RSView SE v3.20
Distributed System Design Considerations
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Introduction

The intent of this document is to make a user aware of the numerous variables that come into play when designing a distributed application. Once read, a user will be able to proactively evaluate the current state of a project and understand the areas that require additional detail, research, or instruction to be successful.

Each subject will provide a brief synopsis of the material, decisions to be made, and may contain hotlinks to additional technical notes or reference sites for more specifics.

The information provided within is a guide to assist a project team with critical decisions that need to be made in order for a successful implementation to occur. As with any project, the system integration team is responsible for these decisions.

The Rockwell Automation Knowledgebase should always be consulted for information that may supersede this document.

Prerequisite reading before application development:

- RSView Supervisory Edition Install Guide
  [http://literature.rockwellautomation.com/idc/groups/literature/documents/um/viewse-um005_-en-e.pdf](http://literature.rockwellautomation.com/idc/groups/literature/documents/um/viewse-um005_-en-e.pdf)
RSView SE Component Terminology

**FactoryTalk Directory™** is software that supplies a directory of services (for example, RSView SE Servers, or OPC servers) and names (for example, areas, tags, graphic displays, log models, and so on) to any computer on the network that participates in RSView Supervisory Edition applications.

**RSView Studio** is configuration software for developing and testing machine- and supervisory-level human-machine interface (HMI) applications. RSView Studio contains editors for creating a complete human machine interface application, and contains software for testing the applications you create. Use the editors to create applications that are as simple or as sophisticated as you need. The maximum number of RSView Studio clients that can have simultaneous access to an RSView Supervisory Edition application is 5.

**RSView SE Client** is software for viewing and interacting with supervisory-level applications developed using RSView Studio. The maximum number of RSView SE Clients that can have simultaneous access to an RSView Supervisory Edition application is 50. When counting clients, a client can be an RSView SE Client, an RSView SE Server, a RSSql FactoryTalk connector, RSView Studio, or the RSView Administration Console.

**RSView Administration Console** is software for administering RSView Supervisory Edition applications after they have been deployed. RSView Administration Console contains a sub-set of the RSView Studio editors, so you can make minor changes to an application, without the need for installing RSView Studio. The Administration Console has a two hour time out. A warning message is displayed five minutes before this time expires. To continue using it you will have to shut it down and restart it.

**RSView SE Server** stores HMI project components (for example, graphic displays), and serves these components to clients. The server also contains a database of tags, and performs alarm detection, and historical data management (logging). The RSView SE Server has no user interface. Once installed, it runs as a set of ‘headless’ Windows services that supply information to clients when they request it. The maximum number of HMI servers supported in an application is 10. Each of these can be redundant. In non-redundant scenarios, the maximum number of HMI servers that can be hosted on a single computer is 2. In redundant scenarios, the maximum number of HMI servers that can be hosted on a single computer is 1.

**Data Server** is the software component that allows clients to access information in programmable controllers, devices and other data servers that comply with the OPC-DA 2.0 specification. This data is used to populate HMI tags and display screens among others. Some examples of data servers are RSLinx Classic, RSLinx Enterprise and 3rd party OPC Servers.
New in RSView SE 3.20

- **Graphics XML import and export.** You can now export graphic display information from RSView as an XML file. These files can be modified in a text editor and imported back in to RSView to modify existing graphic objects, add new objects to a display, or create a new display. XML files can be imported one at a time or in a batch mode. This allows for programmatic design-time generation of graphics files.

- You can also use Visual Basic code to do a global search and replace for multiple tags in multiple XML files. The tech note A97349265: RSView Graphic Tags Search and Replace using Graphics XML Exported Files, has a sample VB program that allows you to do this. It also contains VB source code and a white paper that explains how to use the XML document object model.

- **Multiple user domain support.** Users and user groups from different Windows network domains and local workstation domains can now be added to the same RSView user accounts list. When the user accounts list has users and groups from more than one domain, the user name in the Login dialog is entered as domainName\userName. If the RSView user accounts list has users and groups from only one domain, the user is not required to supply a domain name in the login dialog. The first user in the RSView user accounts list that matches the user name in the dialog box is verified. This provides backwards compatibility for customers with just one domain.

- **Improved installation procedure.** Installing RSView Studio is faster and easier with the new, streamlined installation wizard. Additional rollover text and a restructured user interface provide the user with more information and a simpler procedure.

- **New Alarm functions.** Alarm functions that return the number of tags that are in alarm, unacknowledged, or in alarm and unacknowledged, have been added. Individual tag names can be used or wild card queries can be used to return the number of tags in the tag folder that match the criteria.


- **VBA 6.4 support.** The version of Visual Basic for Applications that is supported by RSView for its object model, has been updated from 6.3 to 6.4.

- **'Modify' message now logged to Audit.** In addition to logging a message to Audit when a component is added or deleted, all editors now also log a message to Audit when a component is modified.

- **Alarm Log Viewer displays oldest alarms first.** When the Alarm Log Viewer initializes, it now always displays records oldest to newest.

Software Installer

As part of the installation process, RSView creates program folders and modifies registry entries. To make these modifications, the user that is currently logged in must have *administrative rights* on the computer on which RSView is installed (for example, the Windows 2000 Administrator account has these rights). You do not need administrative rights to run RSView.
Software Installation Order

- Internet Information Server (IIS)
  - To develop and test distributed applications on a single computer Microsoft Internet Information Server must be installed.
  - Only install on HMI Servers for a distributed system. To create stand-alone applications, IIS does not need to be installed.
  - Microsoft Internet Information Server software can be found on the Windows 2000, Windows 2003 or Windows XP CD-ROM, if it is not currently installed.

- FactoryTalk Automation Platform (FTAP)
  - FactoryTalk Automation Platform must be installed first before installing any of the RSView Supervisory Edition software components.
  - Install FTAP on all 3rd party OPC PC’s
  - If Microsoft.NET is not currently installed on the computer, it will automatically be installed at this point.

