User Manual

Original Instructions

PlantPAx Distributed Control System

PlantPAx Distributed Control System

Verification and Troubleshooting

IMPORTANT This manual applies to PlantPAx System Release 4.5/4.6.
For PlantPAx System Release 5.0, see PROCES-UM100.

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Chapter 4

Server or Workstation Checklist

Chapter 5

System Architecture Checklist

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PASS Checklist

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Chapter 8

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Appendix A

Access the Attachment

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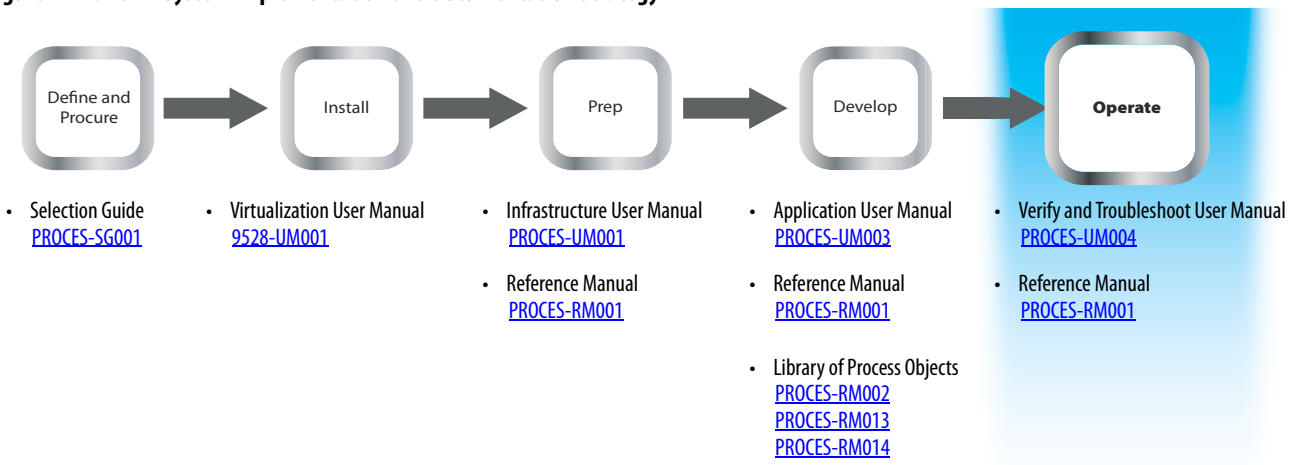
The PlantPAx® system provides a modern approach to distributed control by using common technology (integrated architecture) shared with all other automation disciplines within the plant. This approach creates a seamless information flow across the plant to create optimization opportunities and enables a Connected Enterprise.

Our scalable platform provides you with the flexibility to implement a system appropriate for your application. Figure 1 shows the documents (this manual in the highlighted section) that are available to help design and implement your system requirements.

Figure 1 - PlantPAx System Implementation and Documentation Strategy



- **Define and Procure** – Helps you understand the elements of the PlantPAx system to make sure that you buy the proper components.
- **Install** – Provides direction on how to install the PlantPAx system.
- **Prep** – Provides guidance on how to get started and learn the best practices to follow before you develop your application.
- **Develop** – Describes the actions and libraries necessary to construct your application that resides on the PlantPAx system.
- **Operate** – Provides guidance on how to verify and maintain your systems for operation of your plant.

Purpose of the User Manual

This document provides procedures on how to verify and troubleshoot the PlantPAx system. A Microsoft® Excel® workbook, which is included with this manual, contains checklist worksheets to verify and document that your system design aligns with PlantPAx system recommendations. This manual also offers steps on how to troubleshoot your system if performance expectations are not met.

Summary of Changes

The table indicates the updated information in this manual.

Topic	Page
Each server can now have 20,000 alarms	101
Virtual memory load value increased to 3 GB	106

Additional Resources

These documents contain additional information that concern-related products from Rockwell Automation.

Resource	Description
PlantPAx Distributed Control System Selection Guide, publication PROCES-SG001	Provides basic definitions of system elements and sizing guidelines for procuring a PlantPAx system.
PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
PlantPAx Distributed Control System Infrastructure Configuration User Manual, publication PROCES-UM001	Provides procedures to configure infrastructure components for your PlantPAx DCS systems.
PlantPAx Distributed Control System Application Configuration User Manual, publication PROCES-UM003	Describes procedures to start development of your PlantPAx distributed control system.
Rockwell Automation Library of Process Objects Reference Manual, publication PROCES-RM002	Provides common procedures for using the Rockwell Automation Library of Process Objects. Manual also includes procedures for Alarm Builder and security codes.
Rockwell Automation Library of Process Objects: Logic Instructions Reference Manual, publication PROCES-RM013	Provides controller codes and tags for Rockwell Automation Library objects. The objects are grouped by family and attached as Microsoft Excel files to the manual PDF file.
Rockwell Automation Library of Process Objects: Display Elements Reference Manual, publication PROCES-RM014	Provides common display elements for the Rockwell Automation Library. For improved accessibility, the elements are combined into one manual.
PlantPAx Virtualization User Manual, publication 9528-UM001	Describes the catalog numbers and details for using virtual image templates to configure virtual machines.
Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page	Website helps you find product-related downloads including firmware, release notes, associate software, drivers, tools, and utilities.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Overview

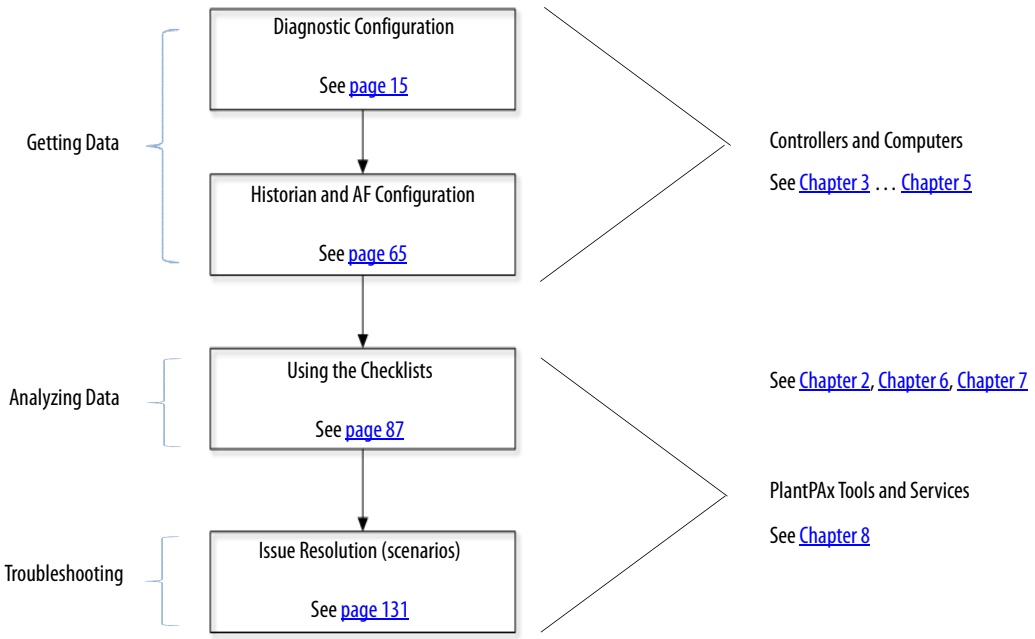
A well-performing process control system is critical to the operation of your plant. It is important to have a strategy to verify that the system is performing properly before initial deployment. Equally important is being ready to respond if the system isn't performing at the expected level.

Performance of the PlantPAx® system is dependent upon following the design and application rules that are provided by the PlantPAx Reference Manual. These rules and guidelines are developed through a process called characterization. Characterization is the activity of measuring system performance against key operational criteria called Critical System Attributes (CSAs). CSAs define what is expected in terms of performance of the PlantPAx system.

This manual describes how to monitor performance and verify PlantPAx system design against CSA recommendations by using the PlantPAx system checklists. Before you implement the checklists, make sure that your controllers are properly configured to extract diagnostic information. Chapter 6 explains how the L_CPU Add-On Instruction and FactoryTalk® Linx (data server) are initially configured to access computer data from system servers.

Figure 2 describes the three main topics in this manual to help you choose the information. Click the link or see the respective page number for procedures.

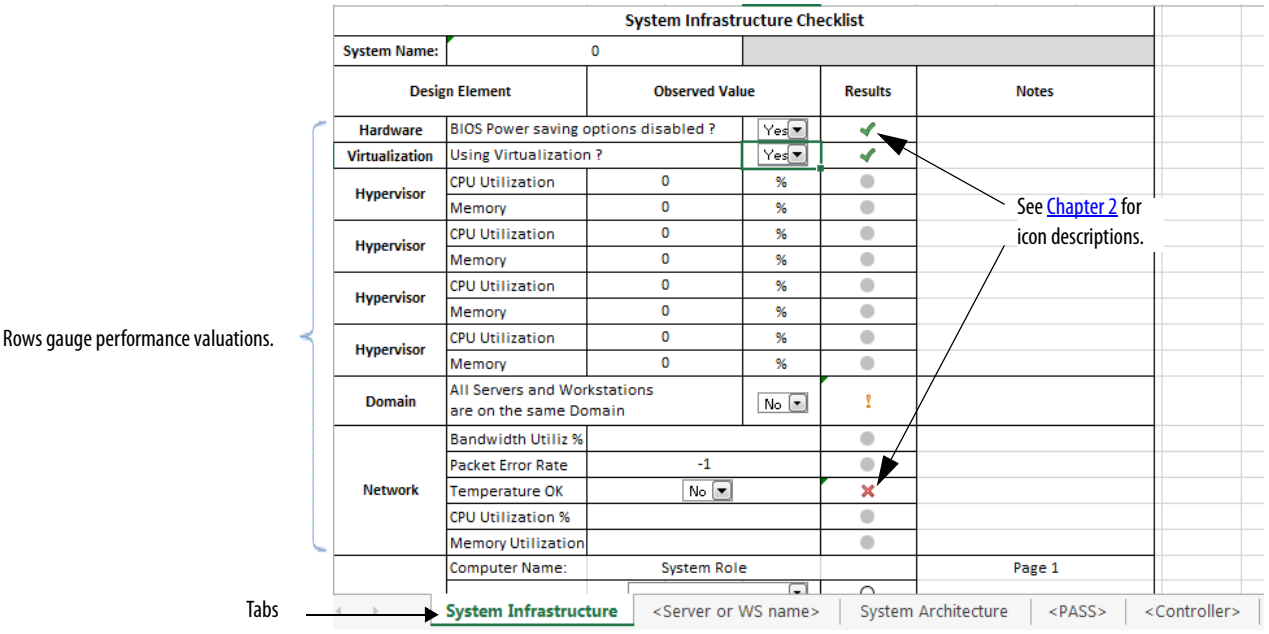
Figure 2 - Topics in This Manual



Attached to this manual is a folder (PlantPAx Checklist) that has five checklist spreadsheets. Each checklist is an individual worksheet in one Microsoft® Excel® workbook. The worksheets are organized by discipline or system element. We refer to the individual worksheets as checklists throughout this manual.

The checklists cover the following areas of the system design:

- System infrastructure
- Servers and workstations
- System architecture
- Process Automation System Server (PASS)
- Controllers



The five checklists are accessible via tabs on the bottom of the MS Excel workbook. Tabs that have labels inside brackets indicate checklists that can be renamed to match system elements in your application. For example, <PASS> can be copied and renamed to <PASS01>, <PASS02>, if two PASS servers are to be verified on the system.

Each checklist verifies design attributes that meet the following criteria:

1. **Easily observable:** This manual instructs you where and how to check the design attribute. You can use one or multiple checklists. See the table in Chapter 2 for recommended selections that are based on the system stage.
2. **Common:** The checklists are designed to verify applications that have configurations aligned with PlantPAx system recommendations. There are possibilities that some valid configurations are not covered by PlantPAx system documentation. In these cases, the associated attributes are not included in the checklists or these manuals.

3. **Clear impact:** The user experience benefits if the system conforms to the provided limits.

The manual instructions also help spotlight potential issues that could affect performance. Chapter 8 provides some basic troubleshooting examples and procedures if your system is not meeting performance expectations.

The MS Excel workbook is attached within the PDF manual. Appendix A instructs you how to access the Excel file.

To make sure that you have the latest checklists, see the Knowledgebase Answer ID 771236 at https://www.rockwellautomation.custhelp.com.

Verification tools are included in the Knowledgebase article. These tools either assist or perform necessary actions that are required to complete the checklist. The tools are described in a 'Before You Begin' section of each checklist chapter.

Notes:

Verification Recommendations

In today's automated manufacturing environments, it is important at various stages of development to make sure that applications align with PlantPAx® system recommendations. Pinpointing snags during pre- and post-configuration stages can help reduce costly downtime.

Periodic evaluation after startup also can be done to verify the accumulated affect of process and system changes.

Table 1 defines which checklists to use to verify compliance with the guidelines that are outlined in the PlantPAx Distributed Control System (DCS) Selection Guide (PROCES-SG001) and Reference Manual (PROCES-RM001).

Similar to a snapshot, each checklist verifies respective system design attributes to provide an overall picture of your plant operation at any given time.

Table 1 - Checklist Selection

Development Stage	PlantPAx System Checklists				
	System Infrastructure See page 15	Server or Workstation See page 39	System Architecture See page 65	PASS See page 87	Controller See page 113
System prep is complete per the instructions in the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001. Not all application code is complete.		●	●		
Code is complete, but not running on equipment or network that is being used for the production environment (for example, acceptance testing).				●	●
Code is complete, running in production environment (for example, site and acceptance testing).	●	●	●	●	●

Checklist Flexibility and Visual Clues

Each checklist contains entry fields that gather information for the selected design element. You do not have to use all five checklists. As Table 1 shows, use only the checklists that are required to verify that functionality is compliant with system guidelines.

Table 2 summarizes each checklist.

Table 2 - Checklist Content

System Area	Description
System infrastructure	Verifies system infrastructure elements that are shared across all servers and workstations. For example, virtual hypervisor and network.
<Server or workstation name>(1)	Verifies the loading and configuration of each individual server and workstation. Use this checklist to review each server and workstation on your system.
System architecture	Verifies the design and configuration of your system components. The checklist includes FactoryTalk® View, FactoryTalk® Historian, and FactoryTalk AssetCentre software configurations.
<PASS>(1)	Verifies applications that PASS servers host. Review includes FactoryTalk View Site Edition (SE) design attributes, alarm setup, and communication.
<Controller>(1)	Verifies the application and load on your controller. Use this checklist to review each controller on your system.

(1) Duplicate and rename a new checklist for each controller, PASS, server, or workstation in your system.

In the Results column, one of five icons appears from the status of the Observed Value.

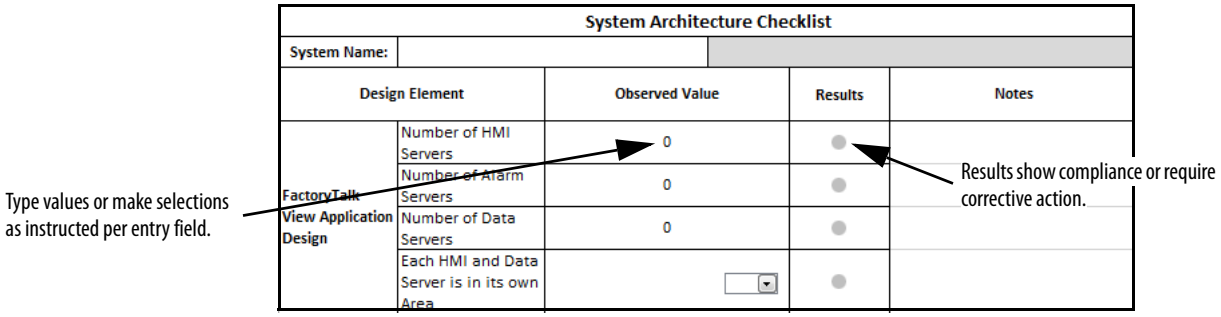


Table 3 - Checklist Icon Descriptions

Icon	Description
✖	Failure – requires correction
!	Warning – requires additional attention to confirm if results are acceptable for your system
✔	Passed – aligns with system recommendations
●	Not applicable – not completed or does not apply
○	Information only – documentation or calculation purposes only

IMPORTANT A successful PlantPAx system design has completed checklists that do not have any failures and all warnings are addressed. You can attach reports to a checklist for categories that are information only.

Before You Begin

Checklist procedures operate under the following assumptions:

- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have access to Microsoft® Excel® software to complete a checklist.

System Infrastructure Checklist

This chapter describes verification procedures for virtualized or traditional system infrastructure. Common infrastructure attributes, including network switches, servers, and workstations, are reviewed to make sure of PlantPAx® system compliance.

The purpose of this checklist is to verify your system data against PlantPAx system design recommendations. The collection of data lets you analyze overall system performance and pinpoint any potential performance issues.

The Microsoft® Excel® worksheet, which we refer to as a checklist, has entry fields to document system design information. There are five icons that indicate the status of the entered information and actions to be taken, if necessary. The checklist data provides a snapshot of whether your system is operating efficiently.

To access this checklist, click the System Infrastructure tab on the Microsoft Excel workbook.

Before You Begin

The System Infrastructure checklist procedures operate under the following assumptions:

- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have access to Microsoft Excel software to complete the checklist.
- The FactoryTalk® Network Manager™ is available to generate network switch information. Access the Network Manager from the Product Compatibility and Download Center (PCDC).

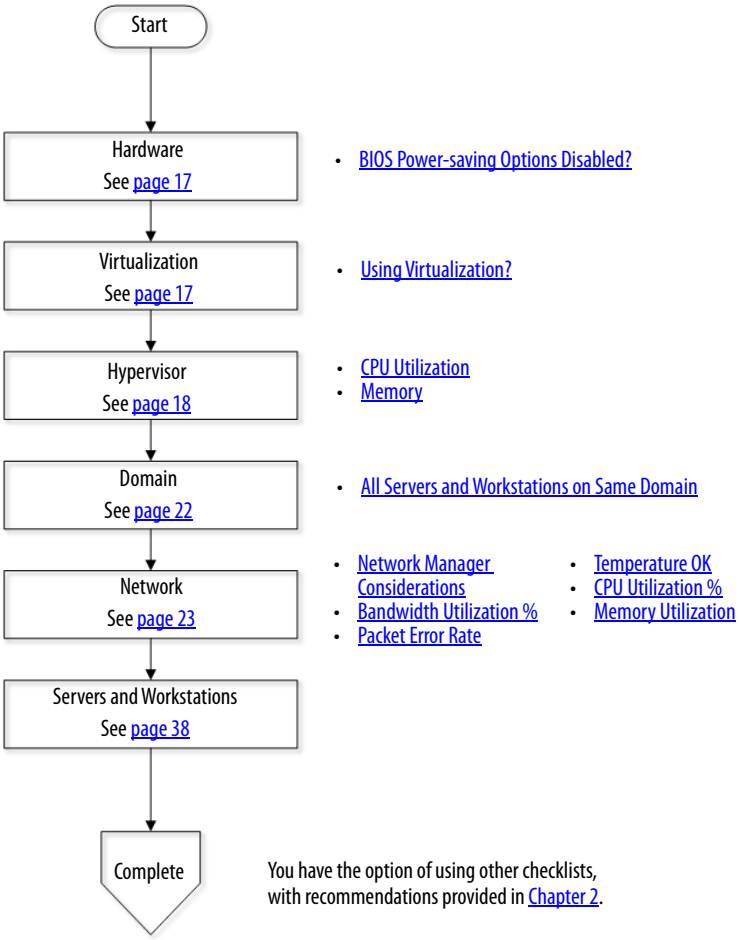
TIP The download of the tool is not required. If this tool is not used, you can collect information manually from the web pages of each Stratix® switch.

Your system infrastructure has been configured per the following instructions in the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

- You have defined a range of IP addresses for the DHCP server in the domain, if applicable for your system.
- You have created groups and assigned users in the domain controller.
- If you are using virtualization, the VMware vSphere Client software is installed and connected to a vCenter server or ESXi (hypervisor) host.

Click the page number or the links in the workflow for quick access to specific information.

Figure 3 - System Infrastructure Workflow



Hardware

IMPORTANT You can only access a computer BIOS when restarting that computer. Make sure that you are in a non-productive environment to restart a computer.

