applicable) before the Configuration Tool is used to make device deployment requests. Failure to do so may result in missed callhomes unless and alternate method is used for callhome.

The following list describes the configuration menu items available through tabs in the Configuration Tool. Note that these pages do refresh dynamically every 30 minutes —you must manually refresh the page for more frequent updates:

- Status tab — Displays status information about the connection between the ESRS Client and EMC, including connectivity status, proxy server enabled; Policy Manager enablement, connectivity status, and type; and other application statuses.
- Managed Devices tab — Enables viewing of managed devices. Enables entry of requests to add new devices, make changes to managed devices, and remove currently managed devices.

  Note: Customers may use the Configuration Tool to make requests to add, edit, or remove a device. However, approval within the EMC Enterprise by an EMC Global Services professional is required before these changes will take place. Please ensure that the appropriate communication occurs with your EMC representative.

- Proxy Servers tab — Provides the ability to enable or disable a proxy between an ESRS Client and the EMC Enterprise. *You should only change these values if requested by EMC support personnel or if changes are made in your environment (change of any of the following: Proxy server name or address, port, type, user name or password).*

- Policy Manager tab — Provides the ability to enable or disable communication between a Policy Manager and an ESRS Client, and configure Proxy Server for Policy Manager use.
- Services tab — Displays the state (running or disabled) and the startup type (automatic or manual) of the following services related to ESRS and Connect Homes:
  - IIS
  - FTP
  - SMTP
  - HTTP
  - Gateway
  - Watchdog
  - SRS Gateway Proxy Service
- Remote Sessions tab — Displays all active remote sessions through the ESRS Client and managed devices.
- Log tab — Displays the log file for the Configuration Tool activity.

Devices managed on an ESRS Gateway Client will automatically be deployed to all other Gateway Clients in a Cluster. Event notifications are handled by the configuration of the end device and will use the ESRS Client for which it is configured, if a problem occurs with that Client, the end device fails over the notification to an alternate ESRS Client in the High Availability Gateway Cluster configured on the device. Remote access session management is handled by the Gateway Client whose heartbeat first retrieves the access request.

Device management

The Configuration Tool enables you to request the addition of, the removal of, or to edit the IP address of a managed device.

Adding a device

To add a device, you must enter the following data in the Managed Devices tab of the Configuration Tool:

- Serial number
- Model (product type)
- IP address

After you enter a device management request, it must be approved by an authorized EMC Global Services professional using the EMC Enterprise tool.

Note: EMC Global Services personnel must verify with your network administrators that the IP address of the managed device is accessible from the ESRS Client. If Network Address Translation (NAT) is being used in the environment, the IP address used to deploy the device must be the NAT IP address, not the device's physical IP address. Let's say, for example, that the local IP address of a device is 192.168.0.100, and is only on your internal network. To continue the example, let's say that you are using NAT (or a NAT device) that maps the device IP (192.168.0.100) to IP 10.10.44.22 so that the device can be reached from within your DMZ. In this case, EMC must use the IP address of 10.10.44.22 to reach the device, and in the Configuration Tool the IP address field must be changed to 10.10.44.22.

Note: Port Address Translation (PAT) is NOT supported.

Once the device deployment has been approved by the EMC Enterprise and the synchronization process is complete, the Configuration Tool adds the matched device to the current managed device list and makes the device available for remote access. If the serial number or Party ID for a newly integrated device does not match the EMC Global Services registered device lists for your site, EMC Support personnel must resolve the issue to permit deployment.

Changing a device's IP address

You can use the Configuration Tool to request a change to a device's IP address. Your request will be sent to the EMC Enterprise for approval by an authorized EMC Global Services professional and will not take effect for the ESRS Client until approved and the ESRS Client(s) syncs with the EMC Enterprise. This may effect the ability to connect to the end device.

Unmanaging a device

If you want to unmanage a device, you can use the Configuration Tool to request the device's removal from the list of managed devices. Your request will be sent to the EMC Enterprise for approval by an EMC Global Services professional. When approved, the serial number of the device will be disassociated from your ESRS Client and removed from the Configuration on the ESRS Client and will no longer be displayed in the Configuration Tool.