- RSView Supervisory Edition
  - Specify the location of FactoryTalk Directory (A reboot is required for changes to take affect)
  - RSLinx Enterprise (optional)
  - RSLinx for RSView and/or 3rd Party Servers (optional)

Activation Keys

- Rockwell Software's Windows-based software packages are copy-protected. Only a computer with access to the activation files can actually execute the software.
- When a Rockwell Software product is launched, the software first checks the local hard drive, then network hard drives, and finally local floppy drives for activation. Systems attached to extensive networks can take quite a while to search for activation files on all available drives. If the system fails to detect either the activation file or the Master Disk, the product fails to start, starts in Lite mode or starts in Demo mode depending on the software product.
- Installing all keys on the FactoryTalk server allows for a central management location. This configuration allows the user to be able to see what keys are in use and how many are still available. Loss of communication from Clients to FTD will cause clients not to obtain a license, resulting in limited demo mode functionality.
- Installing keys on each computer guarantees that computers’ license will not be used by another computer.
- Use the move utility, EvMove, to move activation files. Attempts to copy, rename, move or e-mail an activation file by other means will damage the file and can render the software inoperative.
- For more information, please reference the online help for the product.

Default File Locations for SE Distributed Applications

Application File (W2K):
C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects\
Application File (WinXP):
C:\Documents and Settings\All Users\Shared Documents\RSView Enterprise\SE\HMI Projects\

FactoryTalk Directory File (W2K):
C:\Documents and Settings\All Users\Application Data\Rockwell\RNA Server\Global\*.RnaD

FactoryTalk Directory File (WinXP):
C:\Documents and Settings\All Users\Application Data\Rockwell\RNA Server\Global\*.RnaD

Operating Systems
- Windows 2000 (Server and Pro) with Service Pack 4 or later and Windows XP (Pro only) with Service Pack 1 or 2 and Windows 2003 Server.
- Mixed Mode authentication is supported on NT4 or Windows 2000 Servers running active directory; Native Mode authentication on Windows 2000 or 2003 servers is not yet supported.

Installing a new Operating System on computers
Be sure to always install the PC vendor supported or recommended OS if upgrading or modifying your system. In some cases there are no proper hardware drivers for a particular hardware/software combination. Using unsupported operating systems or drivers can cause the computer to be unstable. Obviously if the OS is unstable, it is too much to ask for any applications running on it to be stable.

How to determine a domain's mode
- Start the Active Directory "Domains and Trusts" (on a Win2K domain controller, go to Start-> Programs-> Administrative Tools)
- Right-click the domain and select "Properties".
- Look on the General tab in the section entitled "Domain operation mode:". This will indicate the current mode.

Windows XP SP2
- If using Windows XP SP2 as a server computer, ensure that the client computers are using the same operating system. While not all server and client operating system combinations have been verified, the combination of Windows XP SP2 servers and Windows 2000 Professional SP4 clients has been found to have problems. This anomaly has been observed with both Rockwell Software and third-party products.
- Increased security has been built into Windows XP SP2 which includes locking down incoming network traffic with Windows Firewall. Because of this, in order to run RSView on Windows XP SP2 you need to run Rockwell Software's Windows Firewall Configuration Utility and modify RSView's firewall settings. This utility can be downloaded from the Rockwell Software Knowledgebase R103763505 – Windows Firewall Configuration Utility for Windows XP Service Pack 2
- The Rockwell Software products need to be installed first before running the Windows Firewall Configuration Utility (WFCU).
Workstation OS vs. Server OS

- Windows XP or 2000 Pro are workstation operating systems. They have a 10 connection limit.
- It is recommended that HMI and Data Servers and the FactoryTalk Directory be installed on Windows 2000 family servers. Multiple connections are established to each server by every RSView SE Client and RSView Studio.
- RSView SE does not support clustered servers.
- RSView SE is not officially supported in a Virtual computer environment such as VMware.
- When you are running a distributed application on Windows XP Professional and using Windows workgroups, you must disable the default XP feature, 'simple file sharing', or RSView SE clients will not be able to authenticate. For details, see Help provided with Windows XP, or look under the heading 'RSView SE in a Windows workgroups environment' in the Known Issues topic of the release notes.

Workgroup vs. Domain

Workgroup
Decentralized Administration

Workgroups Advantages:
- No Domain Controller (Windows Server OS) to purchase.
- One less computer in network to maintain.
- Recommended only for small SE applications where user accounts don’t change often.

Workgroup Rules:
- All computers participating in a single application must be members of the same Windows workgroup.
- All users participating in the workgroup must be members of the Administrators group.
- Create the same set of user accounts and passwords on every computer in an RSView Supervisory Edition application. For details see Help provided with Windows.

Domain
Centralized Administration

Domain Advantages:
- Centralized Administration
- One place to manage Users, Groups and Security
- Automate Name Resolution and IP addresses with DHCP, DNS, WINS
- Recommended for larger SE applications, or environments with changing user accounts

Domain Rules:
- For applications consisting of more than 10 computers, a domain controller is recommended.
- The RSView SE Server and FactoryTalk Directory should not be installed on the same computer as the domain controller.
RSView SE supports Windows 2000 or NT4 Domains. Refer to the “Operating Systems” section for the supported domain configurations.

**Domain Controller**

Rockwell Software does not support running application software on computers configured as domain controllers.

The key sentence in this TechNote is "In general, Microsoft does not recommend running applications on computers configured as domain controllers, and certainly not applications that require more than Authenticated User privileges in order to run successfully."

Installation of any application software on a domain controller can have adverse affects on the network and is the responsibility of the user to accept the risk.

**Individual user account vs. Groups**

- Individual account allows the client computer to tell who the logged in user is and act on it in the VBA environment.
- Group accounts in an RSView SE application do not need to be modified when a Windows user account is added or removed. Adding the new Windows user account to a group used within RSView SE is all that is needed to give that user access to the RSView SE application.

**Component Installation**

**All components on one computer vs. across multiple computers**

One Computer Pro

- Reduced hardware expense
- Single point for updates and troubleshooting

One Computer Con

- CPU and Memory loading
- Single point of failure

Multiple Computer Pro

- Distributing the CPU and Memory load
- Not a single point of failure. (Not referring to Redundancy)

Multiple Computer Con

- Additional hardware cost
- Multiple locations for updates and maintenances
Networking

- A network is only as good as the hardware. RSView SE is a Client/Server software solution that relies on having a strong and stable network to perform. Ethernet communications rely on a network that does not have noise, excessive collisions, or broadcast storms.
- The TCP/IP protocol should be the largest consumer of Ethernet network bandwidth.
- Use name-brand NICs (3Com, Intel) where possible.
- Consider contacting Gary Slivka (gtslivka@ra.rockwell.com) of Rockwell Automation’s Network Services group. For a fee they can assist in troubleshooting, designing, configuring, purchasing and commissioning of the networks and their components.