BIOS Power-saving Options Disabled?

From the computer BIOS, verify that the BIOS power-saving options are disabled. Power-saving options reduce computer resources for your system elements.

1. From the checklist pull-down menu, choose Yes or No to indicate if you have disabled power-saving options in all computers in the system.
2. Observe your results and make necessary changes.

	Not complete until an option is chosen.
	Yes; pass.
	No; fail. Correct and reverify.

Virtualization

Your PlantPAx system servers and workstations can be deployed in a traditional and a virtualized environment. Traditional, for our purposes, means that each server or workstation uses an operating system (OS) that is natively on the computer. Virtual machines are installed on an operating system (OS) that is independent of the computer hardware being used.

Using Virtualization?

This row verifies if virtualization is used.

1. From the checklist pull-down menu, choose Yes or No to indicate if you are using a virtual environment.
2. Observe your results and make any necessary changes.

	No; you are using a traditional infrastructure.
	Yes; you are using virtualization. This option applies whether you are using the PlantPAx virtual image templates or another virtual system.

Hypervisor

This section applies only if virtualization is being used. The row verifies the settings, sizing, and loading of the virtual infrastructure. A hypervisor is a software program that allows multiple operating systems to share one hardware host. Each operating system appears to have the host processor, memory, and other resources all to itself.

IMPORTANT We recommend that you perform the verification procedure for every host server (hypervisor) in your PlantPAx system.

Before you begin, generate a host summary report to gather performance readings to this section of the checklist. Complete these steps.

1. Open a web browser.

   We recommend Firefox web browser.

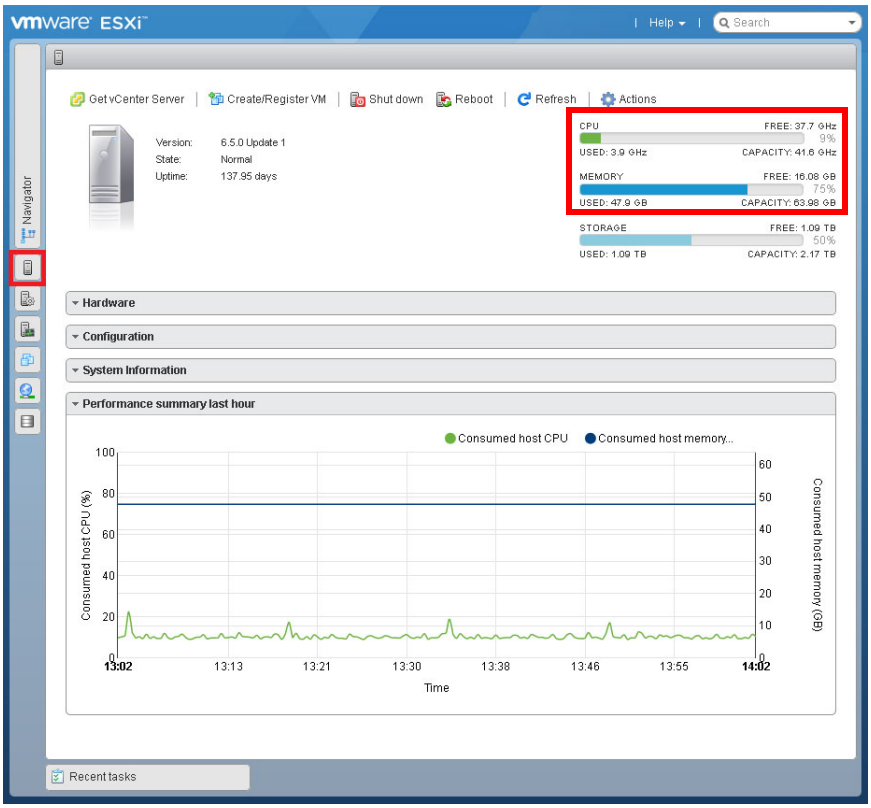
2. Type the IP address of the vCenter server.

   The web login page appears.

3. Click the web client.
4. Type your user name and password for the single-server login.

If a group of ESXi hosts is available in the selected context, select the host or group of hosts from the Source list, and then click Next. This action generates an HTML output. Print the output and attach the information to the Hypervisor checklist section.

TIP In the Notes section of the checklist, record the CPU and memory utilization. You can also use the memory information in the Data server section of the PASS checklist. See page 106.



CPU Utilization

The checklist row verifies the CPU utilization of the hypervisor.

1. From the host summary report that is generated on page 18, record the CPU utilization in the checklist and press Enter.
2. Observe your results and make necessary changes.

	Not complete until a value is entered.
	Yes; pass. CPU utilization is within 50% of used resources.
	No; fail. CPU utilization exceeds system recommendations.

For virtual image recommendations per system element, see the PlantPAx DCS Selection Guide, publication PROCES-SG001.

Memory

The checklist row verifies the memory utilization of the hypervisor.

1. From the host summary report that is generated on page 18, record the CPU utilization in the checklist and press Enter.
2. Observe your results and make necessary changes.

	Not complete until a value is entered.
	Yes; pass. Memory utilization is within 50% of used resources.
	No; fail. Memory utilization exceeds system recommendations.

For virtual image recommendations per system element, see the PlantPAx DCS Selection Guide, publication PROCES-SG001.

Resource Pool Allocation

Each virtual machine (VM) consumes a portion of the hypervisor resources. Resource allocation is performed on an individual VM basis by using shares, reservations, and limits. Setting these values on every VM is time-consuming. Resource pools, however, provide dynamic allocation of CPU and memory resources for efficiently scaled servers and workstations.

Virtual memory shares are set by priority: High, Normal, Low depending on the minimum reservation per system element. Table 4 shows our recommendation for three resource pools with the server-type allotment.

Table 4 - Server Resource Pool Allocation

Resource Pool Name	CPU Shares	CPU Reservation	Memory Shares	Memory Reservation	Server or Workstation
High	High	50% of available host CPU Hz	High	Minimum as specified for each virtual template	PASS OWS AppServ-OWS
Normal	Normal	Zero	Normal	Zero	EWS AppServ-EWS AppServ-Asset AppServ-Batch AppServ-Info
Low	Low	Zero	Low	Zero	FactoryTalk Directory Domain Controller

For more information on resource pool allocation, see the PlantPAx DCS Reference Manual, publication PROCES-RM001.

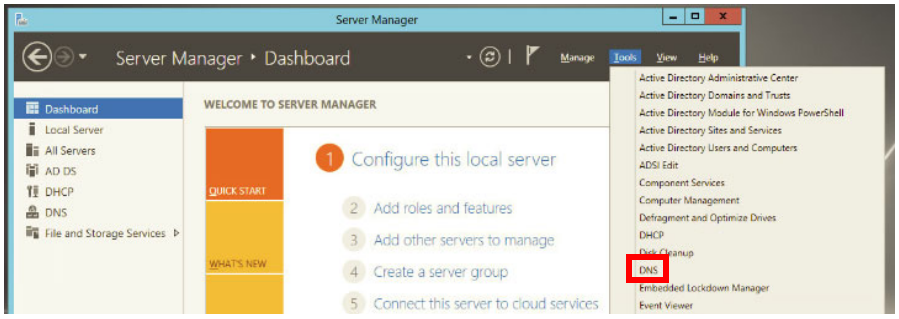
Domain

This section of the checklist verifies that all system servers and workstations are on a Windows Domain per system recommendations.

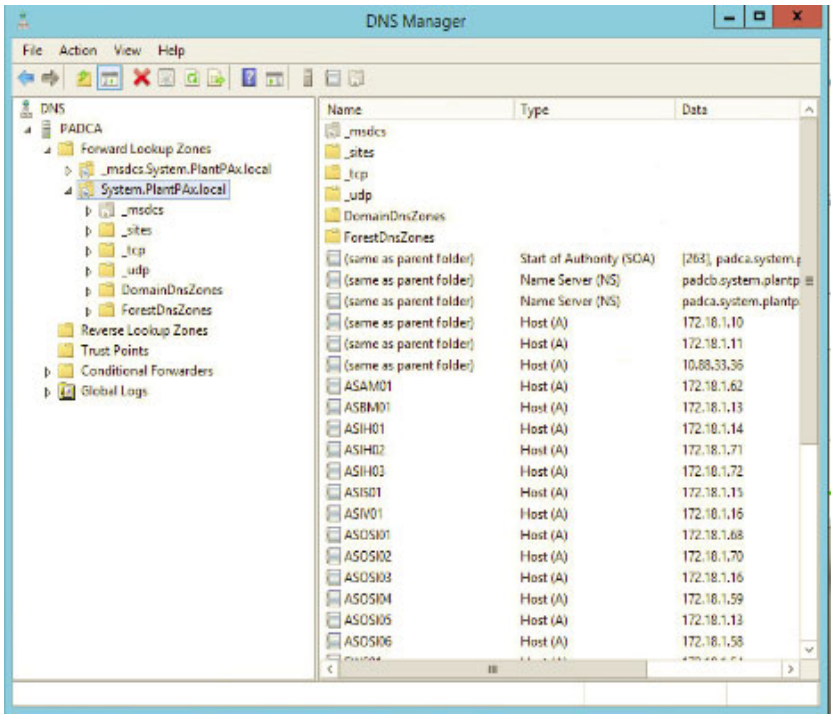
All Servers and Workstations on Same Domain

This row on the checklist verifies that the servers and workstations are configured on the DNS server. Complete these steps.

1. Open the Server Manager, click Tools, and choose DNS.



2. Verify that all servers and workstations are listed on the DNS Manager dialog box.



You also can use this list to complete the Servers and Workstations section on page 38.

3. From the checklist pull-down menu, choose Yes or No if you are using a Windows Domain.

4. Observe your results and make necessary changes.

	Not complete until an option is chosen.
	No; warning. If you do not intend to use a domain, make sure that your system has fewer than 10 servers and workstations. You also are responsible to make sure that time synchronization, security policies, and user configuration are manually shared across all computers on the system.
	Yes, pass.

Network

This section describes how to run the FactoryTalk® Network Manager™ tool to monitor your network. The tool accesses Stratix® and Cisco® network switches to diagnose the health of the network, and inventories device types and other parameters on the network.

IMPORTANT Example screen facsimiles in this section could be different than shown because of updates to FactoryTalk Network Manager. For current installation and operating instructions, see the FactoryTalk Network Manager Quick Start Guide, publication FTNM-QS001.

Network Manager Considerations

To download and install the tool, go to the PCDC at https://compatibility.rockwellautomation.com/Pages/home.aspx#/scenarios

Before you use the tool, consider the following for best performance:

- You cannot use Internet Explorer with these procedures. We recommend that you use Chrome or Firefox web browser.
- The password ‘admin123’ must be changed after you initially open the software. We recommend that you create dedicated users to your application configuration and disable default user names.
- When you create an access profile, make sure that the SSH protocol is enabled and the SNMP is configured in all switches as documented in Chapter 1 of the PlantPAx Distributed Control System Infrastructure Configuration User Manual, publication PROCES-UM001.
- To enable external access, you must create an inbound Windows firewall connection (TCP 8443).

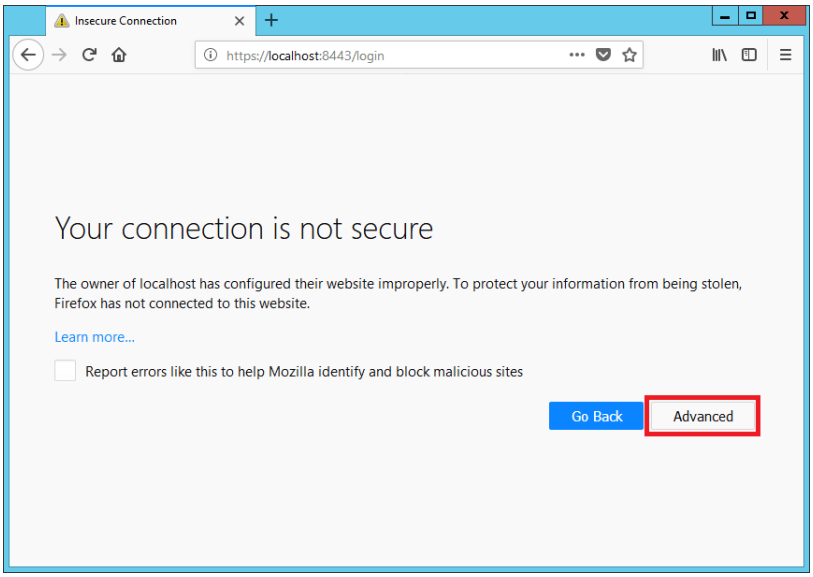
First Time Network Manager Logon

This section describes procedures for initially logging on to the tool. Complete these steps.

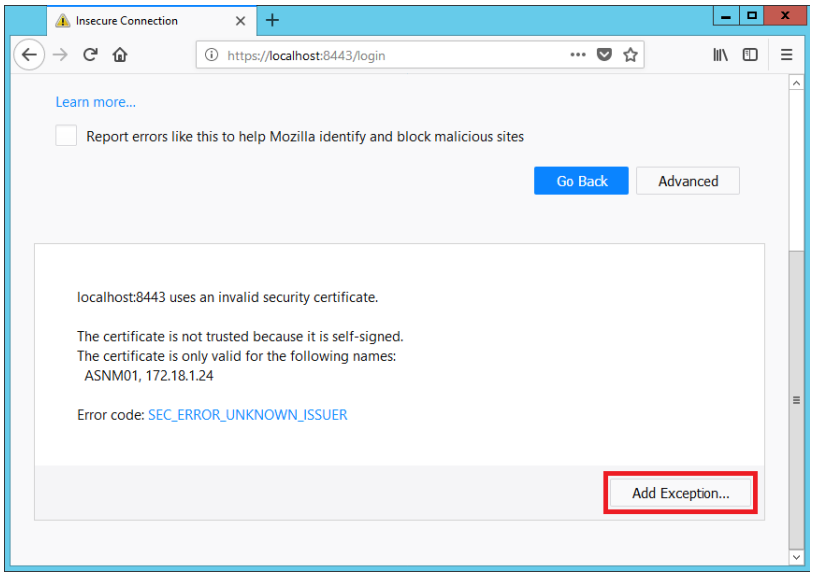
TIP Steps 1...5 must be configured for each computer that is using the Network Manager. Steps 6...8 are performed once.

1. Open the Chrome or Firefox web browser.

   We are adding an exception because the network manager is using a self-signed certificate.



2. Click Advanced.
3. Click Add Exception.

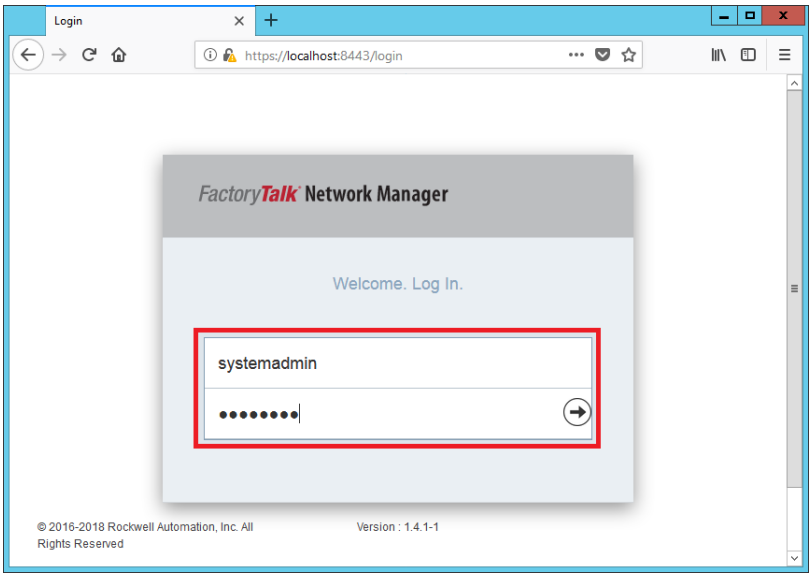


4. Type the URL <https://hostname:portNum/login>, replacing <hostname> with the host name of the network manager server. We suggest this firewall rule to allow for traffic on port number 8443.

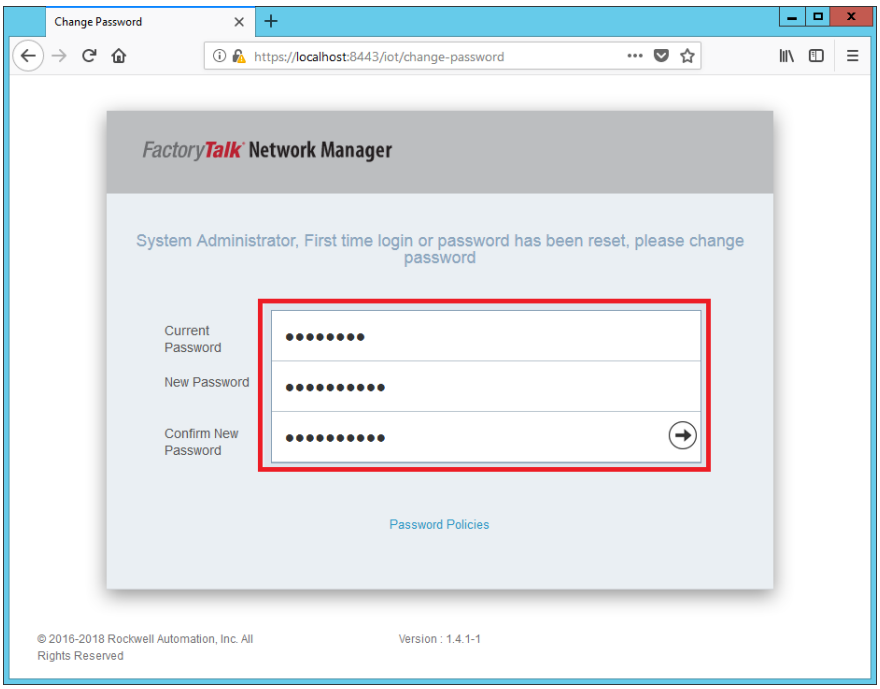
5. Confirm Security Exception.

   A Welcome Login dialog box appears.

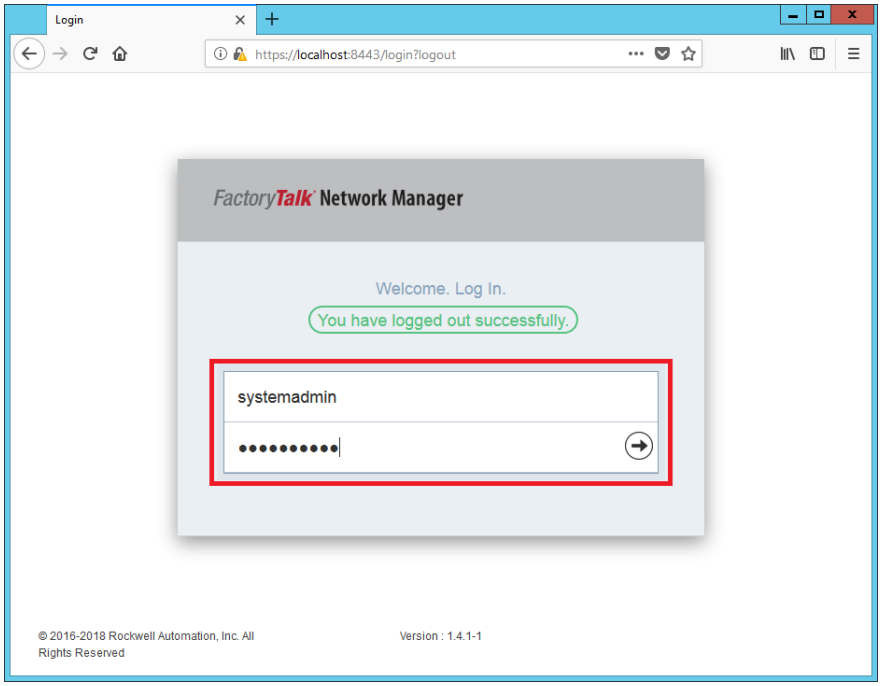
6. Type systemadmin for the user name and admin123 for the password.



7. Retype admin123 in the Current Password text box, and then type a new password.
8. To confirm the entry, retype the new password.