Gateway Extract Utility

To configure a device for management by a ESRS Client, the EMC Global Services professional on site must know the following for each managed device:

- Serial number
- Product type
- IP address that the ESRS Client can use to communicate with the device

The Gateway Extract Utility (**GWExt**), when run on the EMC device, can be used to automate the collection of this information and transport it to the ESRS Client. EMC supplies the **GWExt** utility with the ESRS Client installer.

Your EMC Global Services professional copies the **GWExt** utility from the ESRS Client server to the managed device.

The **GWExt** utility may request the ESRS Client server IP address. The GWExt extracts the serial number and local IP address and device type from the device, creates a configuration file, and transfers the file to the ESRS Client through HTTPS by default. The ESRS Client then uploads the file to the EMC Enterprise to await approval.

Certain products qualified for ESRS have a **GWExt** information file installed at time of production. This information file contains product information that the **GWExt** utility gathers and submits to the ESRS Client for device registration, automating a large portion of the process.

Note: The Gateway Extract Utility (GWExt) utility cannot be executed/used on the following devices when deploying to a Gateway: Centera, RecoverPoint, InvistaCPC, Clariion SP, VNX Block SP, or directly on switches.

Security features

This section details the security features of ESRS.

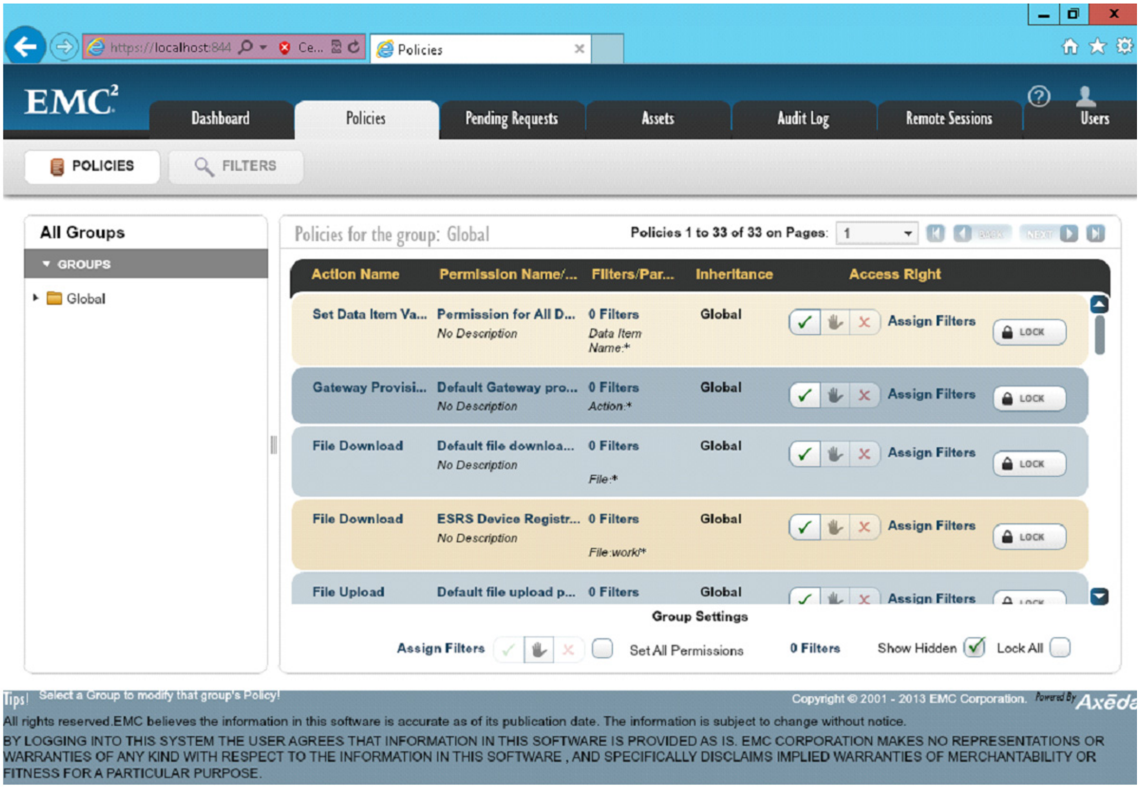
Policy Manager

Using the Policy Manager, you control the authorization requirements for remote access connections, diagnostic script executions, and other ESRS Client-related activities, as shown in Figure 5 on page 25. The Policy Manager enables you to set access permissions for devices being managed by the ESRS Clients. The ESRS Client regularly polls Policy Manager for changes to the permissions and caches the permissions locally on the ESRS Client. All requests and actions are recorded in the Policy Manager database and local audit log files. When a request for remote access or any other action arrives at the ESRS Client enforces the policy received from the Policy Manager even if the Policy Manager is unavailable.