Hubs vs. Switches vs. Managed Switches

Hubs
- Hubs are the least expensive, least efficient and are not recommended
- “Dumb” modules, they do not interpret data or sort messages that pass through them
- Does not have any fault tolerance mechanisms or traffic optimization functionality (i.e. could cause high rate of collisions and errors in network)
- Hubs are not assigned IP or Mac addresses (they are “transparent”)

Switches General
- Switches isolate communications, reducing collisions and network traffic
- “Intelligent” modules, interprets data as it enters and distributes it accordingly

Unmanaged Switches
- Are not configurable but routes data more intelligently than hubs. They do not have big buffers and there is a chance of collisions, errors, dropped packets, packet timeouts.
- Typically used in one network segment or subnets, but could be used in multiple segments or subnets with VLAN implementation.

Managed Switches
- Managed Switches are the most expensive and complicated of the three but most efficient, reliable and useful. Commercial grade managed switches are recommended.
- Are configurable with extra functionality like traffic optimization, fault tolerance mechanisms, alarms, monitoring, packet prioritizing, diagnostics etc.
- Managed Switches have IP / MAC addresses (they are seen as a node or station on the network)

Managed Switches are recommended because:
- Noise does not pass through switches, only packets headed for read destination do.
- Monitoring, Diagnostics, Configuration capabilities
- Bigger buffer and packet optimization capabilities
Redundant Ethernet

Cisco and Hirschmann both offer fault tolerant switches and networking software to manage redundant Ethernet solutions.

IP Addressing: Static vs. Dynamic

- Static IPs should be assigned to all servers (HMI, Data, ODBC data objects). This reduces the chance of client computers not finding servers.
- DHCP can be used for any clients. Reduces administration for IT.

Changing Server IP Address

If the computer name or IP address changes for a computer that is hosting a server (FactoryTalk Directory, HMI, OPC) in a distributed SE application, all computers in the system must be rebooted. This is required to ensure that low-level communications between the computers works correctly.

If the name or IP address changes for the FactoryTalk Directory server, the “Specify FactoryTalk Directory Location” utility should be run to verify proper configuration and connectivity. This should be done after the above step has been completed.

Firewalls

By design, a firewall is intended to ‘block’ network traffic on one segment of a network from reaching another. This is inherently bad for a distributed system that depends on remote communications. A firewall (if necessary) should be placed ‘outside’ the control system, not ‘within’ it. The opening of ports within a firewall may present a security concern, and an IT Security expert will need to be involved in the configuration. The following article is an excellent starting point of reference.

Windows XP Service Pack 2 Firewall

Rockwell provides a configuration utility to aid in the modification of the Windows XP firewall installed with Service Pack 2. This utility can be found at the Rockwell Automation Knowledgebase.
[R103763505 - Windows Firewall Configuration Utility for Windows XP Service Pack 2](http://www.rockwellautomation.com/)
The Rockwell Software products need to be installed first before running the utility.

Microsoft components: DNS, WINS, IIS

- DNS (Domain Name System) - RSView SE browses computer names and must resolve to the computer IP addresses. DNS resolves host names to IP addresses.
- WINS (Windows Internet Name Service) - Provided in Windows 2000 Server for compatibility with older Windows operating systems like Win95 and NT. WINS resolves NetBIOS computer names to the IP address.
- IIS (Internet Information Services) - RSView SE Server uses Internet Information Services to transfer graphic files from servers to clients (SE Client computers do not need IIS installed). A full install of IIS contains 10 components; RSView SE only requires 4 to be installed. (Common Files, IIS Snap-in, World Wide Web Server and Personal Web Manager if using Windows 2000 Pro). Client computers do not need IIS installed.
- SE Clients use the Temporary Internet Files directory to store local copies of SE Server graphic files.

**SE Server Settings and Tips**

- If an HMI server can be accessed by non-RSView clients (e.g. View Portals or Web clients), use RSView Studio or the RSView Administration Console to set the startup type for the HMI server to 'Load and run startup components when operating system initializes'.
- On an SE server using Windows 2000 Pro, use the System tool in Control Panel to set the Performance Option’s Application Response setting to “Optimize performance for Background services” (For Windows 2000 & 2003 Server, this is the default setting). Windows XP Pro has a similar setting.

For additional information please reference [Microsoft’s Description of Performance Options in Windows](#)
On an SE server using Windows 2000 or 2003 Server OS, use the Network tool in Control Panel to set the Server Optimization setting in the Network tool in Control Panel for "Maximize data throughput for network applications" (this is not the default setting).

1) Maximize data throughput for network applications
This setting is best for distributed network applications, which for the most part perform their own memory caching and optimization. Rather than allocating server RAM for file caching, the RAM is available to be allocated to individual applications, as they need it. This is the setting to choose if applications such as RSViewSE or SQL server installed. This setting may also be chosen in cases where extremely large files are routinely copied, because the cache may grow so large from these files that other system processes do not have sufficient RAM.

- Optimizing Windows 2000
- Microsoft’s Maximize Data Throughput Setting for Performance
• In workgroup environments, configure the Windows Time service (W32Time) to synchronize all the
SE computer clocks to a master time server (e.g. the FactoryTalk Directory). In domain environments,
each domain member should be configured automatically when they join the domain. For more
information, see http://www.microsoft.com/windows2000/docs/wintimeserv.doc.
• Rockwell Software currently recommends against the use of Hyper-Threading technology G74144057 -
RSI Products and Intel Hyper-Threading Technology

Redundancy
Redundancy requirements are unique to each application. The ideal redundant solution involves having at least
two instances of everything – hardware, software, networks, and so on. In practice, this is seldom feasible or
even necessary. RSView Enterprise redundancy allows creation of duplicate server information that can be
used if a server fails. The desired outcome is to maximize system availability.