9. Type systemadmin and the new password.

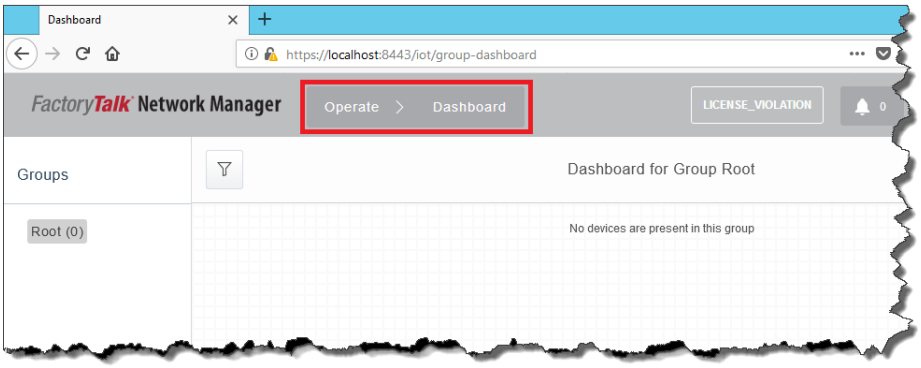


The Network Manager dashboard appears.

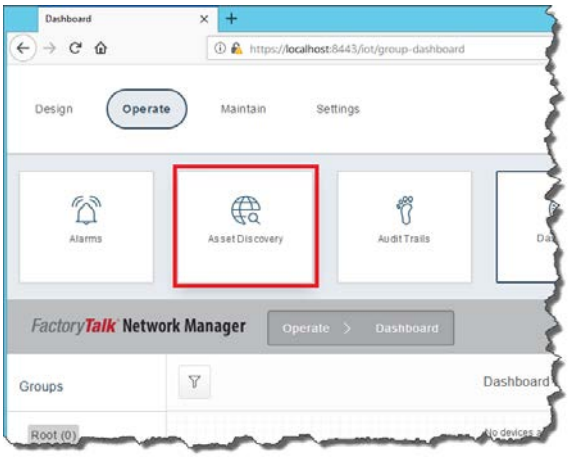
Discovering Assets

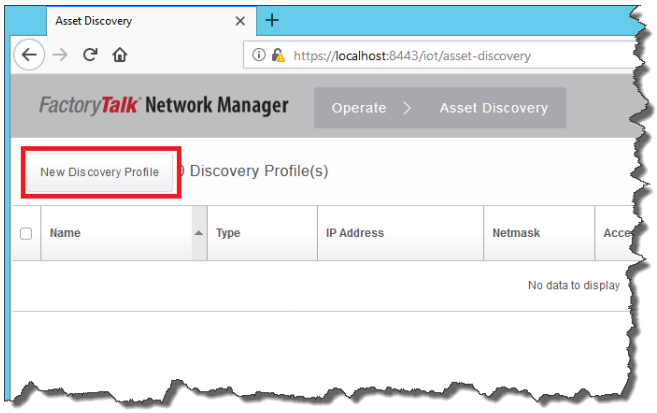
This section describes how to configure the tool to retrieve network asset information that comprises your system. Complete these steps.

1. From the Network Manager dashboard, click Operate>Dashboard.

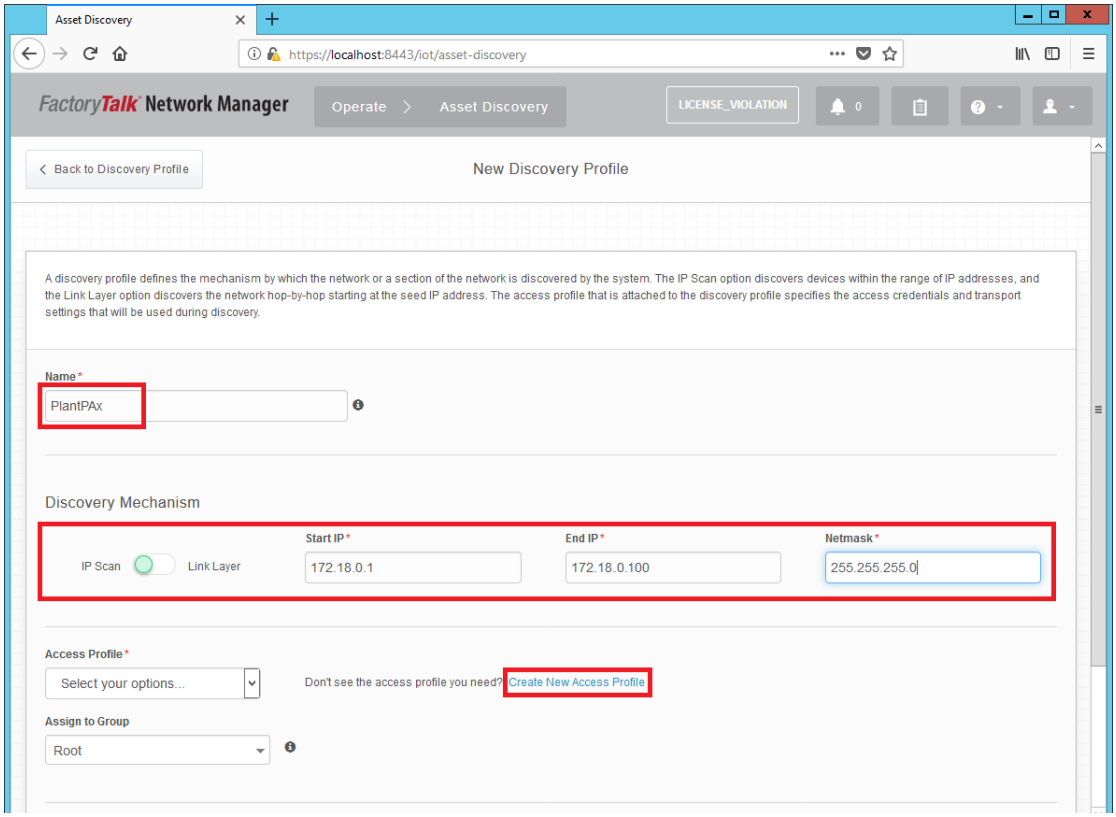


2. Click Asset Discovery and then New Discovery Profile.

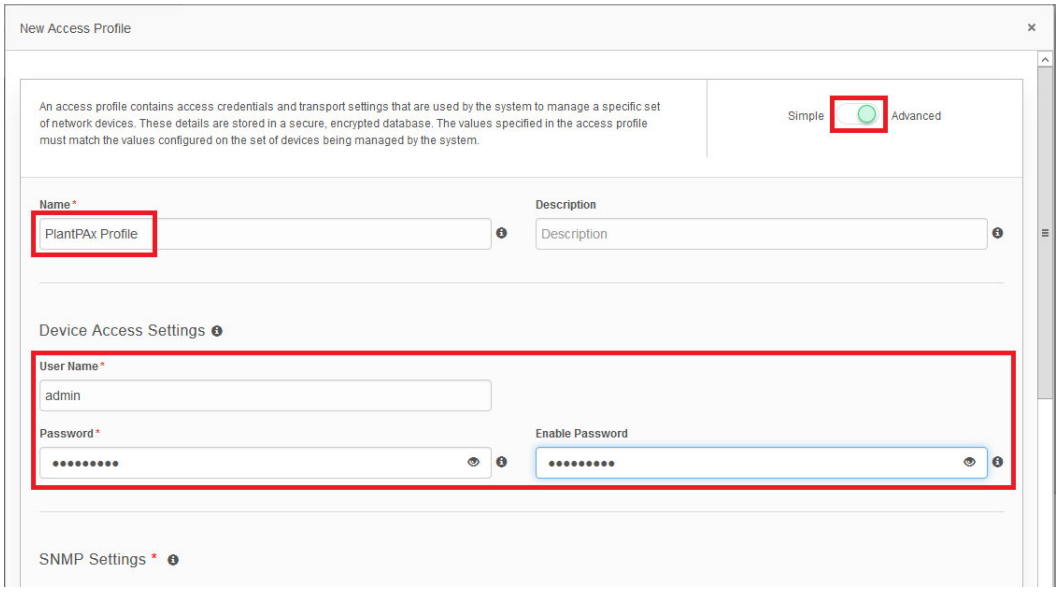




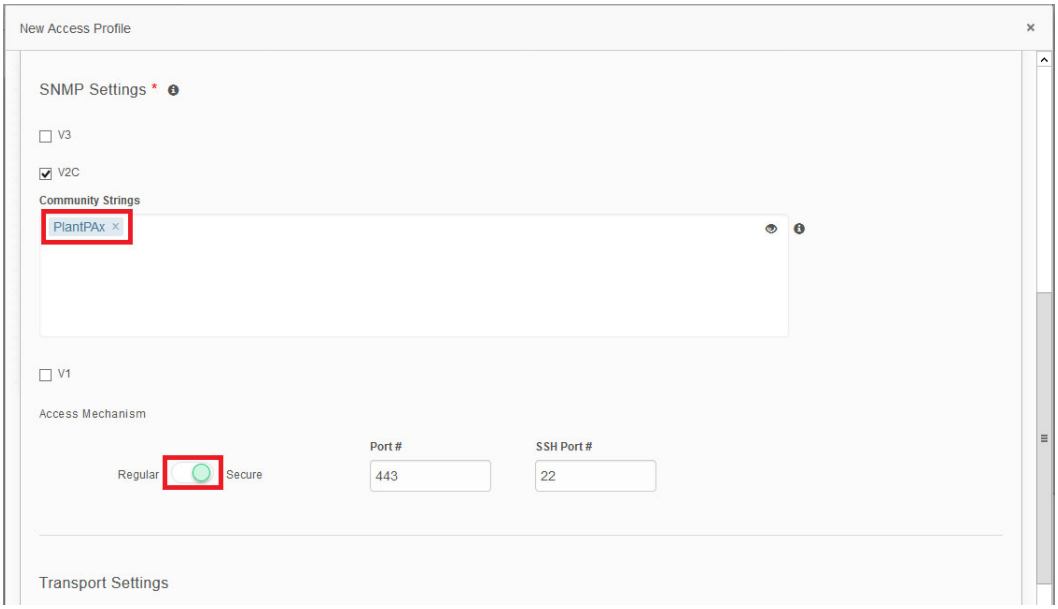
3. To define a discovery profile, you do the following:
   a. Type a profile name. For example, PlantPAx.
   b. Click IP Scan and type a range of IP addresses.
   c. Type a Netmask.
   d. Click Create New Access Profile.



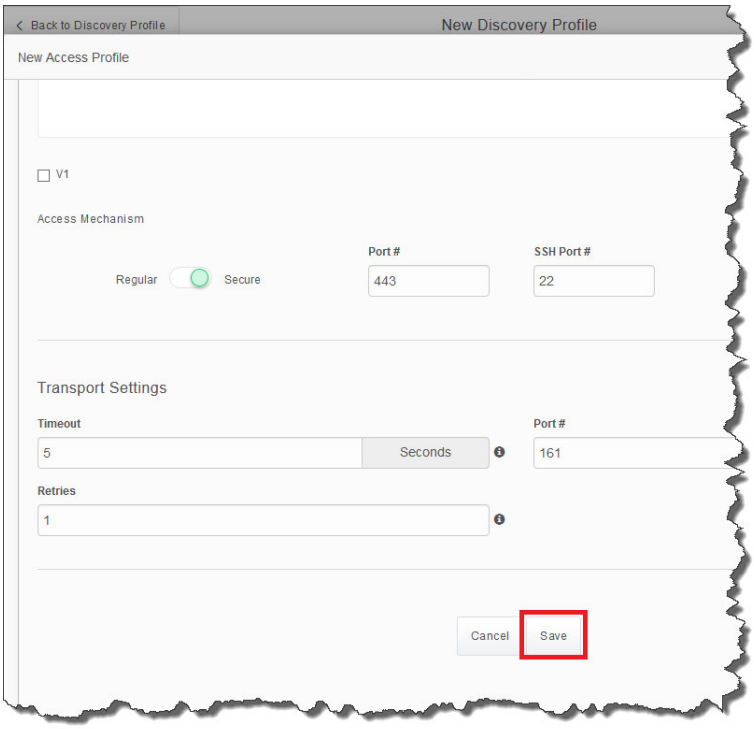
4. To define an access profile, do the following:
   a. Click Advanced.
   b. Type an access profile name. For example, PlantPAx Profile.
   c. Type the user name and password that matches the network switches configuration.
   d. Reenter the same password to confirm the entry.



5. Delete the defaults Community String (public).
6. Type your Community String. The example references the switch configuration that is documented in the PlantPAx Distributed Control System Infrastructure Configuration User Manual, publication PROCES-UM001.
7. Click Secure.

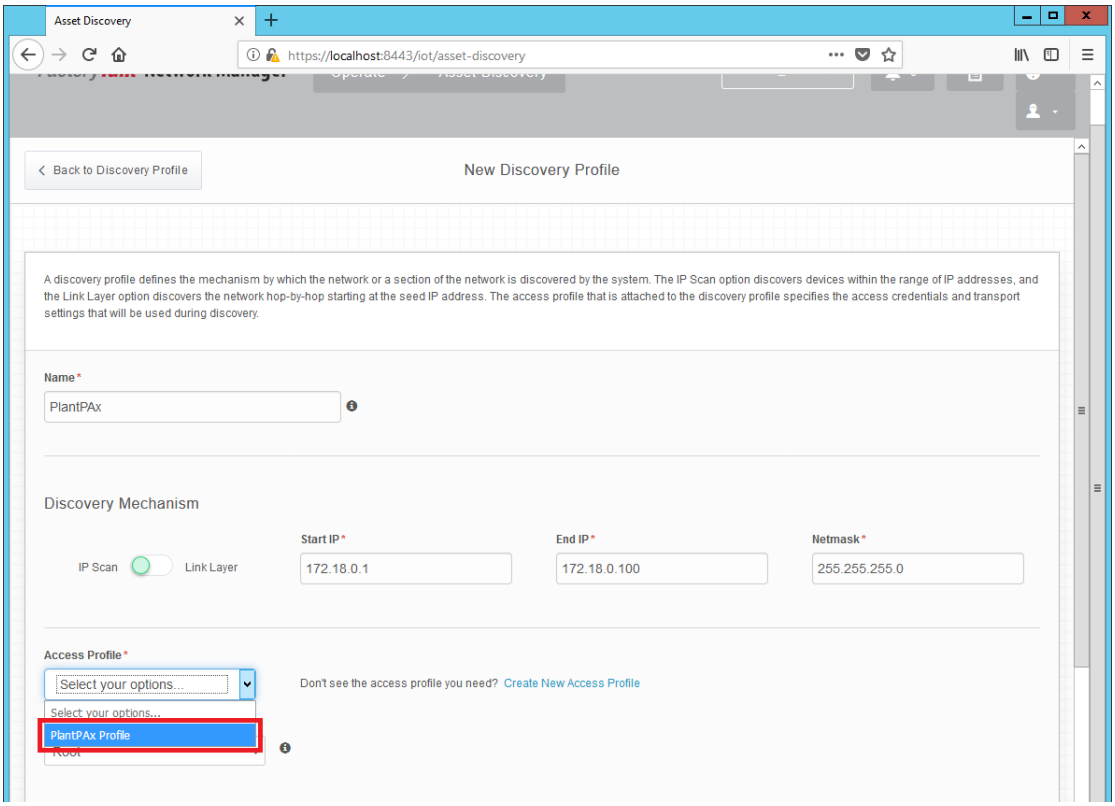


8. Click Save.

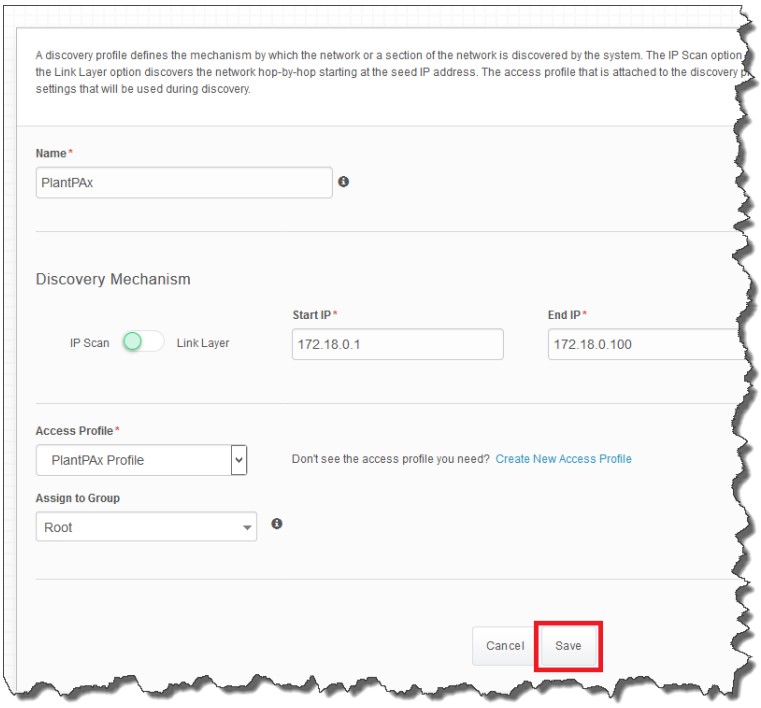


9. To access your profile, click the Access Profile pull-down menu and choose your access profile name.

   The name is the same as entered in step 4.

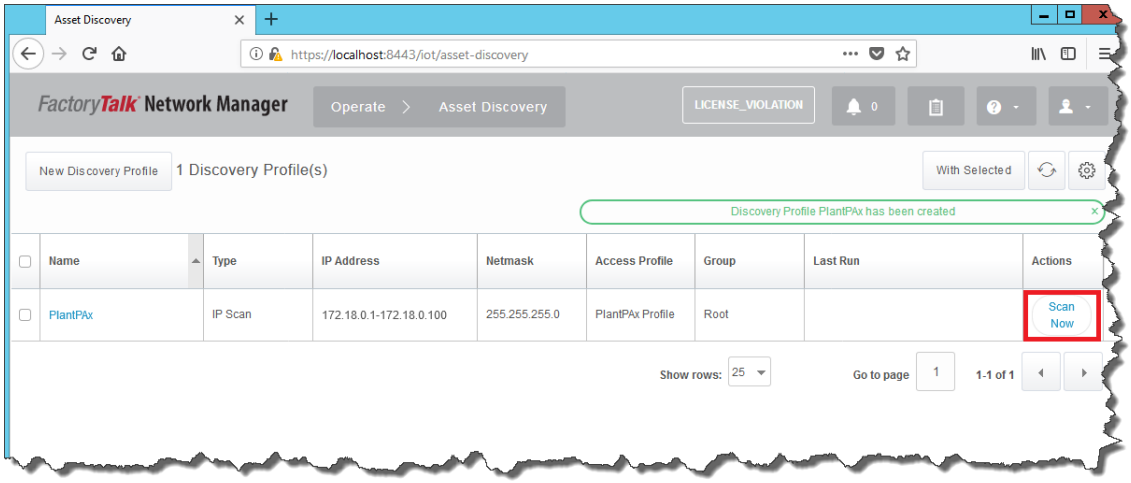


10. Click Save.



Your profile information appears in respective columns.