Policy Manager permissions can be assigned in a hierarchical system, establishing policies based on model and product groups. If required, you can override group-level permissions down to the individual device level.

The Policy Manager provides three options for permissions for every action that the ESRS Client can perform on a device or group of devices:

- Always Allow — You always allow the action.
- Ask for Approval — You must approve the request by providing authorization. (Emails are sent *only* for Remote Access Requests.)
- Never Allow — You always deny the action.



Policies for the group: Global

Policies 1 to 33 of 33 on Pages: 1

Action Name	Permission Name/...	Filters/Par...	Inheritance	Access Right
Set Data Item Va...	Permission for All D... *No Description*	0 Filters *Data Item Name:**	Global	✓ ✋ ✗ Assign Filters LOCK
Gateway Provisi...	Default Gateway pro... *No Description*	0 Filters *Action:**	Global	✓ ✋ ✗ Assign Filters LOCK
File Download	Default file downloa... *No Description*	0 Filters *File:**	Global	✓ ✋ ✗ Assign Filters LOCK
File Download	ESRS Device Registr... *No Description*	0 Filters *File:work/**	Global	✓ ✋ ✗ Assign Filters LOCK
File Upload	Default file upload p...	0 Filters	Global	✓ ✋ ✗ Assign Filters LOCK

Group Settings

Assign Filters ✓ ✋ ✗ □ Set All Permissions 0 Filters Show Hidden ☑ Lock All □

Tips! Select a Group to modify that group's Policy!

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Figure 5 **Policy Management settings**

When you set an authorization rule to Ask for Approval, the Policy Manager sends an e-mail message to your designated address upon each action request, per transaction. This e-mail message contains the action request itself and the user ID of the EMC Global Services representative.

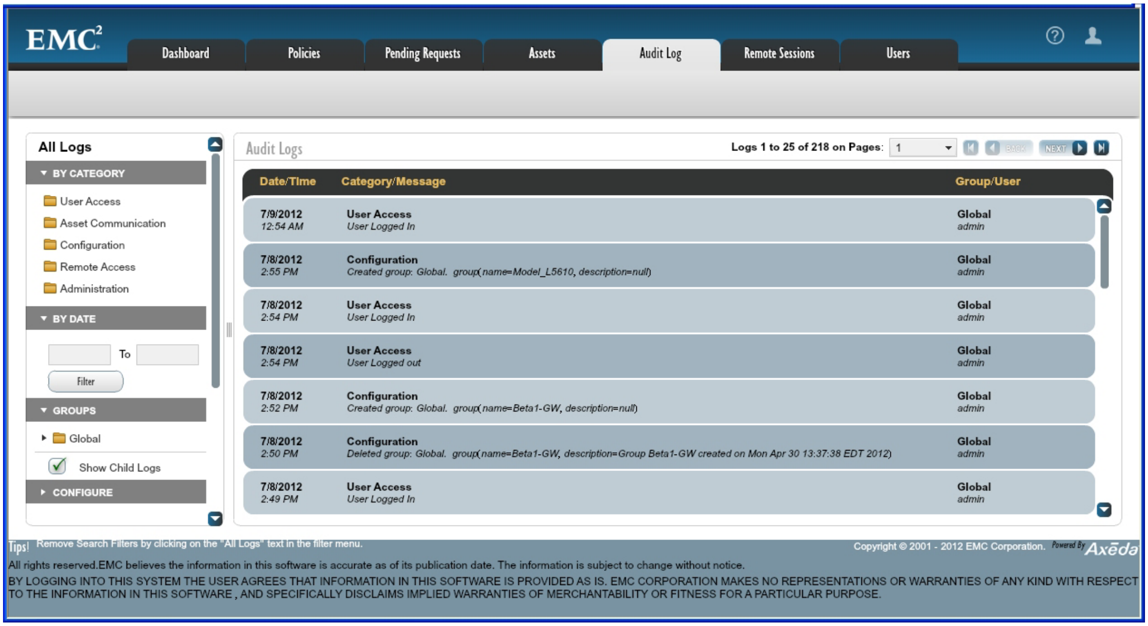
The e-mail message requests your permission to perform the action. You use the Policy Manager interface to accept or deny the requested action. You also have the option of creating filters to set further restrictions on authorization and actions.