Keep in mind that RSView Enterprise Redundancy is typically used for:
• Computer hardware failure
• Software failure on one HMI/Data Server computer
• Power failure on one HMI/Data Server computer

Before setting up redundancy, plan:
• Which components in the system require redundancy?
• What software components on PC’s require backup systems?
• The network layout of the components within the system.
• CPU processing load that is expected for each computer.

Software redundancy can be configured for:
• HMI Server
• Data Server

Software redundancy is not the equivalent of hardware hot backup.

If using (2) computers, one server should be designated as the “Primary” with the responsibility of the Primary
HMI Server and Primary Data Server. The second computer designated as “Secondary” with the responsibility
of the Secondary HMI Server and Secondary Data Server.

The Factory Talk Directory server does not require configuration for redundancy. The Factory Talk Directory
information is cached on each computer that is participating in a distributed application. If the Factory Talk
Directory server computer is disconnected from the network or fails, each client and server in the application
can continue to access the graphics (from HMI Servers) and tags (from Data Servers) in the application as long
as the computer had previously accessed the FactoryTalk Directory server. However, since the Factory Talk
Directory is required to edit the application, it is recommended to place the Factory Talk Directory on a PC
with high availability.
General System Modification Procedure (Redundant & Non-Redundant)

- Some tag information is loaded into RAM when the RSView SE services start. Therefore, some tag database modifications may require:
  - Server restart/reboot
  - Client session restart
  - Client screen refresh

  In order for the change(s) to take affect. The integration team should evaluate what modifications may be needed and have a procedure in place to allow for them once a project has been commissioned.

System Modification Procedure on Redundant Servers

- Simple Display modifications which do not require new Tag creation can be copied and pasted from one server to the other without halting the servers. The change will then take effect the next time the screen is displayed.
- Simple Macro modifications which do not require new Tag creation can be copied and pasted from one server to the other without halting the servers. The change will then take effect the next time the macro is executed.
- Simple modifications to Data Log Models, Derived Tag Files, and Event Files which do not require Tag creation can be copied and pasted from one server to the other without halting the servers. Prior to changing these files they should be stopped first, by issuing the following commands:
  - DatalogOff <Data Log Model Name>
  - EventOff <Event file Name>
  - DerivedOff <Derived Tag Name>

- Once modifications have been completed and saved, then the files need to be restarted by issuing the following commands:
  - DatalogOn <Data Log Model Name>
  - EventOn <Event file Name>
  - DerivedOn <Derived Tag Name>

- Type the command without the < > around the object name.
- HMI Tag Deletion requires halting the server and transferring the project to the other server. All references to tags must first be removed. This includes all reference used in Display Animation, VB code, Event File, Derived Tag File, and Data Log Model.
- Any Alarm Tag changes which require the use of the “Accept Button” in the Tag Database editor requires halting the server and transferring the project to the other server.
- Useful redundancy references:
  - RSView SE User Manual part 2Chapter 25: Setting up redundancy
  - RSView SE User Manual part 2Chapter 26: Deploying distributed applications
  - A66546112 - RSView SE Server Redundancy Guidelines
  - A102052574 - RSView SE - Backup Utility for HMI Server
  - A84048851 - Considerations for returning a restored primary HMI server into service
  - A72747786 - Determine Active and Standby Server Status using the RSView SE Client
Communications

RSLinx Enterprise is the preferred method of communications for RSView SE unless one of the following features of RSLinx Classic is needed.

- OPC/DDE Server to non-FactoryTalk applications
- Alias Topic Functionality
- Unsolicited Messaging
- Complex communication routing (ex. Ethernet to ControlNet to DH+)
- Offline browsing of PLC/SLC RSLogix files

RSLinx Enterprise and RSLinx Classic can both exist on the same computer at the same time. RSLinx Enterprise and RSLinx Classic can both communicate with SLC/PLC/CLX controllers.

RSLinx Enterprise does not have the capability to do complex routing through the CLX Gateway (changing communication protocol ex. CIP to PCCC as in Ethernet to DH+). In this case RSLinx Classic is required.

When designing an application, do not duplicate references to Data Servers (RSLinx Classic, RSLinx Enterprise and 3rd Party OPC Servers) in the RSView SE application. Tags from a single Data Server may be referenced from any HMI project in any area of the application; therefore, it is recommended to place only one Data Server per Area. If a particular physical area in the plant has more than one Data Server (RSLinx for Rockwell controllers and Kepware for a 3rd party controller, for example), create logical “sub-Areas” to separate the two as illustrated below:

For more information, see [A94046122 - RSView SE Area Best Practices](#).
When planning communications:

- Gather information about the types of controllers or devices in the plant, and the software that is available for communicating with them.
- Determine how the programmable controllers on the network will communicate with the application. This will help plan the number of Data Server needed in the application.
- Determine how the application will access data in the controllers or devices. For most purposes the values in controllers or devices can be direct referenced without the need of creating an HMI tag.

For certain special purposes, however, the need to set up an HMI tag database may exist. HMI tags provide extended capabilities, such as:

- Triggering alarms when tag values cross a specified threshold.
- Scaling or offsetting a value before sending it to a programmable controller or device.
- Security

Data Server allows clients to access information in programmable controllers, devices and other Data Server that comply with the OPC-DA 2.0 specification.

**RSLinx Enterprise Predefined Items** are internal counters and strings that are made available as data items (tags) for diagnostic purposes. These items differ from regular data items in that they access internal information contained in RSLinx Enterprise. The referenced technote includes two RSView graphics containing RSLinx Enterprise diagnostics counters. One graphic contains counters that can be used with ControlLogix family controllers and the other one contains counters that can be used with PLC-5, SLC, and MicroLogix family of controllers. These graphics will import into an RSView ME or SE project. [Using RSLinx Enterprise Diagnostic Counters - Predefined items](https://www.rockwellautomation.com/touchscreen/communications/data-server-rslinx-enterprise-diagnostic-counters.html)

**RSLinx Classic vs. RSLinx Enterprise vs. 3rd Party OPC**

When designing an application, do not duplicate references to Data Server (RSLinx Classic, RSLinx Enterprise and 3rd Party OPC Servers) in the RSView SE application. Tags from a single data server may be referenced from any HMI project in any area of the application.