11. Click Scan Now.

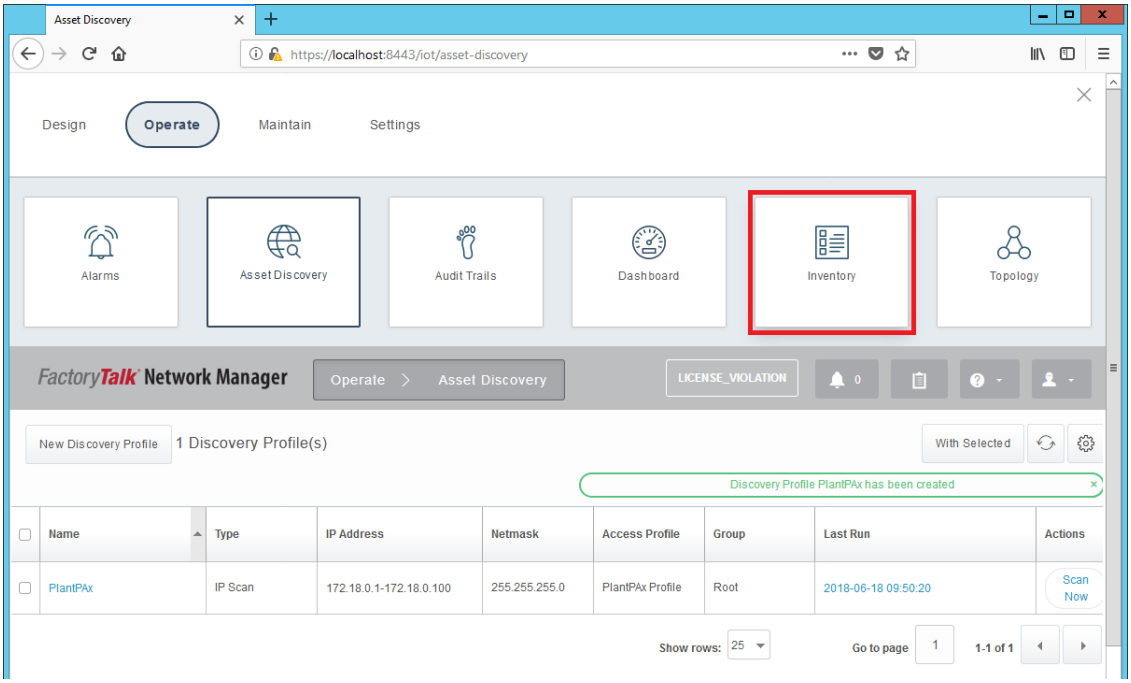


This procedure can take several minutes to discover network assets.

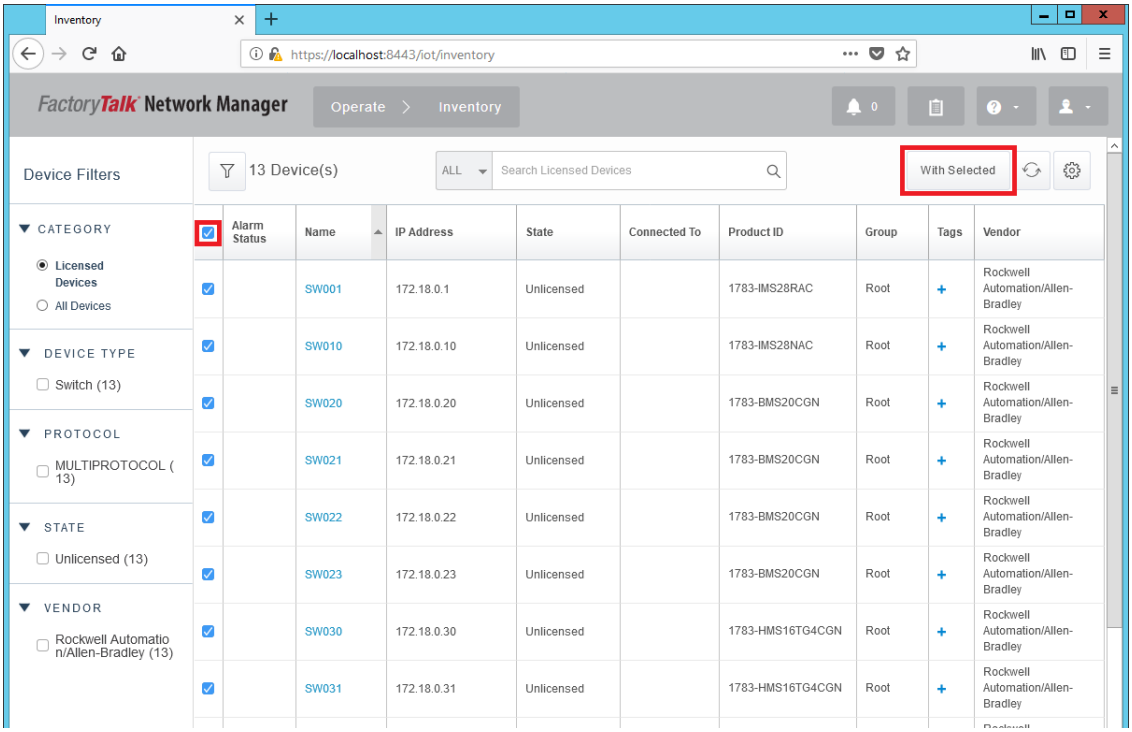
Checking Inventory

This section describes how to inventory and license the assets in your system.

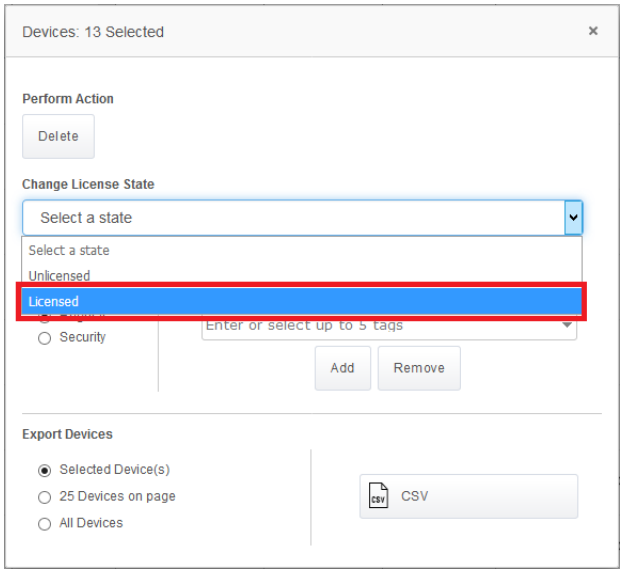
1. Click Operate>Inventory.



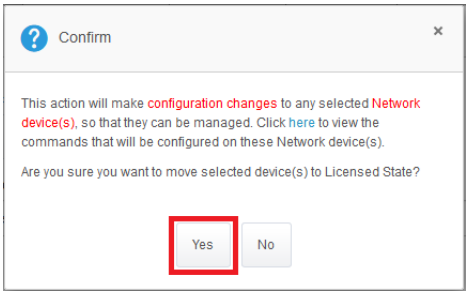
2. Click Select All and click 'With Selected'.



3. Click the Change License State pull-down, and choose Licensed.

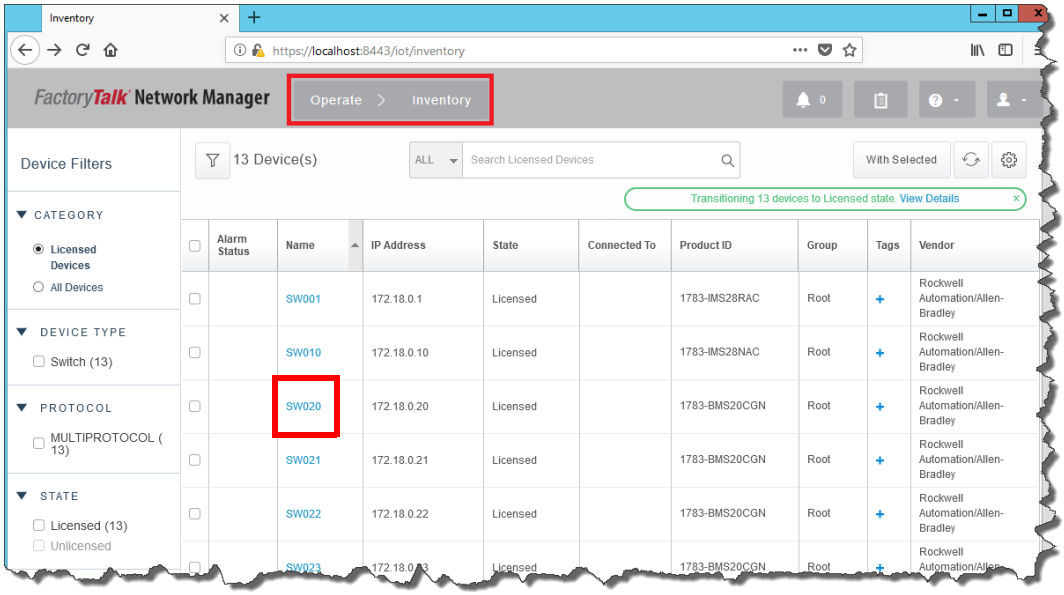


4. Click Yes.

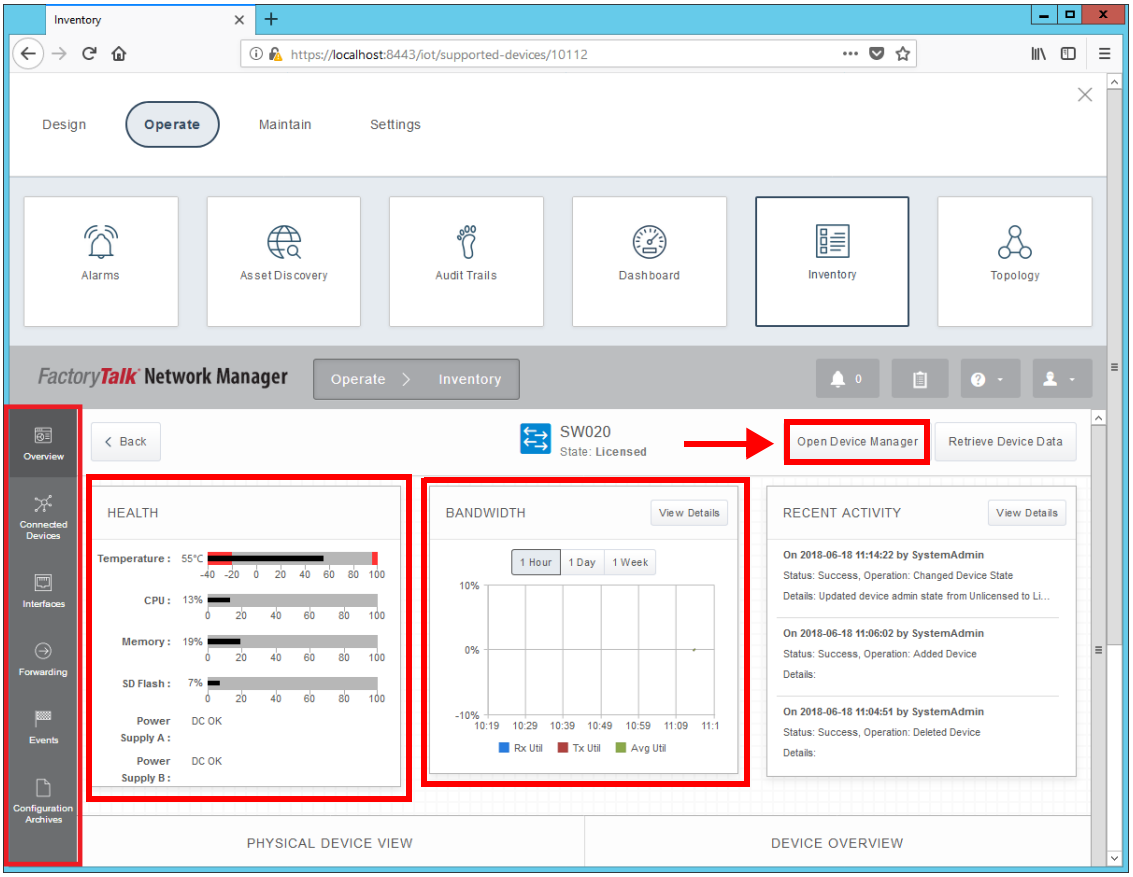


The Inventory dialog reappears with 'Licensed' for the state of the selected device filters.

5. Click a switch name to collect information for the checklist.



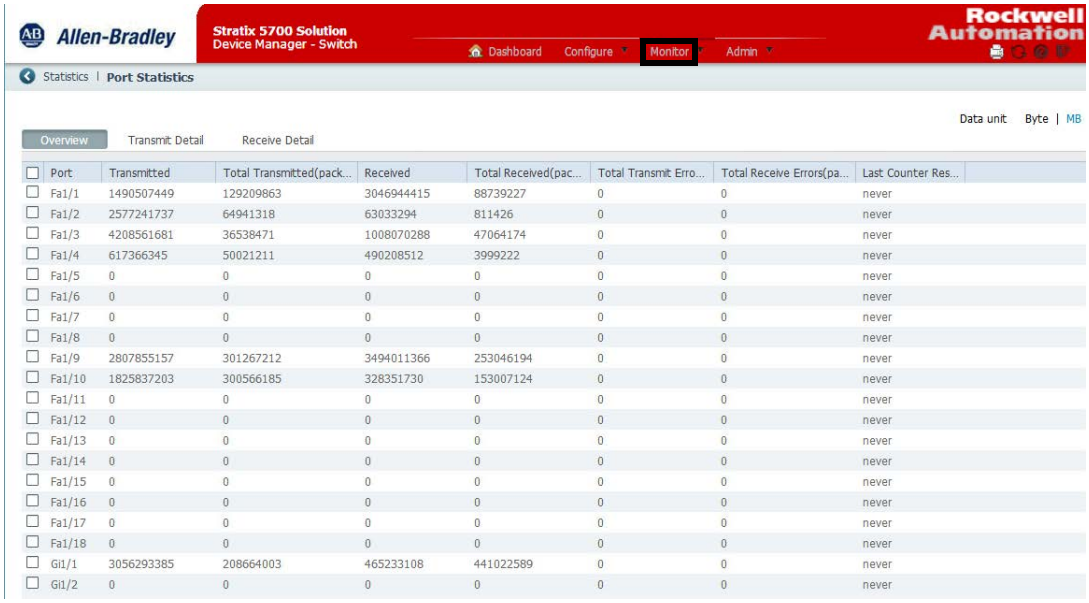
Information for the selected switch, such as temperature, CPU usage, and bandwidth, appears.



6. Click Open Device Manager.

   Details for the selected switch appear.

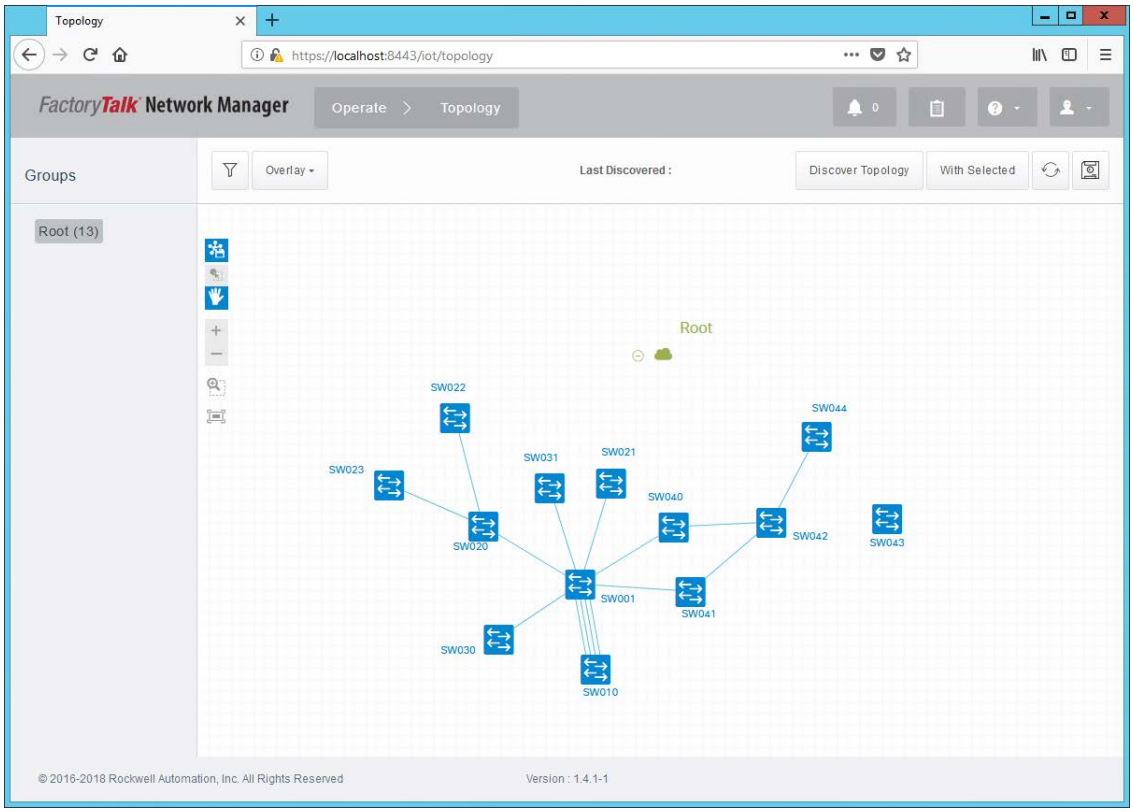
7. Click the Monitor tabs and choose Port Statistics.



Port	Transmitted	Total Transmitted(pack...	Received	Total Received(pac...	Total Transmit Erro...	Total Receive Errors(pa...	Last Counter Res...
Fa1/1	1490507449	129209863	3046944415	88739227	0	0	never
Fa1/2	2577241737	64941318	63033294	811426	0	0	never
Fa1/3	4208561681	36538471	1008070288	47064174	0	0	never
Fa1/4	617366345	50021211	490208512	3999222	0	0	never
Fa1/5	0	0	0	0	0	0	never
Fa1/6	0	0	0	0	0	0	never
Fa1/7	0	0	0	0	0	0	never
Fa1/8	0	0	0	0	0	0	never
Fa1/9	2807855157	301267212	3494011366	253046194	0	0	never
Fa1/10	1825837203	300566185	328351730	153007124	0	0	never
Fa1/11	0	0	0	0	0	0	never
Fa1/12	0	0	0	0	0	0	never
Fa1/13	0	0	0	0	0	0	never
Fa1/14	0	0	0	0	0	0	never
Fa1/15	0	0	0	0	0	0	never
Fa1/16	0	0	0	0	0	0	never
Fa1/17	0	0	0	0	0	0	never
Fa1/18	0	0	0	0	0	0	never
Gi1/1	3056293385	208664003	465233108	441022589	0	0	never
Gi1/2	0	0	0	0	0	0	never

Checking Topology

A topology diagram appears. You can move the switches around for better visibility, if desired.



Checklist Options

You have the option of manually generating additional checklist information into the following rows:

- Bandwidth Utilization %
- Packet Error Rate
- Temperature OK
- CPU Utilization %
- Memory Utilization

Bandwidth Utilization %

This row verifies that the allocation of bandwidth resources is within PlantPAx system recommendations.

1. Identify and record the highest bandwidth utilization percentage of all network switches.
2. Observe the results and make any necessary changes.

	Not complete until a value is entered.
	50% and up is a fail. Review and verify the network architecture for system compliance or call a Rockwell Automation® Support representative.
	Pass.

Packet Error Rate

This row verifies that the error rate for message handling is zero to comply with PlantPAx system recommendations.

1. Identify and record the highest packet error rate for messaging and press Enter.
2. Observe the results and make any necessary changes.

	Not complete until a value is entered.
	Fail. Error rate is greater than 0. If the error rate is not zero, but not increasing, we recommend a reset. Review and verify the network architecture for system compliance or call a Rockwell Automation Support representative.
	Pass.

Temperature OK

This row verifies that all devices are not reporting a high temperature reading.

1. From the checklist pull-down menu, choose Yes or No to indicate whether the temperature of all switches is within system recommendations.
2. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No; fail. Rectify the environment and verify the network design. You also can call a Rockwell Automation Support representative.
	Yes; pass.

CPU Utilization %

This row verifies the percentage of CPU resources that are allocated to a device.

1. Identify and record the highest CPU utilization percentage of all switches, and press Enter.
2. Observe the results and make any necessary changes.

	Not complete until a value is entered.
	No; fail. CPU allocation is greater than 50%. Review and verify the network architecture for system compliance or call a Rockwell Automation Support representative.
	Yes; pass.

Memory Utilization

This row verifies the percentage of memory that is used by a network switch.

1. Identify and record the highest memory utilization percentage of the memory that is reserved, and press Enter.
2. Observe the results and make any necessary changes.

	Not complete until a value is entered.
	No; fail. Memory usage is greater than 50%. Review and verify the network architecture for system compliance or call a Rockwell Automation Support representative.
	Yes; pass.

Servers and Workstations

This informational row documents all your system servers and workstations. You can use the list on the DNS Manager dialog box, as shown on page 22.

1. Type the computer name for the system element and press Enter.

   For example, PASS01.
2. From the System Role pull-down menu, choose the role.

   For example, domain controller, PASS, EWS. For the PASS--C choose PASS.
3. Repeat step 1 and step 2 for each server and workstation in your system.