As with ESRS Client and EMC Enterprise communication behavior, the Policy Manager only responds to requests from the ESRS Client. Since the ESRS Client caches the Policy Manager's permission rules at startup, the ESRS Client must poll the Policy Manager for configuration updates. In this way, the ESRS Client captures any change to the Policy Manager rule set after its last polling cycle. Like the ESRS Client, the Policy Manager is an HTTP listener, which must be configured to receive messages on an agreed-upon port. The default port is 8090, but if necessary, you can specify a different port during your Policy Manager installation. For HTTPS access to the Policy Manager, you must use port 8443 and cannot change it.

The Policy Manager uses the Apache Tomcat engine and a 100 percent compliant local JDBC relational database to provide a secure web-based user interface for permission management.

Logging

The Policy Manager records all remote support events, remote access connections, diagnostic script executions, and support file transfer operations are stored in the Policy Manager database and flat text audit log files. The Policy Manager also audits access to the Policy Manager, policy changes, all authorization or denial of access activity. The audits are viewed through the Policy Manager interface and cannot be edited. The audits are also streamed to local flat text files which can be read w/ any text editor and are not tamper proof. Audit logs can also be configured to stream to a syslog server in your environment. See Figure 6 on page 27 for a Policy Manager interface example.



Date/Time	Category/Message	Group/User
7/9/2012 12:54 AM	User Access User Logged In	Global admin
7/8/2012 2:55 PM	Configuration Created group: Global. group(name=Model_L5610, description=null)	Global admin
7/8/2012 2:54 PM	User Access User Logged In	Global admin
7/8/2012 2:54 PM	User Access User Logged out	Global admin
7/8/2012 2:52 PM	Configuration Created group: Global. group(name=Beta1-GW, description=null)	Global admin
7/8/2012 2:50 PM	Configuration Deleted group: Global. group(name=Beta1-GW, description=Group Beta1-GW created on Mon Apr 30 13:37:38 EDT 2012)	Global admin
7/8/2012 2:49 PM	User Access User Logged In	Global admin

Tips! Remove Search Filters by clicking on the "All Logs" text in the filter menu.

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Figure 6 Audit log example

Device control

ESRS Enterprise proactively monitors and notifies EMC Global Services if the ESRS Client or any managed device fails to regularly communicate back to EMC. EMC alerts you of potential failures or issues that may affect EMC's ability to provide timely support. As an EMC customer, you have complete control over which devices are managed by your ESRS Gateway Client system. You can phase them in by product line, network location, or any other criteria you desire. EMC provides applications and tools to assist you the addition of new devices for management by the ESRS Gateway Client. All device management operations are logged and must be Approved on the EMC enterprise by authorized EMC Global Services professionals.

Digital Certificate Management

During the ESRS Client installation, digital certificates are installed on the ESRS Client. This procedure can only be performed by EMC Global Services professionals using EMC-issued RSA SecurID Authenticators. All certificate usage is protected by unique password encryption. Any message received by the ESRS Client, whether pre- or post-registration, requires entity-validation authentication.

Digital Certificate Management automates ESRS Client digital certificate enrollment by taking advantage of EMC's existing network authentication systems, which use the RSA SecurID Authenticator and the EMC’s private certificate authority (CA). Working with EMC systems and data sources, Digital Certificate Management aids in programmatically generating and authenticating each certificate request, as well as issuing and installing each certificate on the ESRS Client.