Place all Servers (HMI/Data) in their own individual Areas. [RSView SE Area Best Practices](https://www.rockwellautomation.com/touchscreen/communications/data-server-rslinx-enterprise-diagnostic-counters.html)

RSLinx Classic:

- Applications containing more than 10,000 active tags on scan may require its own dedicated host computer. This is dependent on hardware performance.
- Can communicate with SLC/PLC/CLX controllers
RSLinx Enterprise:

- RSLinx Enterprise is optimized to provide the best performance for large numbers of clients (more than 10), and large number of tags (more than 10,000), even if located on the same computer as the HMI server.
- Can communicate with SLC/PLC/CLX controllers
- Preferred RSVIEW SE data server to Rockwell controllers

3rd Party OPC servers

- Applications containing more than 10,000 active tags on scan may require its own dedicated host computer. This is dependent on hardware performance.

**RSLinx Classic Remote OPC Server** must be selected under the "OPC Server name (ProgID):" when configuring RSLinx as an OPC Data Server in RSVIEW SE. Regardless of where the actual copy of RSLinx.exe is running the "RSLinx Remote OPC Server" option must be selected in order to prevent problems accessing OPC Topics. To better understand what is remote vs. what is local the Data Server should be viewed from the SE Client point of view and not the HMI Server, in most cases Data Servers will be remote from the SE Client point of view. In the rare case where an SE Client may host a Data Server, using the "RSLinx Remote OPC Server" configuration will not cause any problems in this case.

**RSLinx Classic with a Logix controller processor**

Please be aware that there are known issues when online editing or downloading to a Logix Controller, particularly when RSLinx Classic is being used as the Data Server. If a client application requests tag data, RSLinx Classic will group the tags into packets, and put these packets on scan with the controller(s). If an online edit or download causes a change to the controller’s data table for a data packet on scan, the packet may need to be taken off scan, and put back on scan for the changes to be reflected.

This may be as minor as navigating off a particular HMI Display to take the tags off scan, and then navigating back to the display; however, in larger, distributed applications (particularly with alarms, event detection, data logging, etc. all enabled), it may be operationally difficult to achieve this short of rebooting the RSLinx Data Server. This would obviously affect ANY client requesting data from this instance of RSLinx Classic.

Many of these issues have been addressed with RSLinx Enterprise, which was designed specifically for the Logix family of controllers, and why RSLinx Enterprise is the recommended Data Server for this platform.

RSLinx Classic was originally designed for the structured data tables of the SLC and PLC product lines. The Logix platform introduced new communication and memory performance parameters that can affect RSLinx Classic. For this reason, RSLinx Enterprise was designed to be the preferred communication server for the Logix platform. Please consult the local Rockwell account representative for a complete comparison.

**Q105635747 - Runtime Editing with RSLinx Classic and Logix Processors**
Security
RSView SE Clients use Windows Users and Groups. RSView SE users must log in with a valid Windows user account.

You can set up security to:
- Prevent writes to specified tags from the RSView SE Client.
- Prevent access to specified displays from the RSView SE Client.
- Prevent access to specified commands from the RSView SE Client.
- Prevent changes to the application from RSView Studio or the RSView Administration Console.

Once an OLE object is activated, there is no security within the associated application. Therefore, the only way to secure the application is to assign security to the OLE object.

In addition to security settings mentioned above for individual users, DCOM and ODBC system security settings may also need to be configured.

Access to Open an Application
To open an application in RSView Studio, the user must have read/write access to the sub-folder that holds the HMI projects. If, for example the security designation for RSView Studio users is Power Users, they will not necessarily have write access.

To make sure that the settings for Power Users are correct, navigate to the sub-folder that holds the HMI projects and right-click Properties. Refer to “Default File Locations for SE Distributed Applications” earlier in this document for folder locations.

In the Security tab of the Properties dialog, select Power Users from the list of groups and user names. In the Permissions box below the list, select Full Control and check the Allow check box.

- A58133979 - DCOM Security Settings for RSView SE Remote Logging
- A88739237 - Virtual Private Networking (VPN) Connections for Remote Communications Across the Internet
Windows Terminal Services

- Terminal Services is a standard feature built into the Windows Server family (Server, Advanced Server, and Datacenter Server) which provides remote access to servers from practically anywhere in your enterprise. It is a transparent system that runs applications and performs data processing and storage functions on the server computer to minimize the amount of information traveling across your network. While multiple sessions run on a single server, each user can only see their individual session. User's desktops are transmitted to clients for display using terminal emulation software. Similarly, the software sends print streams and command functions such as keyboard inputs and mouse clicks across the network between the client and the server.

- For a computer to be a Terminal Services client, it only requires an operating system and the Terminal Services client software. No other software (not even a web browser) is required. For this reason, these clients are known as “thin” clients.

- Since minimal software is needed on the client computer and all the processing is done on the server, client computer hardware can be scaled down to reduce cost.

- **A23953523 - Using RSView SE with Windows 2000 Terminal Services**
- **A96855834 - Using RSView SE with Windows 2003 Terminal Services**
- **A19034721 - VBA Example - How to terminate a Terminal Service Client window**
- **Microsoft Windows 2000 Terminal Services Capacity and Scaling**

Tag Database vs. Direct Referenced Tags

Tag related limits:
- An HMI Server supports 40,000 alarmed tags, 10,000 of them can be analog
- Each graphic display can contain up to 3,000 references to expressions or tags (HMI and Direct). This limit includes the tags contained in embedded variables.

Tag Database (HMI Tags):
- Very useful when creating similar controls. Parameter files can reference directory folder structure or tags for quick duplication of controls
- Easy to do Tag Replacement (search and replace)
- HMI tags must be used (that is, Direct Referenced tags can not be used) for any of the following components in the application
  - Alarms
  - Security (can not set security to Direct Referenced tags)
  - Data manipulation (if the OPC Data Server does not provide: scaling, offset values, setting minimum or maximum limits on values)
- For optimum performance, do not place all the HMI tags in the root folder. It is also recommended that you limit the number of tags in a folder to less than 2000. HMI tags contained in nested folders do not contribute to the number of tags in the root of the folder.
- **P90538095 - Large numbers of HMI Tags within a single Tag DB folder can cause slow object animation performance when opening screens**
Direct Referenced Tags:
- No need to build or create a tag database since tags are directly referenced from the controller
- Parameter files can be used with Direct Referenced Tags

**Alarm Acknowledge Bit**

The acknowledge bit is used for telling other RSView applications or controllers that a tag has been acknowledged. When an acknowledge bit for a tag is set up, all HMI servers automatically monitor that bit at run time. When an operator acknowledges an alarm for the tag, the acknowledge bit is set. All other HMI servers then acknowledge the alarms associated with that bit. This means operators can acknowledge an alarm in one application and have it recognized in other applications (i.e. global alarm acknowledge between applications).