When all entry fields are verified, type the name of the person who completed the checklist and the completion date. We suggest that you store the checklist and any attachments in an accessible location to compare with future system data. Discrepancies can show potential issues that could adversely affect performance.

You can close the Microsoft Excel workbook or click another tab to continue to verify data.

Server or Workstation Checklist

This chapter describes verification procedures of basic configuration for each server and workstation in the PlantPAx® system.

The purpose of this checklist is to verify your system data against PlantPAx system design recommendations. The collection of data lets you analyze overall system performance and pinpoint any potential performance issues.

The Microsoft® Excel® worksheet, which we refer to as a checklist, has entry fields to document system design information. There are five icons that indicate the status of the entered information and actions to be taken, if necessary. The checklist data provides a snapshot of whether your system is operating efficiently.

To access this checklist, click the <Server or WS Name> tab on the Microsoft Excel workbook.

IMPORTANT Complete this checklist for each computer on your system. To duplicate a checklist, do the following:

- Right-click the <Server or WS name> tab and choose Move or Copy.
- Click Create a copy and then click OK.
- Double-click the checklist name and type a name that identifies the computer that you are verifying.

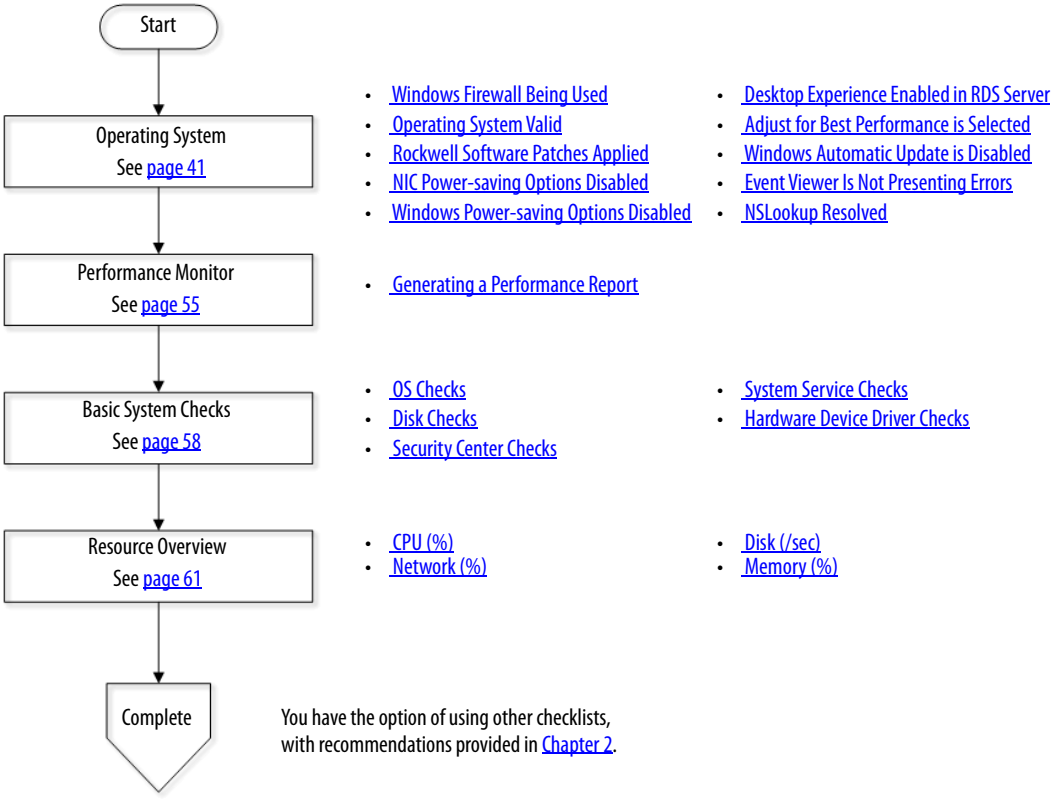
Before You Begin

The Server or Workstation Name checklist procedures operate under the following assumptions:

- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have access to the following tools to complete the checklist:
  - Microsoft Excel software
  - Performance Monitor (PerfMon) utility is connected to the servers and workstations that are being verified

Click the page number or the links in the workflow for quick access to specific information.

Figure 4 - Server or Workstation Workflow



Operating System

The rows in this checklist section verify the following operating system requirements:

- Windows Firewall Being Used
- Operating System Valid
- Rockwell Software Patches Applied
- NIC Power-saving Options Disabled
- Windows Power-saving Options Disabled
- Desktop Experience Enabled in RDS Server
- Adjust for Best Performance is Selected
- Data Execution Prevention (DEP) Turn On for Essential Items
- User Account Control (UAC) Never Notify
- Windows Automatic Update is Disabled
- Event Viewer Is Not Presenting Errors
- NSLookup Resolved

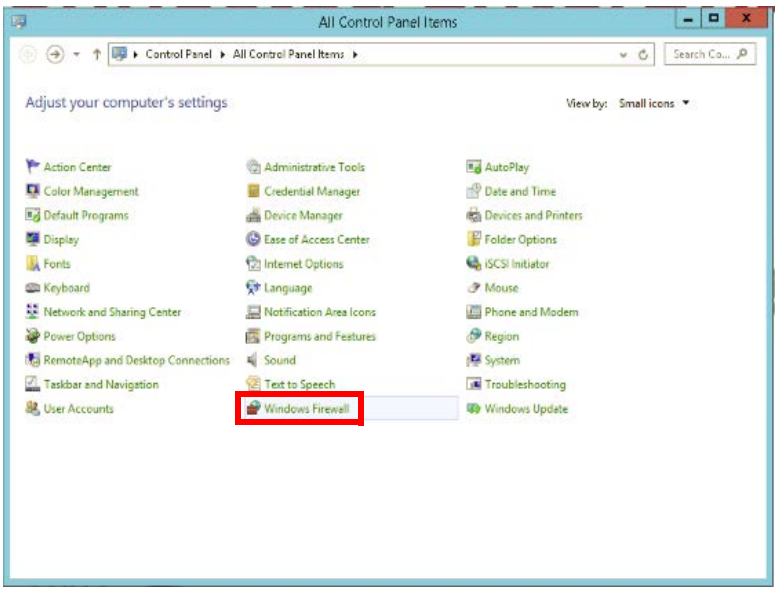
IMPORTANT Complete this checklist for each server and workstation in your system.

Windows Firewall Being Used

A Windows firewall, whether Microsoft or third-party software, helps prevent outside intrusion to system operations. This row makes sure that the Windows firewall with inbound rules is active in the system. For firewall rules, see 'Enable Windows Firewall' in the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

To check if the firewall state is enabled, complete these steps before completing this section.

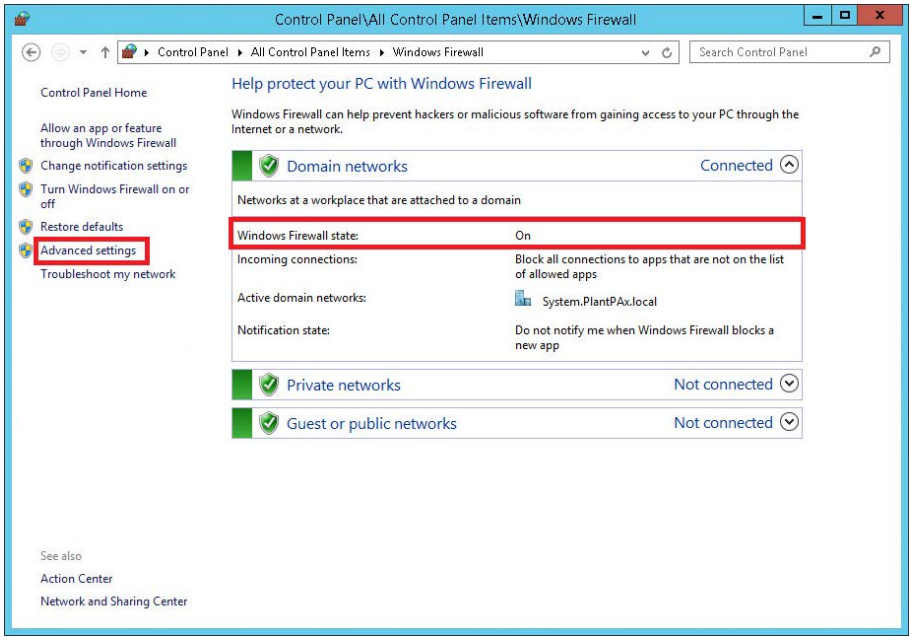
1. Open the Control Panel of the computer and choose Windows Firewall.



2. Make sure that Windows Firewall is enabled, and then choose Advanced Settings.

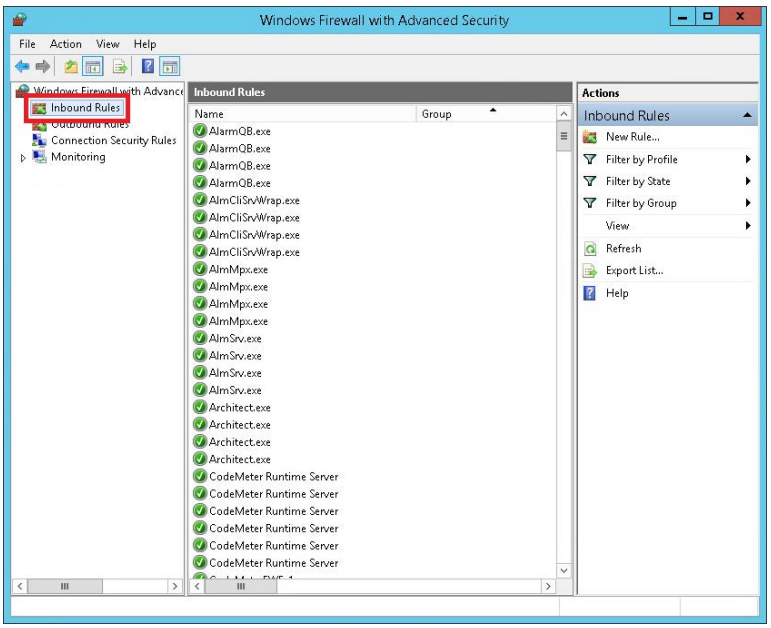
   If the firewall is not enabled (off), you receive a warning message. Proceed to step 4.

   The display example is an enabled firewall. You must repeat these steps for each computer in your system.



   Rules that are created by the Windows Firewall Utility appear under Inbound Rules. Use this list for step 3.

Inbound rules explicitly allow or block inbound network traffic that matches the criteria in the rule. You must verify that Rockwell Automation software is allowed.



3. From the checklist pull-down menu, choose Yes or No if a Rockwell Automation entry is 'Enabled' with the firewall.
4. Observe your results and make any necessary changes.

	Not complete until an option is chosen.
	No; warning. Write in the Notes column what solution is providing firewall protection or why it was disabled on this system.
	Yes, pass. We recommend that you follow firewall rules that are detailed in the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

Operating System Valid

This row verifies that the server or workstation operating system that you are using matches PlantPAx system recommendations.

IMPORTANT The following PlantPAx system firmware and software versions use these Windows operating systems:

PlantPAx system 4.6: Windows 2016, 64 bit (servers); Windows 10, 64 bit (workstations)

PlantPAx system 4.5: Windows 2012 R2, 64 bit (servers); Windows 10, 64 bit (workstations)

PlantPAx system 4.0: Windows 2012 R2, 64 bit (servers); Windows 8.1, 64 bit (workstations)

PlantPAx system 3.0: Windows 2008 R2, 64 bits (servers); Windows 7 64 bit (workstations)

For details, see the PlantPAx DCS Selection Guide, publication PROCES-SG001.

1. From the checklist pull-down menu, choose Yes or No whether you are using a valid OS for the PlantPAx system.
2. Observe your results and make any necessary changes.

	Not complete until an option is chosen.
	No; warning. Confirm and record in the Notes column that the OS being used is supported by the installed products. **NOTE:** System performance can be impacted by a mismatch of operating systems within the system.
	Yes, pass.

Rockwell Software Patches Applied

This row verifies if you are using the latest software patches for the Rockwell Automation software that is installed on your PlantPAx system. Before updating system software, we recommend that you verify software updates on a non-production system or when the facility is non-active.

IMPORTANT The Patch Validator tool verifies current software versions on your system. The tool also installs a patch roll-up.

To download, see the Knowledgebase Answer ID 30393 at https://www.rockwellautomation.custhelp.com.

1. From the checklist pull-down menu, choose Yes, No, or N/A whether you are using the current software patches.
2. Observe your results and make any necessary changes.

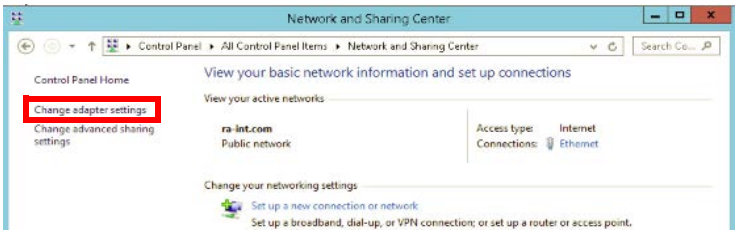
	N/A; you are in a production environment.
	No, warning. Write the Patch Validator version or date last used in the Notes section. When time permits, use the tool to perform a patch roll-up. For procedures, see the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.
	Yes, pass.

NIC Power-saving Options Disabled

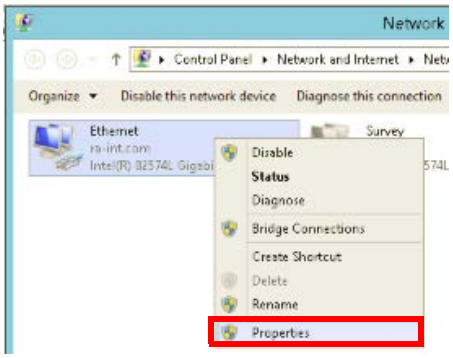
This row verifies that you have disabled power-saving for the Network Interface Card (NIC). The NIC card connects a workstation to other devices on the network. The power-saving feature turns off the network card when not in use, which can interfere with network throughput.

Complete these steps to disable NIC power-saving.

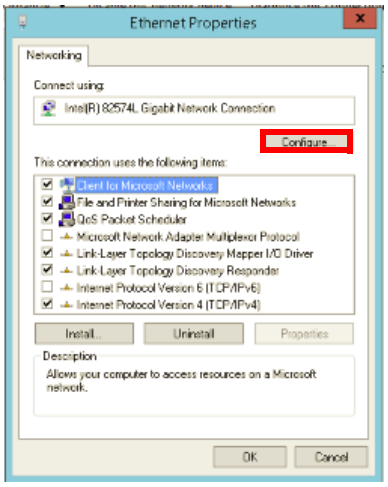
1. In Microsoft Windows, open the Control Panel and choose Network and Sharing Center.
2. Click Change adapter settings on the Network and Sharing Center dialog box.

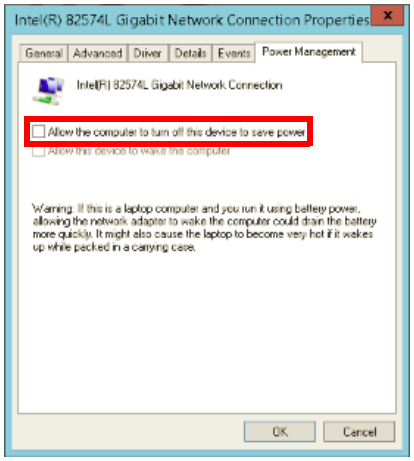


3. Right-click the Network adapter and choose Properties.



4. Click Configure, then click the Power Management tab.
5. Make sure the 'Allow the computer to turn off this device to save power' is disabled (no check mark).





6. From the checklist pull-down menu, choose Yes or No whether the NIC power-saving is disabled.
7. Observe the results and make any necessary changes.

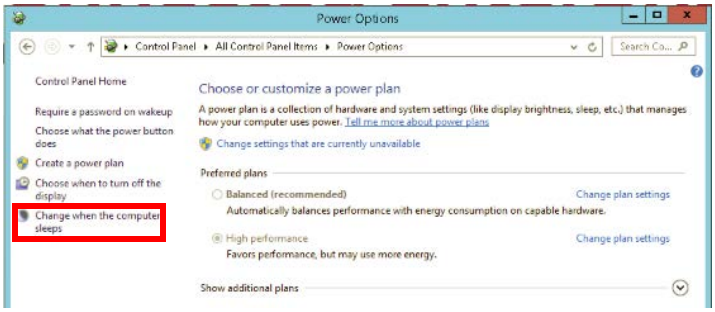
	Not complete until an option is chosen.
	No, fail. Correct and reverify.
	Yes, pass.

Windows Power-saving Options Disabled

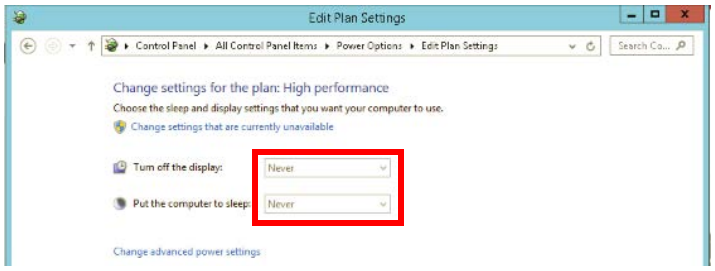
This row verifies that you have disabled power-saving for the Windows operating system. The power-saving feature turns off Windows OS features when not in use, which can interfere with network throughput.

Complete these steps to disable Windows power-saving.

1. In Microsoft Windows, open the Control Panel and choose Power Options.
2. Repeat step 2 on page 45 and step 3 on page 46.
3. Click 'Change when the computer sleeps' on the Power Options dialog box.



4. From the Put the computer to sleep pull-down menu, choose Never.



5. From the checklist pull-down menu, choose Yes or No whether the Windows power saving is disabled.
6. Observe the results and make any necessary changes.

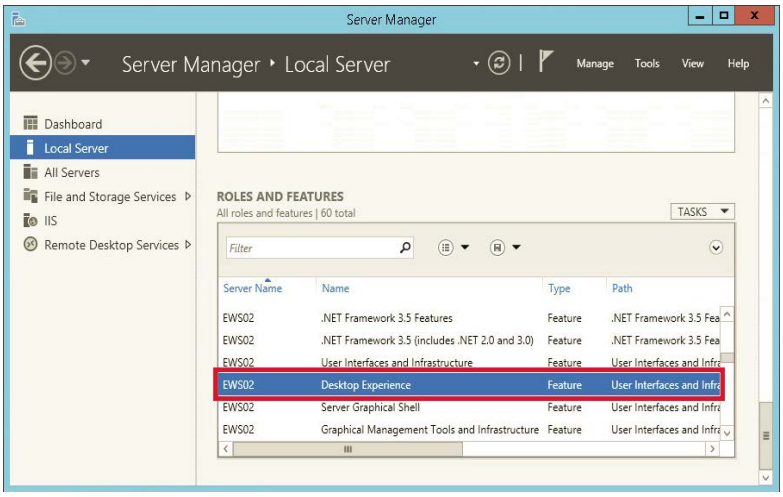
	Not complete until an option is chosen.
	No, fail. Correct and reverify.
	Yes, pass.

Desktop Experience Enabled in RDS Server

This row applies to only those application servers that are using Remote Desktop Server (RDS) functionality, such as the AppServ-EWS or AppServ-OWS. RDS enables multiple instances of the OWS and EWS as thin clients from one server. Thin clients can run applications and process data on a remote computer to minimize the amount of information on a network.

Complete these steps for AppServ-OWS and AppServ-EWS servers that are using RDS functionality.

1. From the Windows server, open Server Manager.
2. Click Local Server and review the Roles and Features listings.



3. From the checklist pull-down menu, choose Yes, No, or N/A whether desktop experience is enabled for RDS servers.
4. Observe the results and make any necessary changes.