The ESRS Digital Certificate provides proof-of-identity for your ESRS Client. This digital document binds the identity of the ESRS Client to a key pair that is used to encrypt and authenticate communication back to EMC. Because of its role in creating these certificates, the EMC Certificate Authority is the central repository for the EMC Secure Remote Support ESRS key infrastructure.

Before the certificate authority issues a certificate for the ESRS Client, it requires full authentication of a certificate requester by verifying that the EMC Global Services professional making the request is Properly authenticated using the EMC RSA SecurID, and belongs to an EMC Global Services group that is permitted to request a certificate for the customer site. The certificate authority then verifies that the information contained in the certificate request is accurate generates the Certificate and returns the certificate to the requestor. The process is as follows:

The EMC Global Services professional requests a certificate by first authenticating himself or herself using an EMC-issued RSA SecurID Authenticator. Once authentication is complete, the ESRS Client installation program gathers all the information required for requesting certificates and generates a certificate request, a private key, and a random password for the private key. The ESRS Client installation program then writes the certificate request information to a request file, ensuring accuracy and completeness of the information.

The installation program then submits the request over an SSL tunnel. After the certificate is issued and returned over the SSL tunnel the installation program automatically installs the certificate on the ESRS Client.

Note: Due to EMC's use of RSA Lockbox technology, a certificate cannot be copied and used on another machine.

Device access control

ESRS achieves remote application access to a process running on an EMC storage device by using a strict IP and application port-mapping process. You have complete control over which ports and IP addresses are opened on your internal firewall to allow connectivity. The remote access session connection is initiated by an EMC Global Services Professional request that results in a session being staged on a EMC Global Access Server. After the ESRS Client and Policy Manager evaluate the request the session is established through a pull connection by the ESRS Client. EMC never initiates (pushes) a connection to your ESRS Client or network. Your policies determine if and how a connection is established.

Device configuration access control

Your policies determine if and how a connection is established. Once your devices are configured for ESRS management, you must ensure that the configuration of the managed devices are carefully controlled and monitored. For example, changing the configured IP address of the ESRS Gateway Client will disables the storage device connect home capabilities; or changing the IP address of the storage device disables EMC's ability to perform remote service on that device. After changes to the Gateway or devices configuration are made these changes MUST be reconfigured on the other affected portions of the Solution. Each device modification is tracked in the Policy Manager and the EMC enterprise audit logs.

EMC Enterprise access control

Several robust security features are incorporated into the EMC enterprise. To access the ESRS Enterprise Solution, EMC Global Services professionals or authorized service providers must log in using RSA SecurID two-factor authentication technology. Only authorized EMC personnel or authorized service providers can access the EMC's ESRS Enterprise Solution.

Supported products

The products supported by ESRS are listed in Table 3 on page 30.

Table 3 **Product and application releases supported by ESRS Clients (page 1 of 2)**