One acknowledge bit can be setup for each tag, one for a group of tags or one for all tags. The more acknowledge bits that are set up, the greater the system overhead. If possible group alarms to share an acknowledge bit.

A burst of alarms or alarm acknowledges will induce a high amount of read/write traffic over a very short period of time.

Acknowledge bits as well as Handshake bits should be accounted for when determining the total number of tags on scan.

**Data Log**

Data log is an RSView component that collects and stores tag values. Using a Data Log Model, you specify which tag values to collect, when to collect them, and where to store them.

When planning data collection, design the system so only essential data is collected. Limiting data collection is important because collection activities require substantial processing power and generate significant traffic on the communication channel or network.

Keep data collection requirements in mind when designing the layout of the programmable controller data tables and the tag database. Ideally, tag addresses should reference contiguous blocks of programmable controller data tables to reduce network traffic and optimize system response.

In a redundant SE system it is suggested to log to a third computer as opposed to locally, in doing this there is only one location to manage the data and there is no need to merge multiple files or databases together after a failover or switchover.
Data Logging to Secondary Path
RSView lets you specify a secondary or backup path to use if the primary path for file sets or the ODBC database becomes unavailable. This could happen because of network failures or because of lack of disk space on the computer where the data is being logged.

If the primary data log location becomes unavailable, RSView begins to store the data in a buffer. The buffer can hold up to 64 Kb of data. If the primary location is still unavailable when the buffer fills, or when the maximum amount of time to buffer data has elapsed, RSView switches to the secondary path.

RSView checks periodically to determine whether the primary file path has become available again. If it has become available, RSView switches back automatically.

RSView also checks the status of the primary path if the secondary path becomes unavailable, and will switch back if possible. If both paths are unavailable, RSView buffers the data. If the buffer fills and both paths are still unavailable, RSView empties the buffer (the data in the buffer is lost) and begins storing new data in the buffer. RSView continues checking both paths until one becomes available.

Multiple data log models
At run time, up to 20 models can run simultaneously on each RSView SE Server. Use multiple data log models to:
- Store related information in separate file sets
- Log groups of tags at different rates
- Log groups of tags based on events

Data Log storage formats
Logged data is stored in either an internal file set, providing faster performance for historical trends, or in an ODBC compliant database. If a file set is used, tag values are stored in proprietary format files. Trend objects can read the data to plot in a graphic display.

If values are stored to an ODBC compliant database, it highly recommended that this be a separate database server and not an SE Server. Data can be viewed in third party ODBC compliant tools such as Microsoft Excel, Seagate Crystal Reports or Rockwell Software RSBizWare Historian.

If the ODBC database becomes inaccessible, RSView logs the data to backup files in proprietary format. The location of backup files is configurable.
**Trending**

- When planning trends, consider how they will be used. For example, will the trend be used to:
  - Analyze process trends
  - Monitor production efficiency
  - Archive process variables to ensure compliance with government regulations
- Based on such considerations, it can be determined:
  - Which tags need to be plotted on the same trend
  - Which tags need to be plotted from a data log model
  - Which tags need to be plotted against time, or against another tag
- Trends can display real-time or historical data with up to 100 pens (tags) in each trend.
- Trend Templates may be used to create preconfigured trend objects for use in graphic displays.
- Trend Snapshots may be used as overlays with real-time trends.

Graphic displays that contain trend objects created in previous versions of RSView Studio, need to be opened in RSView Studio 3.2 and saved to ensure that they work correctly at run time.

**Database Considerations**

The larger a database gets, the longer it takes for SQL queries to execute. Report generation will also be impacted as the size of the database grows. Proper database management will be required to maintain a responsive reporting system. Server hardware will also play an important role in the responsiveness of the database.

Additional information:
- SQL-Server-Performance.Com
- Microsoft SQL Server 2000 Operations Guide
- Oracle DBA Information

**Graphic Displays**

- Develop hierarchy of displays with each display giving more granular detail of an object, area or function. This prevents displays from being cluttered by attempting to display a large amount of information at one time. This also reduces the demands on the Data Server from having to poll and display a large amount of unnecessary data.
- Create templates to ensure consistency of appearance.
- Each graphic display can contain up to 3,000 references to expressions or tags (HMI and Direct). This limit includes the tags contained in embedded variables.
- When importing a large graphic object (*.jpg, *.bmp) to use as a background. Converting the object to wallpaper will allow smoother mouse control over the object and provide a better environment for developing the graphic.
- Converting the object to wallpaper saves memory for faster display of screen.
Importing and Exporting Graphic Display XML Files

Each graphic display’s information is contained in a file called \DisplayName\gfx. The Graphics Import Export Wizard in RSView Studio allows you to export this information to an XML file, or to import a graphic display XML file. The XML files can be edited to modify objects that already exist or to add new objects. You can not import or export a display that is currently open in the same instance of RSView Studio that you are attempting to import or export from. Having the display open in a second or remote instance of Studio will not cause it to fail. However if you have an older version of a display open and save it after the import has been done you will over write your changes.

For more information about importing and exporting graphic display XML files, see Appendix E, Importing and exporting XML files, in the RSView SE User Manual Volume 2.

ActiveX Components

An ActiveX object is a software component that is supplied independently from RSView through products such as Microsoft® Office XP, Visual Basic®, and many other third-party applications.

An ActiveX object gives you access to its features through the object’s properties, events, and methods. By embedding an ActiveX object in an RSView graphic display and then assigning properties or specifying handlers for the object’s events, the object can interact with RSView. Information is passed between an ActiveX object and RSView using RSView tags.