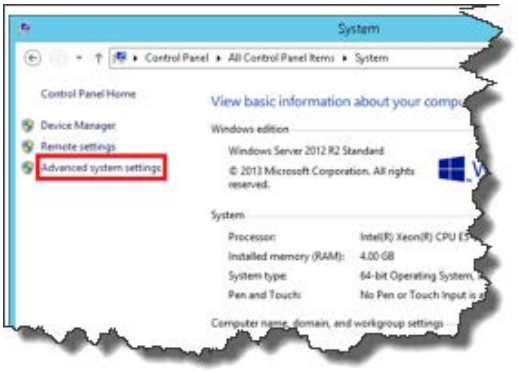
	N/A; not using RDS option.
	No, fail. Correct and reverify.
	Yes, pass.

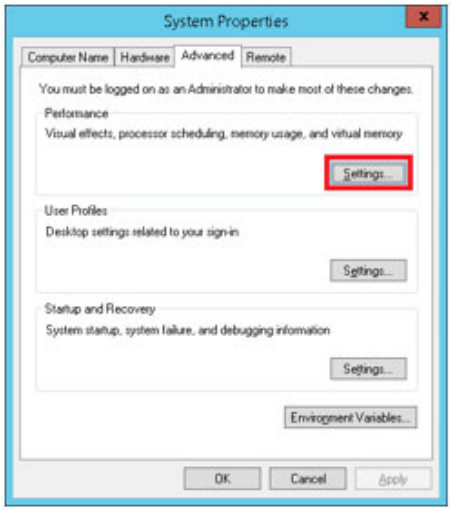
Adjust for Best Performance is Selected

This row verifies that Windows settings are enabled for best performance. When Adjust for Best Performance is selected, enhanced features that are not used are turned off, which yields more memory and performance for the system.

Complete these steps.

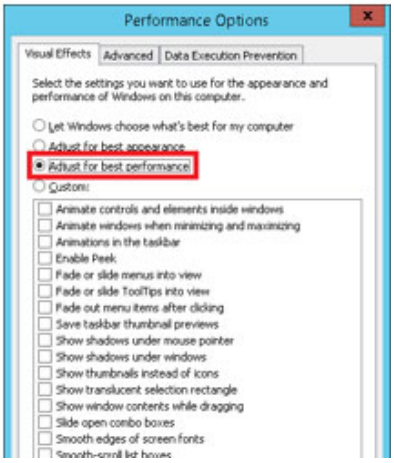
1. In Microsoft Windows, open the Control Panel and choose System.
2. Click Advanced system settings, and on the Advanced tab click Settings.





The Performance Options dialog box appears.

3. On the Visual Effects tab, make sure 'Adjust for best performance' is enabled.



4. From the checklist pull-down menu, choose Yes or No whether best performance for Windows is enabled.
5. Observe the results and make any necessary changes.

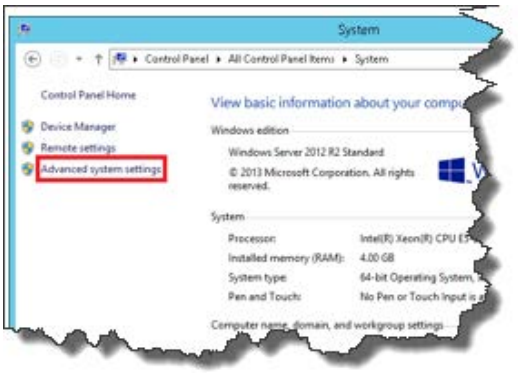
	Not complete until an option is chosen.
	No, fail. Correct and reverify.
	Yes, pass.

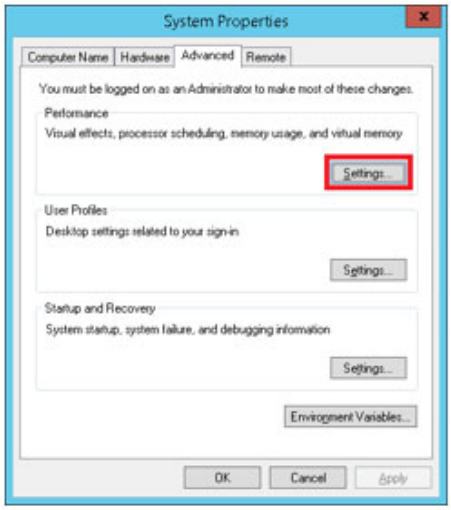
Data Execution Prevention (DEP) Turn On for Essential Items

This row verifies that Windows settings are enabled for essential Windows programs and services.

Complete these steps.

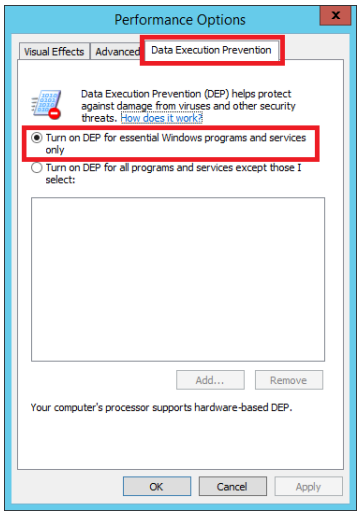
1. In Microsoft Windows, open the Control Panel and choose System.
2. Click Advanced system settings, and on the Advanced tab click Settings.





The Performance Options dialog box appears.

3. On the Data Execution Prevention tab, make sure 'Turn on DEP ...' is enabled.

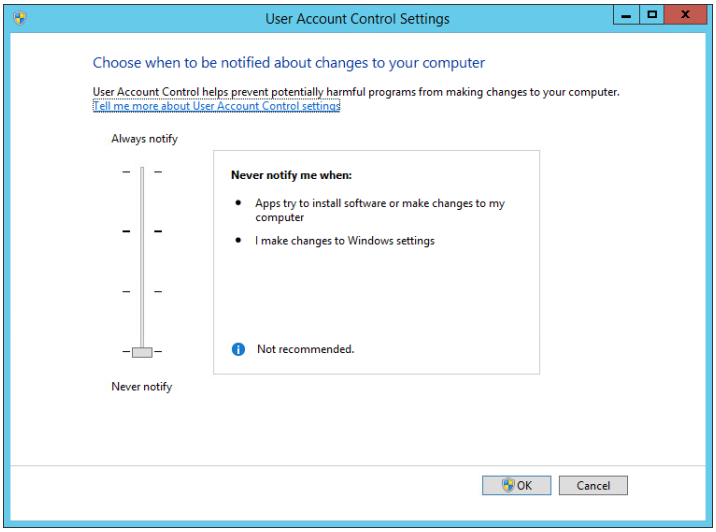


User Account Control (UAC) Never Notify

This row verifies that a user is never notified by the UAC.

Complete these steps.

1. In Microsoft Windows, open the UAC settings.
2. Confirm 'Never Notify' is enabled.



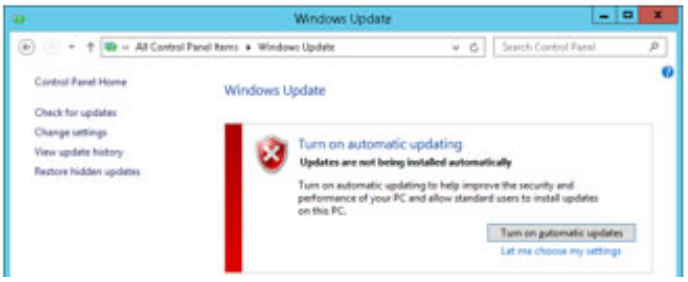
Windows Automatic Update is Disabled

This row verifies that Windows automatic update is disabled. Disabling this functionality helps prevent updates that have not been qualified by Rockwell Automation from being installed on the workstation or server.

We recommend that you verify and test updates before being installed.

Complete these steps.

1. In Microsoft Windows, open the Control Panel and choose Windows Update.
2. Make sure that the update option is disabled.



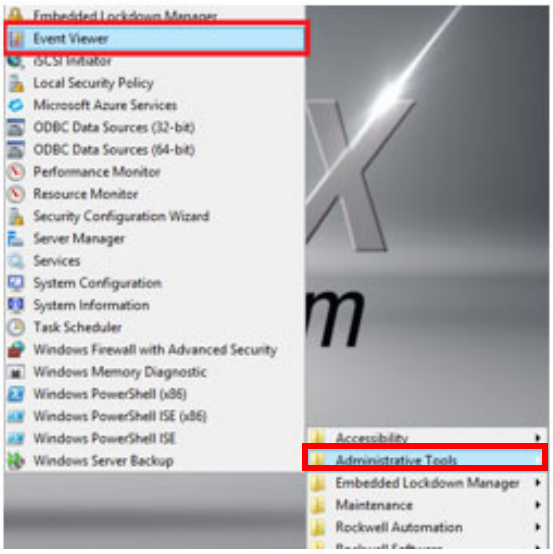
3. From the checklist pull-down menu, choose Yes or No whether Windows automatic update is enabled.
4. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Correct and reverify.
	Yes, pass.

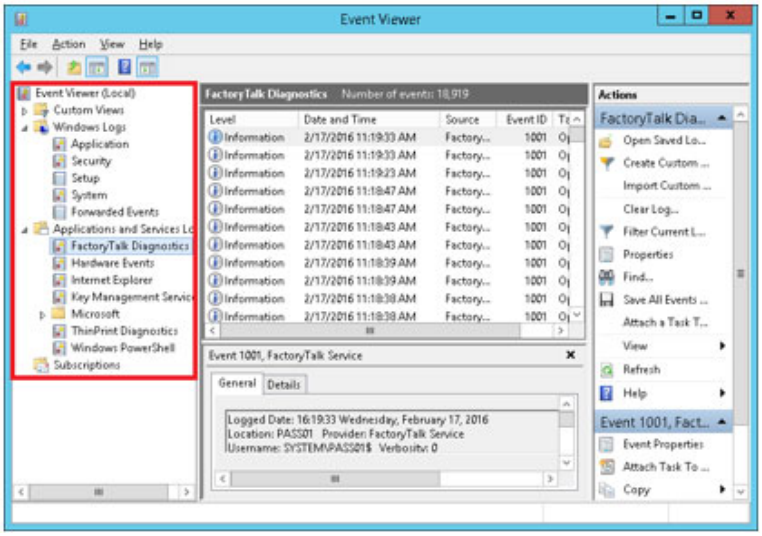
Event Viewer Is Not Presenting Errors

This row verifies that the Event Viewer is not showing errors in the logs. All errors must be corrected before you can proceed. Complete these steps.

1. In Microsoft Windows, click Administrative Tools and choose Event Viewer.



The Event Viewer window appears. Make sure that you check each log.



2. Verify that the logs do not contain errors.
3. From the checklist pull-down menu, choose Yes or No whether there are errors on the Event Viewer window.

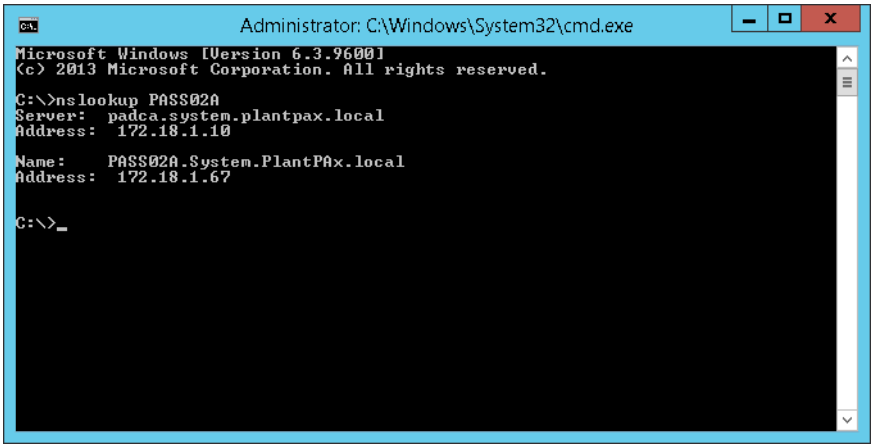
4. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Research the errors and make necessary corrections. Like faults, you need to wait for a period of time and make sure that the errors are no longer occurring.
	Yes, pass.

NSLookup Resolved

This procedure verifies the mappings of IP addresses to host names. The steps apply if you are using a domain or a workgroup.

1. At the Command Prompt, type the NSLookup and server name and press Enter.
2. If you receive the message 'DNS Request Timed Out', choose No for the NSLookup Resolved pull-down menu.
3. If the NSLookup provides the server name and IP address (as shown in the example) then communication is good and NSLookup has resolved successfully. Choose Yes from the pull-down menu for NSLookup Resolved.



If the NSLookup ping does not provide a server name and IP address, go to the Troubleshooting scenarios, starting on page 131, to resolve the issue.

Performance

The Windows Performance Monitor (PerfMon) utility provides a snapshot of the current performance of a computer. Subsequent snapshots can show deteriorated performance for maintenance updates. The report information is used to complete the Basic System Checks and Resource Overview sections of the checklist.

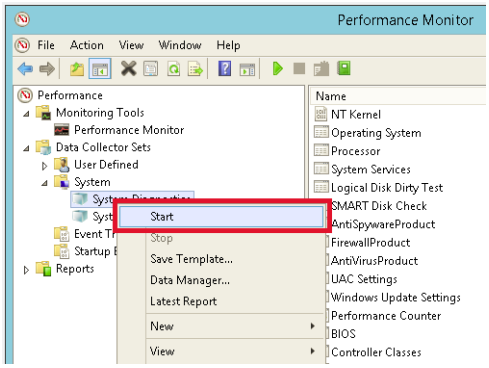
Generating a Performance Report

This section explains how to generate the PerfMon report.

IMPORTANT The Performance Monitor tool can increase CPU usage by 5…10%. However, the procedure does not affect the general report data.

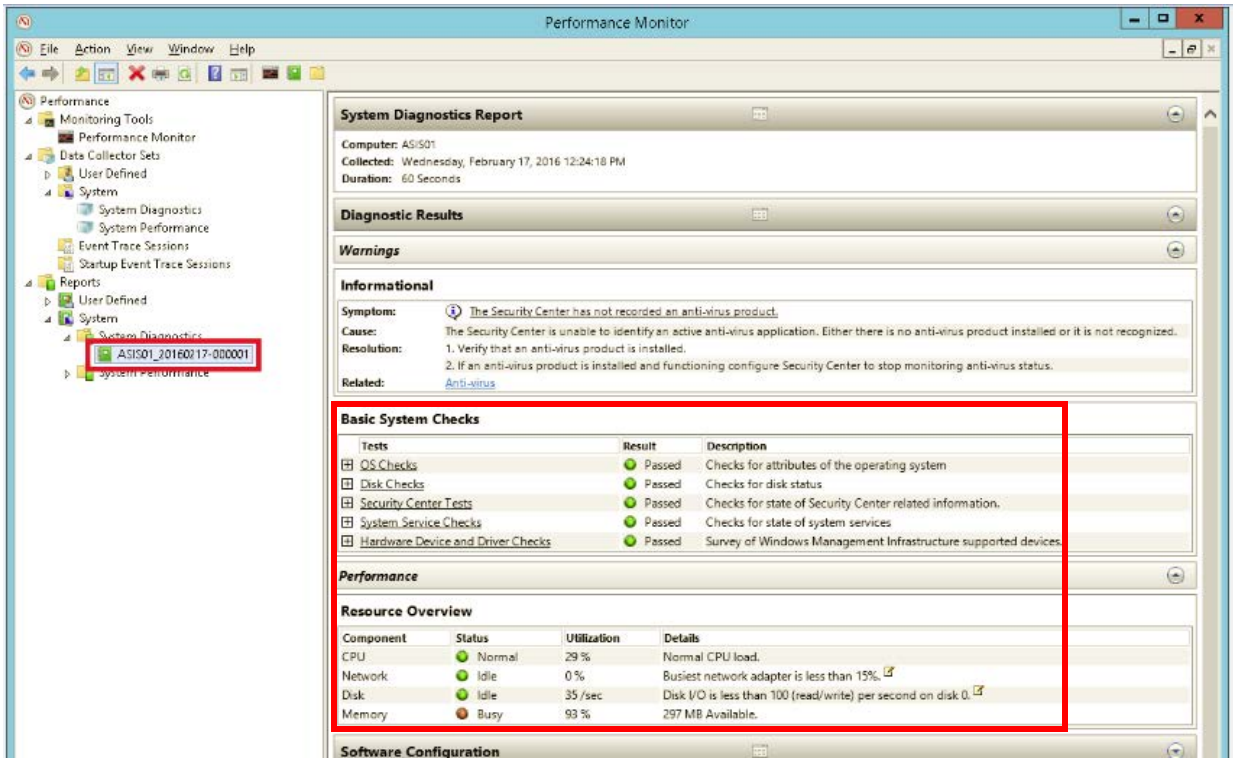
1. Click Administrative Tools and choose Performance Monitor.

2. Click to expand Data Collector Sets>System, right-click System Diagnostics and choose Start.



The system diagnostics procedure takes about 1 minute.

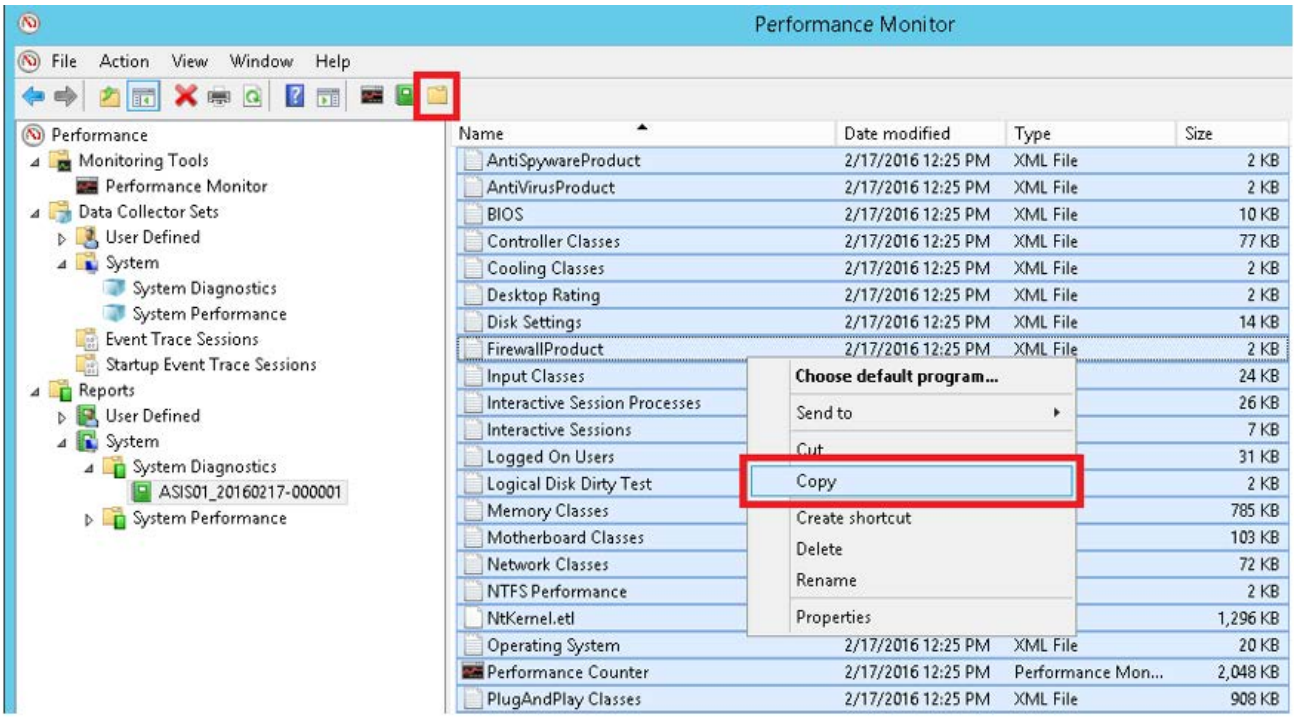
3. To view the report, click to expand Reports>System>System Diagnostics and choose the desired report.