Product	Environment/application releases	Minimum ESRS Client Code Supported
Atmos	Atmos 1.4 or later	2.06
Avamar	Avamar 6.0 or later	2.06
Celerra	NAS Code 5.4 or later	2.02
Centera	CentraStar® 2.4 or later [b]	2.02
CLARiiON CX, CX3, CX4, and AX4-5 Series storage systems (distributed or Enterprise environments)	EMC FLARE® Operating Environment 2.19 or later EMC Navisphere® Manager 6.19 or later The AX-100/AX-150 are not supported as they do not support the required CLARalert. **Note:** AX4-5 series are supported only if the Navisphere Full license (with CLARalert) is purchased and installed on the storage system.	2.02
Connectrix Manager (CM) managing Connectrix M-series switches	Connectrix Manager 7.x with DialEMC 2.2.10, or Connectrix Manager 8.x or later with ConnectEMC 1.x	2.02
Connectrix Manager (CM) managing Connectrix M-series and B-series switches	Connectrix Manager 9.6.2 or later with ConnectEMC 1.x [e]	2.02
Connectrix Manager Data Center Edition (CMDCE) managing Connectrix M-series and B-series switches	Connectrix Manager Data Center Edition 10.1.1 or later with ConnectEMC 4.0.2 [f]	2.02
Connectrix Manager Converged Network Edition (CMCNE) managing Connectrix M-series and B-series switches	Connectrix Manager Converged Network Edition 11.1.1 or later with ConnectEMC 5.0.2.8 or later	2.02
Data Domain	DD OS version 4.8 or higher	2.14
Disk Library for mainframe (DLm), Gen2	DLm 4020, DLm 4080, release 1.2 and later	2.02
Disk Library for mainframe (DLm), Gen3	DLm 8000 3.4.0 & 3.4.1	2.18
	DLm 6000 All releases	2.16
	Dlm 2000 All releases	2.12
	Dlm 1000 3.5	2.22
Disk Library for mainframe (DLm), Gen4	DLm® 8100, 2100V, and 2100D	2.24
EMC Disk Library (EDL)	• DL-5100 and 5200 series • DL-4000 series—DL-4100, DL-4106, DL-4200, DL-4206, DL-4400A/B, DL-4406A/B • DL-700 Series—DL-710, DL-720, DL-740 • DL-310 • DL3D 1500, 3000, 4000—Release 1.01 and later	2.02

Table 3 **Product and application releases supported by ESRS Clients (page 2 of 2)**

Product	Environment/application releases	Minimum ESRS Client Code Supported
Greenplum Data Computing Appliance (DCA)	Greenplum 4.0	2.12
Invista	Invista 2.2 or later	2.02
Isilon	OneFS 7.1	2.24
RecoverPoint	RecoverPoint 3.1, 3.2, 3.3, 3.4 and later [a]	2.02
Symmetrix 8000 Series	EMC Enginuity™ 5567 and 5568, with Service Processor Part Number [c] 090-000-064, 090-000-074, or 090-000-09*x*	2.02
Symmetrix DMX™ Series	Enginuity 5670, 5671	2.02
Symmetrix DMX-3 Series	Enginuity 5771, 5772, 5773	2.02
Symmetrix DMX-4 Series	Enginuity 5772, 5773	2.02
Symmetrix VMAX™ Series	Enginuity 5874, 5875	2.02
Symmetrix Device Client	Enginuity 5670, 5671, 5771, 5772, 5773, 5874, 5875	2.00
ViPR	Contact your EMC representative	2.22
VMAX Cloud Edition (CE)	Contact your EMC representative	2.22
VNX	VNX Operating Environment (OE) for Block 05.31.000.5.006 or greater VNX Operating Environment (OE) for File 7.0.12.0 or greater	2.08
VNX Control Station Device Client	VNX Operating Environment (OE) for Block 05.31.000.5.006 or greater VNX Operating Environment (OE) for File 7.1.44 or greater	2.18
VNXe	VNXe 2.0.x	2.08
VNXe Device Client	VNXe 2.0.x	2.08
VPLEX	GeoSynchrony 4.0.0.00.00.11 or later	2.04
XtremIO	XtremIO 2.2.x and greater	2.22
XtremIO Device Client	XtremIO 2.2.x and greater	2.24
Switch - Fabric Manager managing Brocade B-series	Brocade B-series switches running Fabric OS 5.0.1b through 6.1.0x only, with Fabric Manager 5.2.0b or later [bdeg]	2.02
Switch - Cisco	Cisco MDS switches running SAN-OS 3.1(2) or later, NX-OS 4.1(1b) or later. [b] Nexus switches running NX-OS 4.2(1)N1(1) or later. [bh] MDS switches require Fabric Manager or Cisco Data Center Network Manager (DCNM) to be the same version or higher than the highest switch firmware version. Nexus requires Fabric Manager 5.0(1a) or higher.	2.02

a. RecoverPoint 3.1 and 3.2 utilize ESRS for remote support access only. RecoverPoint 3.3 and later add the connect home feature. RecoverPoint Management GUI (RPMGUI) is supported on ESRS 2.20 and above

b. For remote support access only, not for connect home through ESRS.