For example, you can embed the Microsoft Forms ActiveX objects in RSView graphic displays. If you attach an RSView tag to an ActiveX object’s Value property, the object’s behavior changes as the tag’s value changes.

Be aware that ActiveX versions may very based on the operating system and in turn may not work properly. For example if the Server is running Windows 2000 and the Client is Windows XP the installed ActiveX components may be different. This is only a concern if you have imbedded ActiveX components in an RSView graphics or a VBA form.

Q95033431 - How to register an ActiveX control in Win32 Windows 2000/XP computer
**Visual Basic for Applications**

You can use Visual Basic for Applications (VBA) to customize and extend the capabilities of RSView SE. RSView graphic displays include the ability to incorporate Microsoft Visual Basic for Applications (VBA) scripts. Use the VBA integrated development environment (IDE) to create, test, and debug VBA procedures that run in response to events triggered from within RSView graphic displays.

**Limited** support is available through Rockwell Automation Technical Support for customers needing assistance debugging their VBA scripts. A maximum of 20 lines of code per problem can be considered.

The version of Visual Basic for Applications that is supported by RSView for its object model, has been updated from 6.3 to 6.4

- Use of custom VBA code should be limited. Only use when a native feature of the product does not meet the necessary requirements.
- VBA is single threaded.
- VBA is not recommended for continuous calculations. For continuous calculations the use of an OCX or EXE is recommended only if derived tags are not suitable.
- VBA is not compiled code.

Additional information:
- [G102842138 - Recommendations For Writing Visual Basic for Applications in RSView SE](#)
- [Q103626320 - RSView SE 3.0 Client Object Model](#)

**RSView Enterprise Tools**

- **Application Manager** is software for moving, copying, renaming, backing up, and restoring applications.
- **DeskLock** is software that locks users in the RSView SE Client program and prevents them from having access to the Windows desktop and using Windows system keys.
- **RSView SE Administration Console** is software for administering RSView Supervisory Edition applications after they have been deployed.
- **RSView SE Service Manager** is a tool for starting and stopping HMI servers. For example, use this tool to stop an HMI server before copying its set-up files to a redundant server.
- **SE Alarm Log Viewer** is software for viewing the contents of alarm log file sets.
- **Tag Import and Export Wizard** is software for importing or exporting the RSView SE Server’s tag database.
Naming Components

- RSView supports long file names. File names, including the path can be up to 200 characters long. For example a graphic with the name “System Overview” has 15 characters in it but has 118 characters in its full name because of the directory structure “C:\Documents and Settings\All Users\Documents\Rsview Enterprise\SE\HMI Projects\My Application\Gfx\System Overview.gfx”
- Names that conflict with commands and macros: To avoid problems when issuing commands and macros, do not use command names to name macros. For example, say you wanted to name a macro Display. To avoid confusion with the Display command, name the macro DisplayScreen instead.

Overall Considerations

- The browse button appears beside data entry fields. Type information into the field or click the browse button to open a list containing valid entries for the field. This will prevent typographical errors from requiring a debug later in the application development.
- During the design phase and before the development portion of the project, talk to the operators, maintenance personnel and other experts who are going to use the system. Find out what information they need to optimize plant operations to allow for efficient design and implementation of the application.
- Keep update rates only as fast as necessary for the process. These processes are Tag Read/Write, Data Logging, Derived Tags or Events and their update rates are important and can have a direct influence on the performance of the HMI server and clients. The update rate is also influenced by the rate that the tag in the target device changes.
- To calculate the maximum number of tags that could possibly be on-scan from a Data Server (e.g. RSLinx) add all of the following: (if a tag is used in multiple places it only counts once)
  - Tags on graphics being displays (or have been displayed if displays are configured to cache and always update)
  - Alarm and Alarm Acknowledge tags
  - Tags in Derived tag equations (only derived files running)
  - Tags in Event files (only event files running)
  - Tags in Data Logs Models (only models that are running)
  - Handshake tags
  - Tags that Macros or VBA are Reading or Writing to
  - Also take into consideration other applications like RSSql and RSBatch that may be using the same Data Server
If planning to upgrade the operating system from Windows 2000 or Windows XP Home to Windows XP Professional, see the Rockwell Automation Knowledgebase tech note P88739858 for information about how to perform the upgrade. Not following this procedure may have detrimental effects on future application development.

Do not have “RSViewSE” in the name of the computer. E58138896 - RSViewSE Distributed applications fail to create an HMI Server

When creating graphic screens, selecting ‘Replace’ will cause the currently displayed screen to close while opening the newly requested screen. If you select ‘Overlay’ you need to be sure to manage them more closely. It is possible for multiple screens to be open one on top of the other using up memory and CPU resources unnecessarily. See the online Help for more information.

HMI startup components (services) have two options, ‘On Demand’ and ‘Load and run startup components when operating system initializes’. This setting can be accessed in Studio or the Administration Console by right mouse clicking on the HMI server icon and selecting properties. In general ‘On Demand’ is selected during development so that all the services do not startup every time the computer is started. Once the system is deployed it should be set to ‘Load and run startup components when operating system initializes’.

When using 10/100Mb Network Interface Cards (NICs) and switch ports, do not leave them at auto detect. Set them at 100Mb / Full Duplex unless communicating to older 10Mb hardware, in that case set the speed at 10Mb and not 100Mb. Leaving network ports at ‘Auto’ and the NICs at hardware defaults may degrade network throughput dramatically.

Ghosting may be used in order to be more efficient in setting up a large system. However, this may cause an issue with communications due to duplicate serial numbers. Q106947514 - Ghosting / Imaging multiple computers with RSLinx Enterprise will cause serial number duplication problems and will require registration modification

**Designing A Multi-User System**

When an application is run by multiple users, behavior which is appropriate in a single-user environment might not be appropriate. For example, if a graphic display that is running on several clients contains a shutdown macro that stops a derived tags file, when the display is closed on one client, the shutdown macro will stop the derived tags file. This would affect the display on the other clients, because the derived tags file resides at the server.
**Misc. Procedure**

- Before any Tags are deleted from the online ControlLogix Tag Database, they must first be removed from RSView SE Application. This includes all reference used in Tag Database, Display Animation, VB code, Event File, Derived Tag File, and Data Log Model. This will remove tags from the scan list and prevent communication errors that can disrupt the performance of the application.