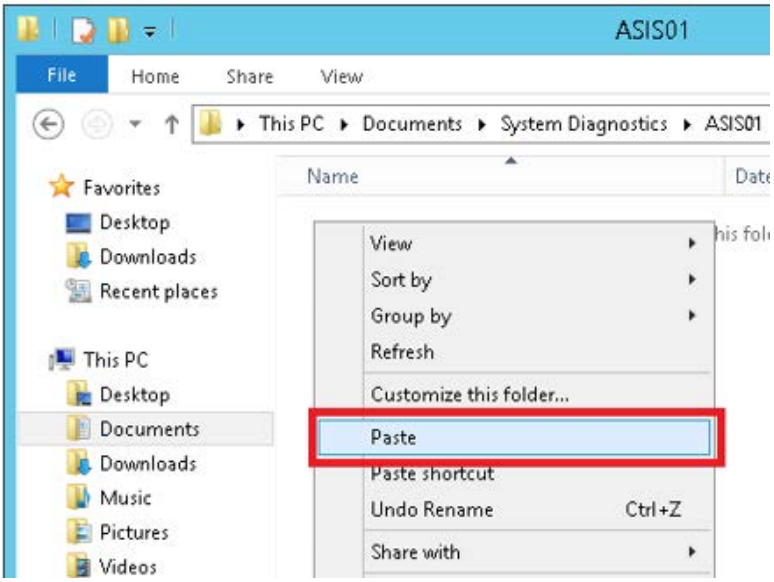
IMPORTANT You can copy information in the 'Basic System Checks' (page 58) and 'Resource Overview' (page 61) sections of the report into the checklist. Each system check and component on the report is explained in the following pages.

We recommend that you perform the following optional steps to save the report electronically for future reference.

4. Click the folder icon, select all files, and click Copy.



5. Create a local folder to store the reporting files, right-click and choose Paste.



The report is named 'report.html' in the specified directory.

6. To match the computer that was tested, rename the report.

   The report is in HTML format and can be opened in most web browsers.

Basic System Checks

See page 55 to generate a report by using the Performance Monitor utility. The report information is used to verify the following checklist rows:

- OS Checks
- Disk Checks
- Security Center Checks
- System Service Checks
- Hardware Device Driver Checks

In the electronic report, each of these items can be expanded in the list to view additional information.

OS Checks

This row of the checklist verifies that the attributes of the operating system conform to PlantPAx system recommendations.

1. Click the pull-down menu on the checklist.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Review your computer configuration and make changes or upgrades to make sure that servers and workstations are within recommended limits.
	Yes, pass.

Disk Checks

This row of the checklist verifies the status of the disks in the operating system.

1. Click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Address any drive issues on the computer or server that did not pass and reverify.
	Yes, pass.

Security Center Checks

This row of the checklist verifies system security-related information.

1. Click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, warning. Review security settings and reverify if you made changes.
	Yes, pass.

System Service Checks

This row of the checklist verifies the state of system services.

1. Click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Address any system service issues on the computer or server that did not pass and reverify.
	Yes, pass.

Hardware Device Driver Checks

This row of the checklist verifies the Windows management of supported devices in your PlantPAx system.

1. Click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Address any device driver issues on the computer or server that did not pass and reverify.
	Yes, pass.

Resource Overview

See page 55 to generate a report by using the Performance Monitor utility. The report information is used to verify the following checklist rows:

- CPU (%)
- Network (%)
- Disk (/sec)
- Memory (%)

CPU (%)

This row of the checklist verifies that the CPU load complies with PlantPAx system recommendations.

1. Type a value and click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Resize the system or split the servers for more CPU in a virtual environment.
	Yes, pass.

Network (%)

This row of the checklist verifies that the busiest network adapter is < 50%.

1. Type a value and click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Reevaluate the network traffic and reverify.
	Yes, pass.

Disk (/sec)

This row of the checklist verifies the operations per second performed by the hard disk drive.

1. Type a value and click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, as shown on page 55.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Replace the disk with a higher throughput or create additional disks.
	Yes, pass.

Memory (%)

This row of the checklist verifies the memory capacity of the server or workstation.

1. Type a value and click the checklist pull-down menu.
2. Choose Passed or Not Passed based on the information on the Performance Monitor report, and type the usage.
3. Observe the results and make any necessary changes.

	Not complete until an option is chosen.
	No, fail. Increase the memory capacity.
	Yes, pass.

When all entry fields are verified, type the name of the person who completed the checklist and the completion date. We suggest that you store the checklist and any attachments in an accessible location to compare with future system data. Discrepancies can show potential issues that could adversely affect performance.

You can close the Microsoft Excel workbook or click another tab to continue to verify data.

Notes:

System Architecture Checklist

This chapter describes verification procedures for the overall layout of your PlantPAx® system architecture. You can review essential PASS and HMI attributes.

The purpose of the checklist is to verify your system data against PlantPAx system design recommendations. The collection of data lets you analyze overall system performance and pinpoint any potential performance issues.

The Microsoft® Excel® worksheet, which we refer to as a checklist, has entry fields to document system design information. There are five icons that indicate the status of the entered information and actions to be taken, if necessary. The checklist data provides a snapshot of whether your system is operating efficiently.

To access the checklist, click the System Architecture tab on the Microsoft Excel workbook.

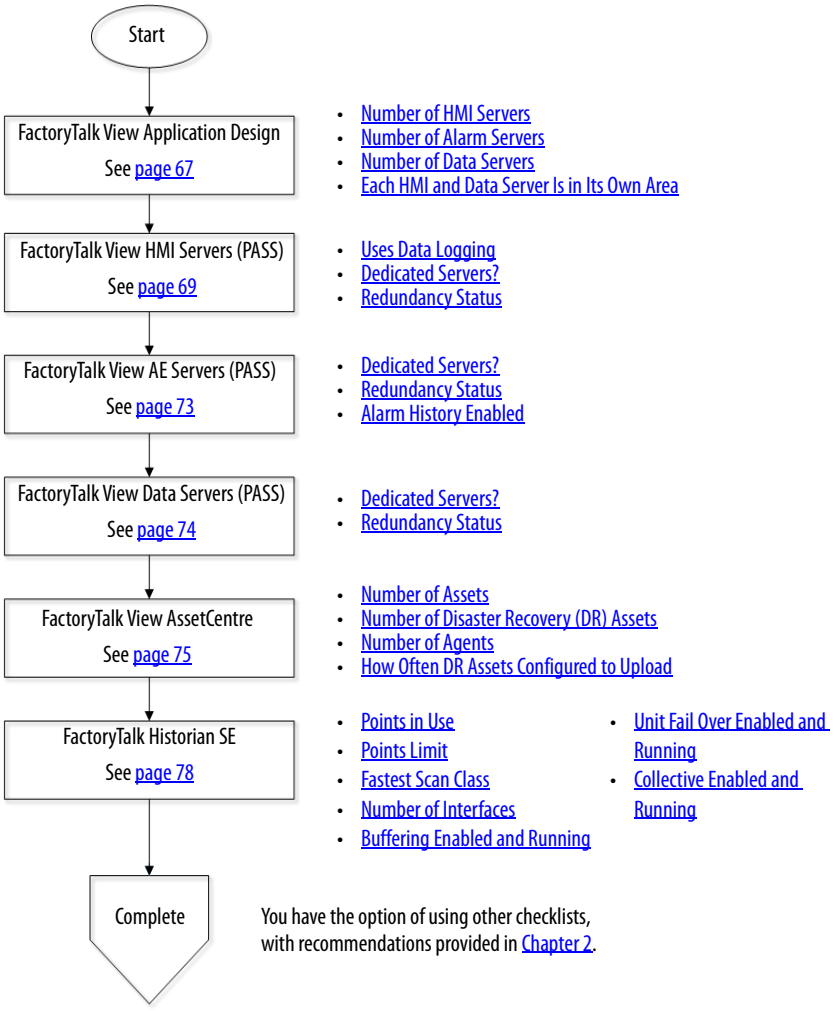
Before You Begin

The System Architecture checklist procedures operate under the following assumptions:

- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have access to Microsoft Excel software to complete the checklist.
- You have configured the following FactoryTalk® software:
  - View Site Edition
  - AssetCentre
  - Historian Site Edition
- You also have configured the FactoryTalk Historian SE Excel Add-In tool.

Click the page number or the links in the workflow for quick access to specific information.

Figure 5 - System Architecture Workflow

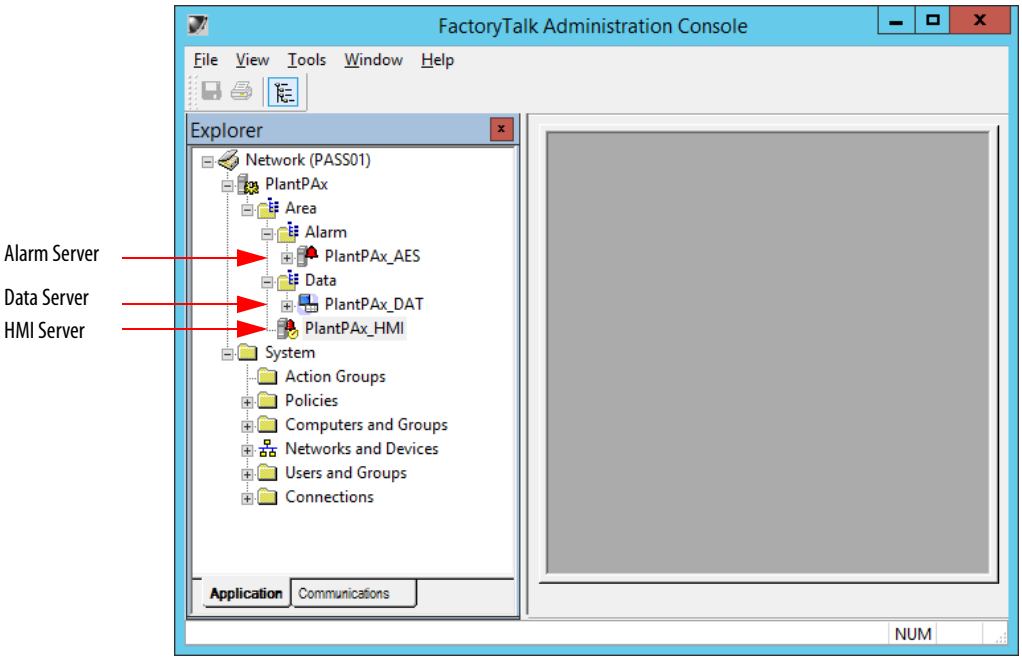


FactoryTalk View Application Design

The rows in this checklist section verify that the following FactoryTalk View application design attributes comply with system recommendations:

- Number of HMI Servers
- Number of Alarm Servers
- Number of Data Servers
- Each HMI and Data Server Is in Its Own Area

You can view these attributes in the FactoryTalk Administration Console or the FactoryTalk View Studio software program.



IMPORTANT See page 14 for descriptions of the five symbols that indicate the status of the Observed Value. Faults must be corrected and warnings must be satisfactorily reviewed for verification.

Number of HMI Servers

The number of servers and how they are configured can impact the speed of system communication. Complete these steps to make sure that your HMI server count is within supported system limits. Servers can be simplex or redundant.

1. Using the application tree in the FactoryTalk Administration Console, select the project to be analyzed.
2. Reference, identify, and count all HMI servers in your system. Then, type the number of HMI servers into the checklist and press Enter.

   If an HMI server is secondary, do **not** add the secondary HMI server to the count.

3. Observe your results and make any necessary changes.

✔	Pass; number of servers <= 10 per system.
✖	Fail; number > 10 maximum servers per system. Reduce the number of HMI servers in the system tree of the FactoryTalk Administration Console window.

Number of Alarm Servers

Complete these steps to make sure that your alarm server count is within supported system limits. Servers can be simplex or redundant.

1. Using the application tree in the FactoryTalk Administration Console, select the project to be analyzed.
2. Reference, identify, and count all alarm servers in your system. Then, type the number of alarm servers into the checklist and press Enter.
3. Observe your results and make any necessary changes.

✔	Pass; number of servers <= 10 per system.
✖	Fail; number > 10 maximum servers per system. Reduce the number of servers in the system tree of the FactoryTalk Administration Console window.

Number of Data Servers

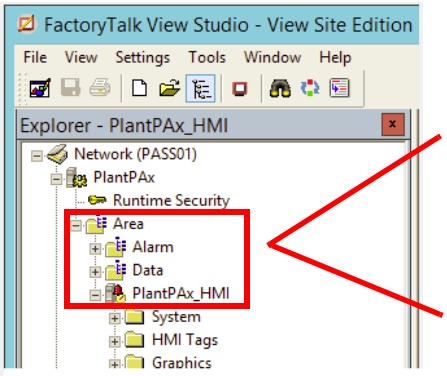
Complete these steps to make sure that your data server count is within supported system limits.

1. Using the application tree in the FactoryTalk Administration Console, select the project to be analyzed.
2. Reference, identify, and count all data servers in your system. Then, type the number of data servers into the checklist and press Enter.
3. Observe your results and make any necessary changes.

✔	Pass; number of servers <= 10 per system.
✖	Fail; number > 10 maximum servers per system. Reduce the number of servers in the system tree of the FactoryTalk Administration Console window. Servers can be simplex or redundant.

Each HMI and Data Server Is in Its Own Area

Server segregation helps optimize performance. To help prevent unpredictable search results, do **not** insert a server into the application root path. Each server must be in its own area.



- Alarm area folder stores the Alarm and Event server.
- Data area folder contains the * server.
- HMI area folder stores FactoryTalk View tags and displays. It's important to verify that there are no other servers in any other area folders.

1. From the checklist pull-down menu, choose Yes or No if each HMI and Data server is in its own area.
2. Observe your results and make any necessary changes.

✔	Yes; pass.
✖	No; fail. Correct the area organization in the tree structure of the FactoryTalk Administration Console window or FactoryTalk View Studio software.

FactoryTalk View HMI Servers (PASS)

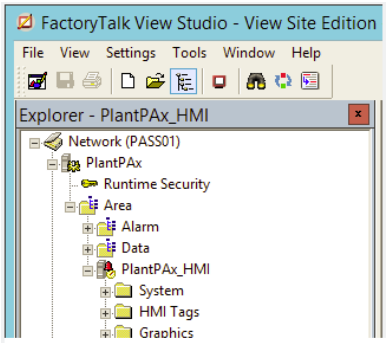
The rows in this checklist section verify that the HMI servers on the PASS comply with system recommendations for these design attributes:

- Uses Data Logging
- Dedicated Servers?
- Redundancy Status

IMPORTANT See page 14 for descriptions of the five symbols that indicate the status of the Observed Value.

Uses Data Logging

We recommend the use of FactoryTalk Historian software rather than FactoryTalk View SE data logs to collect and analyze system data. The Historian software is robust and scalable.



To check if data logs are used in a FactoryTalk View SE project, open a Data Log folder in the HMI server. Verify the data log model is empty.

Complete these steps.

1. From the checklist pull-down menu, choose Yes or No to verify if data logs are used.
2. Observe your results and make any necessary changes.

!	Yes; warning. Use data logs for short-term storage only. Manage the data log size and segregate the hard disk drive that collects the data so PASS server performance is not affected. In the Notes column, provide confirmation of the data log use.
✓	No; pass. We recommend that you use FactoryTalk Historian software for data collection.

Dedicated Servers?

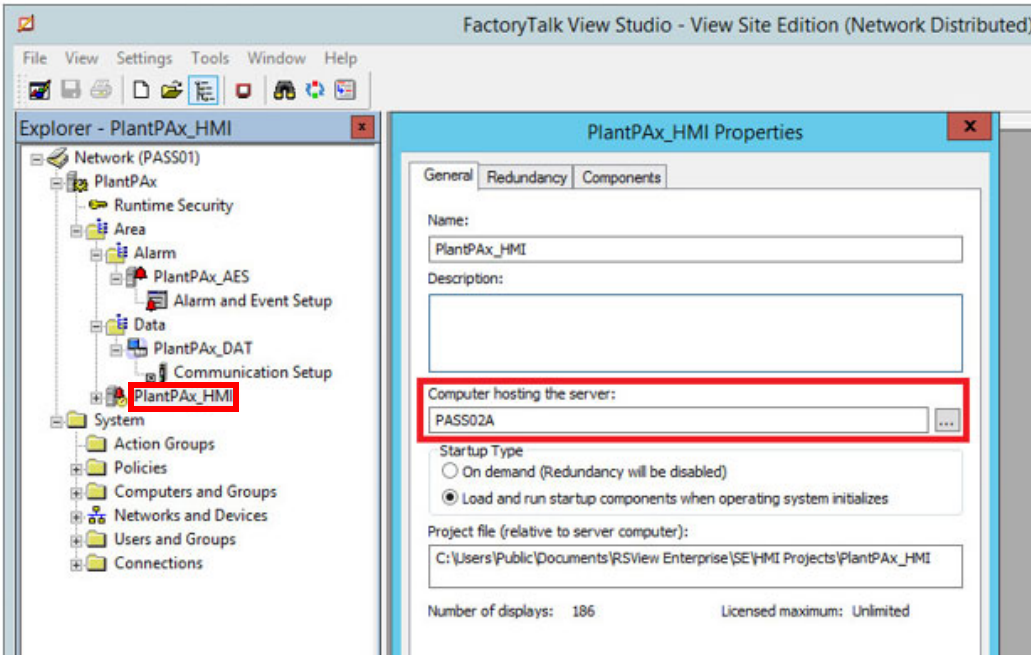
To help prevent unpredictable communication, you cannot have two servers of the same type hosted on one computer. The computer can host multiple servers as long as they are different types. For example, a computer can host one HMI server and one alarm and event server.

You can have multiple data servers as long as they are not the same type. For example, you can have a FactoryTalk Linx server and a RSLinx® Classic server.

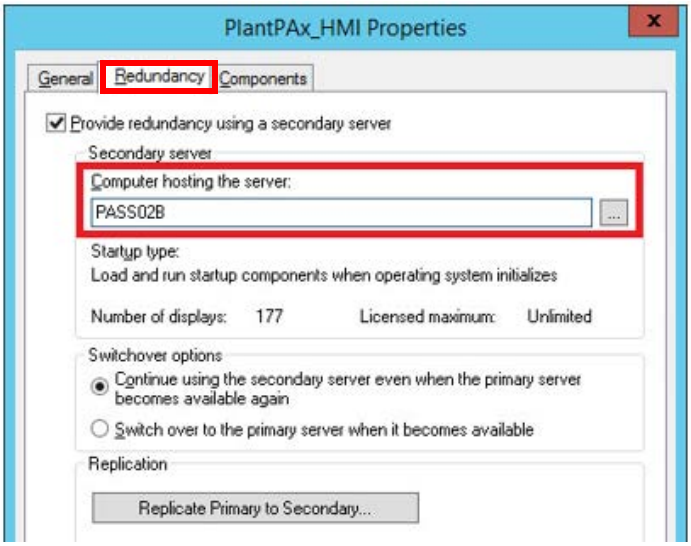
Complete these steps to verify that each HMI server (primary and backup) is operating on a unique host.

1. Open your application in FactoryTalk View Studio software.

2. Right-click the HMI server, and choose Properties to confirm the computer host name.



3. For a redundant server, click the Redundancy tab to confirm the computer that hosts the secondary server.



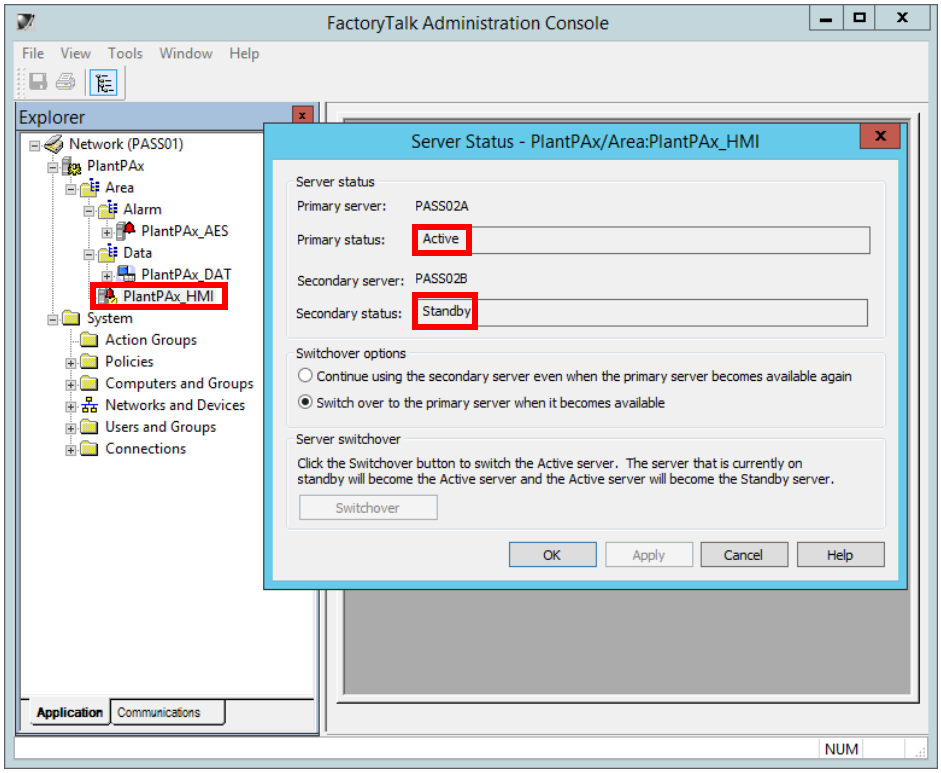
4. From the checklist pull-down menu, choose Yes or No.
5. Observe your results and make any necessary changes.