c. These part numbers designate Service Processor that is running Windows NT SP6. xx70 code only supports ftp for callhome.

d. Fabric Manager does not support FOS 6.1.1 or higher. CM or CMDCE is required. Please refer to the appropriate FOS Release Notes.

e. CM does not support FOS 6.3.x or higher. cmdce is required. Please refer to the appropriate FOS Release Notes.

f. CMDCE is required to support FOS 6.3.x or higher. Please refer to the appropriate FOS Release Notes.

g. Callhome via CM, CMDCE, or CMCNE, otherwise no callhome through ESRS Client.

h. Callhome via Cisco Fabric Manager or Cisco Data Center Network Manager, otherwise no callhome through ESRS Client.

Port requirements

The open port requirements for each product are listed in Table 4 on page 34.

Table 4 Open port requirements for site network and device configuration (page 1 of 2)

EMC product	Open port requirements	
ESRS components	**Outbound**	**Inbound**
Gateway Client server	• TCP 8090 (HTTP) and/or 8443 (HTTPS) (to Policy Manager) • Device dependent ports (to devices) • TCP 443 (to EMC Enterprise) • TCP 443 (HTTPS) and/or 8443 (SSL) to EMC Remote Support **IMPORTANT** Port 8443 is not required for functionality, however without this port being opened, there will be a significant decrease in remote support performance, which will directly impact time to resolve issues on the end devices.	HTTPS, Passive FTP, and SMTP (from managed devices)
Policy Manager	SMTP (to e-mail server)	TCP 8090 (HTTP) and/or 8443 (HTTPS) (from Gateway Client server)
Managed storage devices	**Outbound to Gateway Client server (Service notification)**	**Inbound from Gateway Client server (Remote support)**
Atmos	HTTPS, Passive FTP, SMTP	TCP 22, 80, 443
Avamar	HTTPS, Passive FTP, SMTP	TCP 22, 80, 443
Celerra	HTTPS, Passive FTP, SMTP	TCP 22, 23, 80, 443, and 8000
EMC Centera	SMTP	TCP 22, 3218, and 3682
CLARiiON	HTTPS, Passive FTP, SMTP	TCP 80 and 443 (or 2162 and 2163), 5414, 6389-6392, 9519, 13456, and 60020
Connectrix	HTTPS, Passive FTP, SMTP	TCP 5414
Customer Management Station	N/A	EMCRemote: TCP 5414 RemotelyAnywhere: TCP 9519 RemoteDesktop: TCP 3389 WebHTTPHTTPS: TCP 80, 443, 8443 CLIviaSSH: TCP 22
Data Domain	SMTP	TCP 22, 80, 443
DL3D	SMTP	TCP 22, 443

Table 4 Open port requirements for site network and device configuration (page 2 of 2)

EMC product	Open port requirements	
Disk Library for mainframe (DLm)	HTTPS, Passive FTP, SMTP	TCP 22, 80, 443, 8000
EDL	HTTPS, Passive FTP, SMTP	TCP 22, 11576
Greenplum Data Computing Appliance (DCA)	HTTPS, Passive FTP, SMTP	TCP 22
Invista	(Element Manager) HTTPS, Passive FTP, SMTP	(CPCs) TCP 80, 443, 2162, 2163, 5201, 5414
Isilon	HTTPS, Passive FTP, SMTP	ISI-Gather Log Process: TCP 8118 CLIviaSSH: TCP 22 WEBUI: TCP 8080
RecoverPoint	SMTP	CLIviaSSH: TCP 22 RPMGUI: TCP 80, 443, 7225
Symmetrix	HTTPS, Passive FTP, SMTP	TCP 1300, 1400, 4444, 5414, 5555, 7000, 9519, 23003-23005
ViPR	HTTPS, Passive FTP, SMTP	CLIviaSSH: TCP 22 ViPR Management GUI: TCP 443, 4443, 80
VMAX Cloud Edition (CE)	HTTPS, Passive FTP, SMTP	CLIviaSSH: TCP 22 VClient: TCP 443, 8443, 22, 80, 903, 8080, 10080, 10443, 902 WebHostLogAccess (Primary): TCP 443 WebHostAccess: TCP 443 WebVClient: TCP 9443, 443, 80 vAppAccess (Primary): TCP 5480
VNX	HTTPS, Passive FTP, SMTP	TCP 22,80, 443, 2162, 2163, 6391, 6392, 8000,9519,13456,60020
VNXe	HTTPS, Passive FTP, SMTP	TCP 22, 80, 443
VPLEX	SMTP	TCP 22, 443
XtremIO	HTTPS, Passive FTP, SMTP	CLIviaSSH: TCP 22, 80 XTREMIOGUI: TCP 80, 443, 42502
Switch - Brocade-B	N/A	TCP 22 and 23
Switch - Cisco	SMTP	TCP 22 and 23