- Frequently users want to monitor the utilization and performance of the various components of an RSView SE system and be automatically alerted if a process begins to consume too many system resources. For information on how to accomplish this refer to technote [A111250839 - Monitoring RSView SE memory and CPU usage using Performance Monitor](#).

**How to determine what SE projects load when O/S initializes**

HMI servers in a distributed RSView SE project can be configured to launch in one of two ways:

- On demand, when a client attempts to make a connection to them, or
- Load and run when the operating system initializes

This selection is made in each HMI server's "Properties". Over time, as new projects are developed and tested, it can be easy to forget which HMI servers are automatically running every time the computer starts. Since each HMI server uses memory, CPU time and Activations, this becomes an increasing burden on the computer.

To determine which HMI Servers are loading automatically, open the following file: C:\Documents and Settings\All Users\Documents\RSView Enterprise\SE\HMI Projects\SLHMIServers.XLM. (default location)

Additional information can be found in technotes:

- [A58852570 - How to determine what SE projects load when O/S initializes, and how to prevent them from loading automatically](#).
- [A44344430 - RSView Studio is unable to attach to an existing HMI server](#).
- [P68858272 - Renaming an RSView SE application causes it's HMI Servers to lose it's startup properties](#).

**RSView32 to RSView SE Conversions**

Based on RSView32 v7.0 and RSView SE v3.10

The following objects won't convert from RSView32 to RSView SE:

- VBA
- Native trends
- Tag monitors
- Command lines embedded in graphics
- External applications that depend on RSView32 to be an OPC or DDE Data Server
- Alarm Summaries

Certain ActiveX controls may not function as they did in RSView32. These will need to be evaluated on a case by case basis.
For a complete list of commands that can not be executed in RSView SE refer to Technotes:

- A73549306 - RSView32 to RSView SE upgrade issues
- RSView32 to RSView SE Migration Considerations

TCP/IP Port Numbers used by Rockwell Automation Products

- G65850632 - Ethernet TCP / UDP port numbers for Rockwell products
- Q96531481 - TCP ports used by Rockwell products

ControlLogix Redundancy (v13)

**Automatic IP Address Swapping**

During a switchover, 1756-ENBT and 1756-EWEB modules now swap their IP addresses with their partner modules in the other redundant chassis. This lets you use the same IP address to communicate with a primary module regardless of which chassis is primary.

- Typically, you no longer need to use ControlLogix Redundancy Alias Topic Switcher software to manage the IP addresses. If your application still requires alias topics to manage IP addresses, see ControlLogix Redundancy System User Manual, publication 1756-UM523.
- During a switchover, communication over an EtherNet/IP network with other controllers or HMI may freeze for up to a minute, depending on network topology. If you need bumpless communication with controllers/HMIs, use a separate ControlNet network that is dedicated to communication with those devices.

In a redundant system, use an EtherNet/IP network only for HMI/workstation communication and messaging. Do not use an EtherNet/IP network for:

- communication with I/O modules
- communication between devices via produced/consumed tags

Tools and Utilities

- A102760350 - Patch File Validator Utility*
- A111250839 - Monitoring RSView SE memory and CPU usage using Performance Monitor
- A99968096 - Using RSLinx Enterprise Diagnostic Counters - Predefined items
- A102052574 - RSView SE - Backup Utility for HMI Server
- R103763505 - Windows Firewall Configuration Utility for Windows XP Service Pack 2
- A97349265 - RSView Graphic Tags Search and Replace using Graphics XML Exported Files
Additional Reference Links

**ControlLogix**
- R7913 - Logix Data Collection Application Guide
- ControlLogix Redundancy System User Manual
- ControlLogix Data Collection with RSLinx
- Logix 5000 Controllers Design Considerations
- ControlLogix Redundancy System Revision 13
- Runtime Editing with RSLinx Classic and Logix 2003.09.zip

**FactoryTalk**
- R89650958 - FactoryTalk Automation Platform 1.08.00 Patch TOC

**RSView SE**
- RSView Supervisory Edition Install Guide
- R89649933 - RSView SE 3.20.00 Patch TOC
- A102760350 - Patch File Validator Utility
- A20778 - RSView SE Operating System and Service Pack compatibility

**RSView ME**
- RSView Machine Edition Install Guide
- R89650627 - RSView Machine Edition 3.20.00 Patch TOC
**RSBizWare**

- RSBizWare Historian User's Guide
- RSBizWare PlantMetrics User Guide
- RSBizWare Scheduler User's Guide
- RSBizWare RSSql User's Guide
- RSBizWare Batch User's Guide
- RSBizWare Batch Technical Ref. Vol. 1
- RSBizWare Batch Technical Ref. Vol. 2
- A45458496 - Data Archiving with Historian and PlantMetrics

**Communications**

- R13441518 – RSLinx Classic Service Pack/Hotfix TOC
- R89651589 - RSLinx Enterprise 3.00.00 Patch TOC
- G60231355 - RSLinx Internals: OPC/DCOM timeouts when a remote client is disconnected

**Security**

- A88739237 - Virtual Private Networking (VPN) Connections for Remote Communications Across the Internet

**Microsoft**

- Windows Time service (W32Time) to synchronize all the SE computer clocks to a master time server
- P21111 - Troubleshooting a Windows Network
- Microsoft TechNet article on Domain Controllers
- Microsoft Windows 2000 Terminal Services Capacity and Scaling
- How To Register an ActiveX Control (.ocx) Manually
- Maximize Data Throughput Setting for Performance
- Microsoft’s Description of Performance Options in Windows
General

- Optimizing Windows 2000 for Data Throughput
- G20766 - Compatibility Matrix of RSI/AB software on Windows XP Pro
- G79662951 - Compatibility Matrix of RSI/AB software on Windows XP Pro Service Pack 2
- A69935270 - Windows XP Service Pack 2 is incompatible with FactoryTalk and RSView SE with default settings
- G74144057 - RSI Products and Intel Hyper-Threading Technology
- Additional Rockwell Automation online manuals
  [Link to additional manuals](http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse_category.hcst)