a. HTTPS available only if device is qualified to send files using HTTPS.
b. SMTP by customer e-mail server.
c. Passive FTP if in a centrally managed environment, by management server.
d. If in Distributed mode, by SMTP to the Gateway Client or customer e-mail server.

Summary

EMC Secure Remote Support (ESRS) provides increased security and functionality to the EMC Secure Remote Support portfolio.

Site architecture

You set up ESRS at your site, with the assistance of EMC Global Service professionals. ESRS has the following capabilities:

- **ESRS Client** — This SSL HTTPS handler is the broker that directs communication between your EMC-installed products and EMC Global Services, handling user authentication, service notification data file transfer, remote access session regulation, and device management—all the tasks required for remote support.
- **Configurations** —You can choose from a variety of configurations. If you choose a High Availability Gateway Cluster server configuration, you will use two or more Gateway Client servers to eliminate single point of failure and help ensure that your system is available for remote support of your EMC products.
- **Policy Manager** — This application lets you specify the access authorization criteria for remote access operations on each device or group of devices that you manage using ESRS.
- **Configuration Tool** — This application is used to configure the storage devices that are managed by the ESRS Client. The tool is installed as a component of the ESRS Client.

Security features

ESRS protects customer confidentiality and integrity through the industry-recognized “3 A” security practices—authentication, authorization, and audit logging—with full customer control over remote communications and policy management: All connections are initiated from your site:

- **Device Control** — Your EMC devices are protected with 24 x 7 heartbeat monitoring and rapid alert response to system events.
- **Policy Management** — You can specify authorization rules within a wide range of possible configurations and behaviors.
- **Digital Certificate Management** — Digital Certificate Management automates the ESRS Client digital certificate enrollment by taking advantage of EMC's existing authentication system.
- **Access Control** — You have complete control over the configuration and management of EMC's strict IP and port-mapping secure connection solution. EMC Global Services professionals are granted access to your system only under your approval, in addition to their required authorization using EMC's strict centralized access controls.

Glossary

authenticate Confirm or deny the identity of a system user candidate.

authorize Confirm or deny the level of access or editing privileges for a system user.

Client The ESRS Gateway Client application that acts as the single point of entry and exit for all IP-based EMC remote support activity.

demilitarized zone (DMZ) A computer or subnetwork that sits between a trusted internal network, such as a corporate private Local Area Network (LAN), and an untrusted external network, such as the public Internet.

device See managed device.

embedded client An Embedded ESRS Device Client is integrated on some EMC Products, and utilizes the same technology as the ESRS Gateway Client. If using a Policy Manger, it enforces the policy and audits just like an ESRS Gateway Client, but only on that specific device.

EMC Enterprise The EMC ESRS back-end infrastructure, which includes a Graphical User Interface used by authorized EMC Global Services professionals.

event An error or otherwise notable activity reported from the managed device.

managed device An EMC information infrastructure product (such as Celerra, EMC Centera, CLARiiON, Symmetrix) installed at a customer site and “managed” by an ESRS Client as part of ESRS.

Network Address Translation (NAT) An Internet standard that enables a local-area network (LAN) to use one set of IP addresses for internal traffic and a second set of addresses for external traffic.

RSA RSA, the Security Division of EMC, makers of security servers and SecurID Authenticators used in ESRS authentication procedures.

Documentation

ESRS documentation is available from the EMC Online Support Site:

`http://support.emc.com`