✔	Yes; pass. Yes indicates all computers host only one of any type of server. Put the computer host name in the Notes column.
✘	No; fail. You must not host multiple HMI servers on one PASS server. To verify the host and redundant server, repeat step 1 through step 3.

Redundancy Status

Using the FactoryTalk Administration Console, complete these steps to verify the status of your redundant servers.

1. Right-click the HMI server and choose Server Status.



2. Select one of the following based on the status.
   a. If the status for one server is 'Active' and the other server is 'Standby', choose Synched.
   b. If you have different results, choose 'Not Synched'.
      Identify the servers that are 'Not Synched' in the Notes field of the checklist.
3. From the checklist pull-down menu, choose an option and press Enter.
4. Observe your results and make any necessary changes.

	Does not apply for non-redundant systems.
	Synched; pass.
	Warning, not synched. **IMPORTANT:** Even though synchronization is not a necessary configuration for all primary and secondary servers, we recommend that you test the switchover configuration for all servers.

FactoryTalk Alarm and Event Servers (PASS)

The rows in this checklist section verify that the alarm servers on the PASS comply with system recommendations for these design attributes:

- Dedicated Servers?
- Redundancy Status

Dedicated Servers?

See Dedicated Servers? on page 70 for how to verify a primary and secondary alarm server.

You must not host multiple alarm servers on one PASS server.

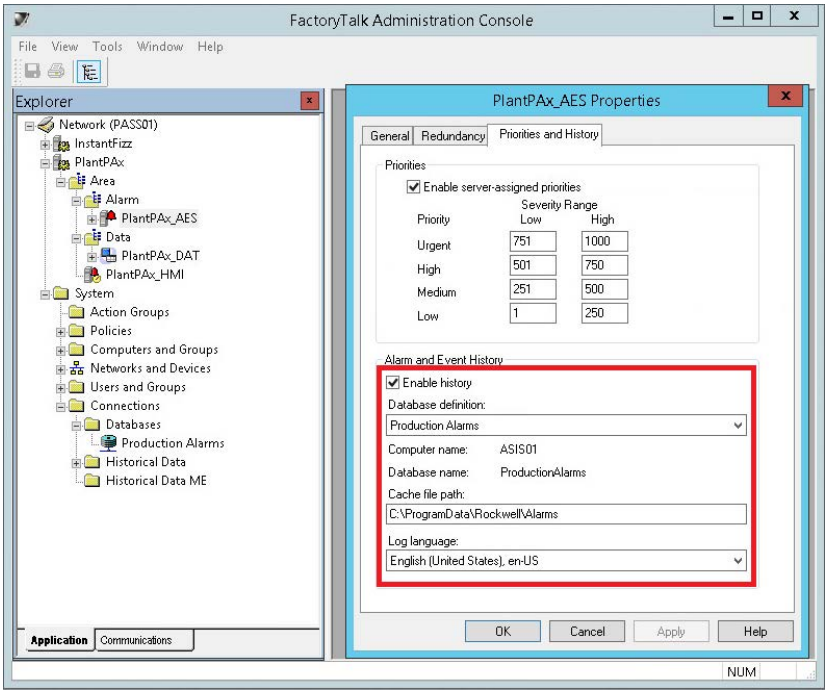
Redundancy Status

See Redundancy Status on page 72 for how to verify the status of redundant alarm servers.

Alarm History Enabled

This row makes sure that you have put a check mark in the Enable History box to log alarm history.

1. On the FactoryTalk Administration Console, click the alarm server in the left pane.



2. On the Alarm and Event Server Properties dialog box, verify that the Enable History box is checked.
3. From the checklist pull-down menu, choose Yes or No whether alarm history is enabled.
4. Observe your results and make any necessary changes.

	Does not apply for non-redundant systems.
	Yes, pass.
	No, warning. Consider how you want to store alarm history.

FactoryTalk View Data Servers (PASS)

The rows in this checklist section verify that your data servers on the PASS are configured within the following acceptable system limits:

- Dedicated Servers?
- Redundancy Status

Dedicated Servers?

See Dedicated Servers? on page 70 for how to verify a primary and secondary data server.

You must not host multiple data servers of the same type on one PASS server.

Redundancy Status

See Redundancy Status on page 72 for how to verify the status of redundant data servers.

IMPORTANT Even though synchronization is not a necessary configuration for all primary and secondary servers, we recommend that you test the switchover configuration for all servers.

FactoryTalk AssetCentre (AppServ-Asset)

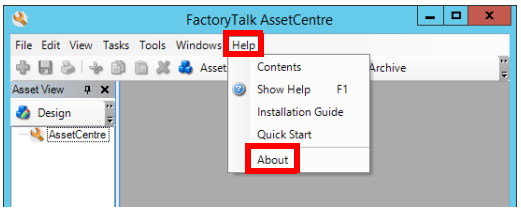
The rows in this checklist section verify how many assets are being processed per agent. A general rule is not to exceed 100 assets over a 12-hour period per agent.

Make sure that the following system design elements are within system limits:

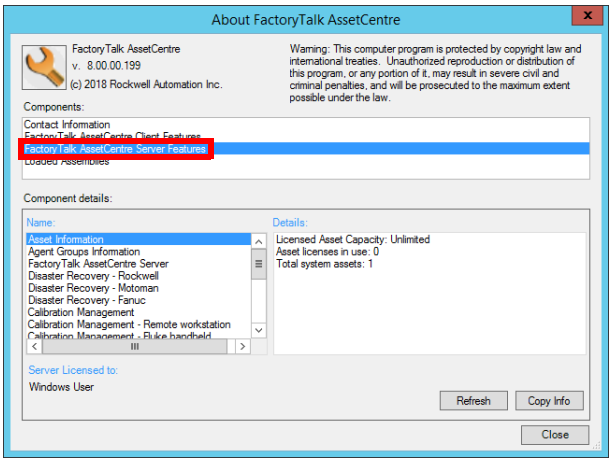
- Number of Assets
- Number of Disaster Recovery (DR) Assets
- Number of Agents
- How Often DR Assets Configured to Upload

Complete these steps to access FactoryTalk AssetCentre software client information to enter in the checklist for verification.

1. On the AssetCentre menu bar, select Help and click About.



2. In the Components box, select FactoryTalk AssetCentre Server Features.



System information appears in the Details pane.

Number of Assets

Complete these steps to document the number of managed system assets.

TIP AssetCentre licensing determines the allowable number of assets. A base license includes 10 assets.

1. From the Details pane of the FactoryTalk AssetCentre dialog box (see page 75), type the number for the 'Total system assets'.

2. Observe your results.

	Baseline documentation purposes only. This value sets a benchmark that can be compared to future server results. The comparison can identify a potential issue with too many assets per license.

Number of Disaster Recovery (DR) Assets

The general rule is not to exceed 100 assets over a 12-hour period per agent.

1. Type the number of controllers that are configured for Disaster Recovery and press Enter.

   To access this information, click Disaster Recovery - Rockwell in the left pane of the AssetCentre dialog box. See page 75.

IMPORTANT While a Disaster Recovery license is required for this functionality, we strongly recommend this system backup.

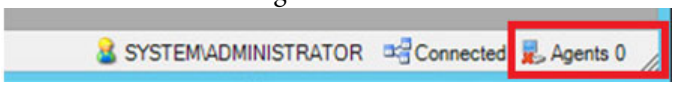
2. Observe your results and make any necessary changes.

	Not complete until you upload assets.
	Pass; an asset upload is within system recommendations.

Number of Agents

Agents are programs that communicate with the FactoryTalk AssetCentre server and perform server tasks, such as disaster recovery.

By using agents, work is distributed and shared among computers to help spread processing load. You can view the number of agents in the bottom-right corner of the AssetCentre dialog box.



1. Type the number of AssetCentre agents and press Enter.
2. Observe your results and make any necessary changes.

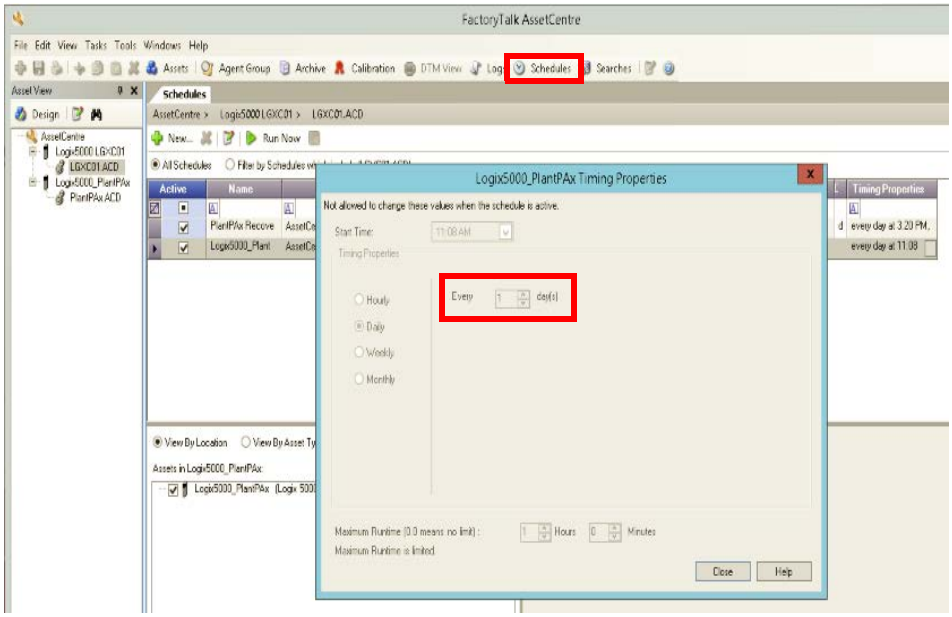
	Not complete until you upload a number of agents.
	Pass; agents have successfully reported completed tasks to the server. The number of reported agents matches the number of installed DR agents.

How Often DR Assets Configured to Upload

This row is used **only** if you are using disaster recovery. In FactoryTalk View AssetCentre software, you can determine the frequency that the assets are scheduled to upload.

1. Type the number of days between asset uploads and press Enter.

   To view this information, click Schedules>Timing properties on the AssetCentre dialog box.



2. Observe your results and make any necessary changes.

⚪	Not complete until you upload assets.
✔	Pass; all asset entry fields are entered and verified.

FactoryTalk Historian SE (AppServ-Info)

The rows in this checklist section verify that the following FactoryTalk View Historian SE design attributes comply with system recommendations:

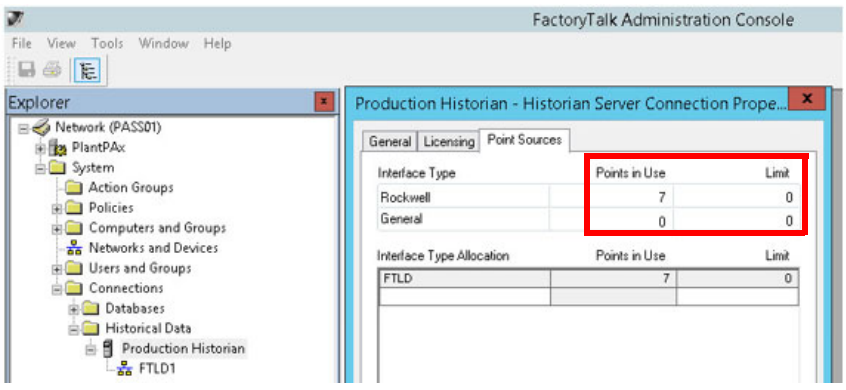
- Points in Use
- Points Limit
- Fastest Scan Class
- Number of Interfaces
- Buffering Enabled and Running
- Unit Fail Over Enabled and Running
- Collective Enabled and Running

Points in Use

A Historian point establishes the data flow to and from the Historian server.

A Historian point does not necessarily correspond to a 'point' on the field device. For example, one 'point' on a device can consist of a process variable, an analog alarm, and source quality. These pieces of information require three separate Historian points.

1. On the checklist, type the number of points that are in use and press Enter.
   a. To view the number of points on the FactoryTalk Administration Console dialog box, click System and choose Connections>Historical Data>Historian SE server
   b. Right-click Properties and then click the Point Sources tab.



A warning displays if the number of points is more than the points limit, which indicates additional licensing is required.

2. Observe the results and make any necessary changes.

	Not complete until points are added.
	Warning; number of points exceeds the points limit. Write in the Notes section whether you need to add licenses or reduce the number of configured points in the Historian software.
	Pass; number of points is less than the points limit.

Points Limit

This row is dependent on Point in Use and, therefore, not optional despite being informational only. The license limit number is used in the evaluation if the points in use exceed the license limit.

1. On the checklist, type the limit number and press Enter.

   The information is identified in the Points Sources tab of the FactoryTalk Administration Console dialog box.

   See page 78 for an example.

2. Observe the results.

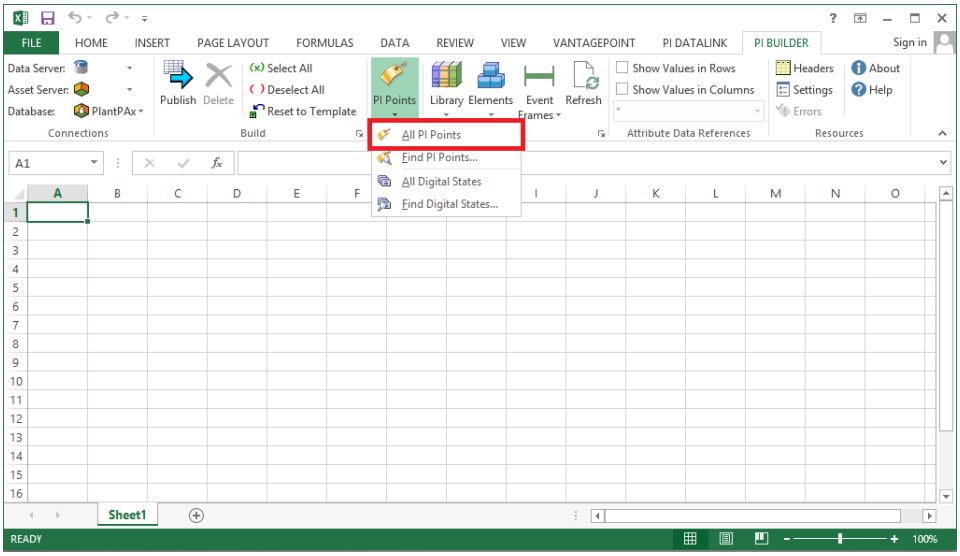
	Baseline documentation purposes only. This value sets a benchmark that can be compared to future server results. The comparison can identify a potential issue with too many points per license.

Fastest Scan Class

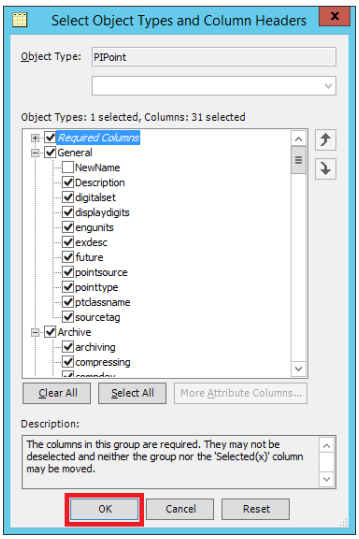
This row identifies the scan rate that is used in FactoryTalk Live Data to send controller information to the Historian server. To view this information, you must have the FactoryTalk Historian SE Excel Add-in tool configured.

IMPORTANT For procedures on how to configure the Excel Add-In Tool, see the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

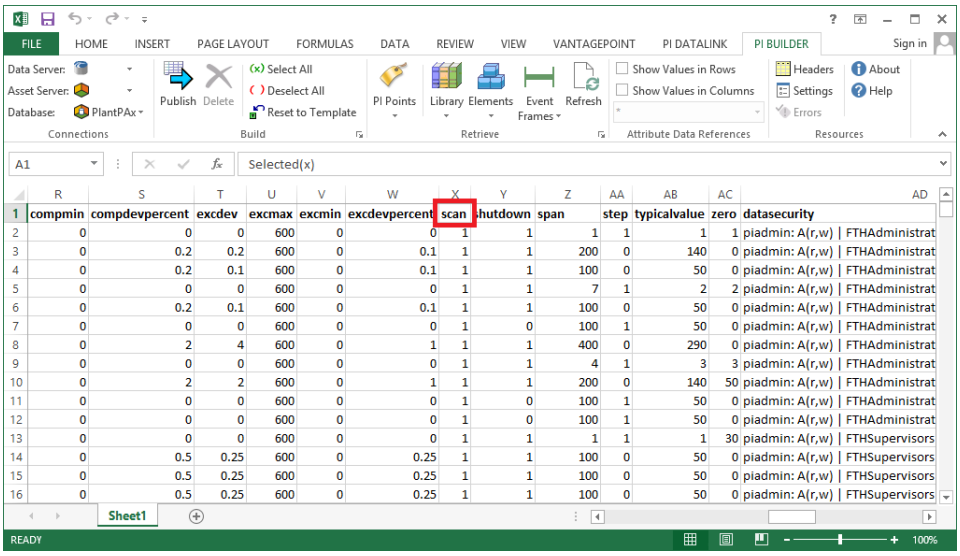
1. From the PI Builder tab, click PI Points and choose All PI Points.



2. Use defaults and click OK.



3. From the checklist pull-down menu, select the scan rate that matches the smallest number you observed in the list of points in the Scan column.



R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
compmin	compdevpercent	excdev	excmax	excmin	excdevpercent	scan	shutdown	span	step	typicalvalue	zero	datasecurity
0	0	0	600	0	0	1	1	1	1	1	1	piadmin: A(r,w) | FTHAdministrat
0	0.2	0.2	600	0	0.1	1	1	200	0	140	0	piadmin: A(r,w) | FTHAdministrat
0	0.2	0.1	600	0	0.1	1	1	100	0	50	0	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	1	7	1	2	2	piadmin: A(r,w) | FTHAdministrat
0	0.2	0.1	600	0	0.1	1	1	100	0	50	0	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	0	100	1	50	0	piadmin: A(r,w) | FTHAdministrat
0	2	4	600	0	1	1	1	400	0	290	0	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	1	4	1	3	3	piadmin: A(r,w) | FTHAdministrat
0	2	2	600	0	1	1	1	200	0	140	50	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	0	100	1	50	0	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	0	100	1	50	0	piadmin: A(r,w) | FTHAdministrat
0	0	0	600	0	0	1	1	1	1	1	30	piadmin: A(r,w) | FTHSupervisors
0	0.5	0.25	600	0	0.25	1	1	100	0	50	0	piadmin: A(r,w) | FTHSupervisors
0	0.5	0.25	600	0	0.25	1	1	100	0	50	0	piadmin: A(r,w) | FTHSupervisors
0	0.5	0.25	600	0	0.25	1	1	100	0	50	0	piadmin: A(r,w) | FTHSupervisors

TIP The number in the scan column represents the scan class, not time.

4. Observe your results and make any necessary changes.

!	Warning; scan rate is faster than 1 second. Scanning data at a rate faster than the data is changing wastes network and computer resources and unnecessarily uses network bandwidth. Reduce the speed at which the data is being scanned.
✓	Pass; meets system performance.

For details on how to install the Historian SE Excel Add-In tool, see the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

Number of Interfaces

This row identifies the number of FactoryTalk Live Data interfaces in your Historian configuration.

1. On the checklist, type the number of FactoryTalk Live Data interfaces in your Historian configuration and press Enter.

2. Observe your results and make any necessary changes.

	Not complete until you enter a number of interfaces.
	Pass. For a redundant interface, Historian Points in Use cannot exceed 20,000 tags per second.

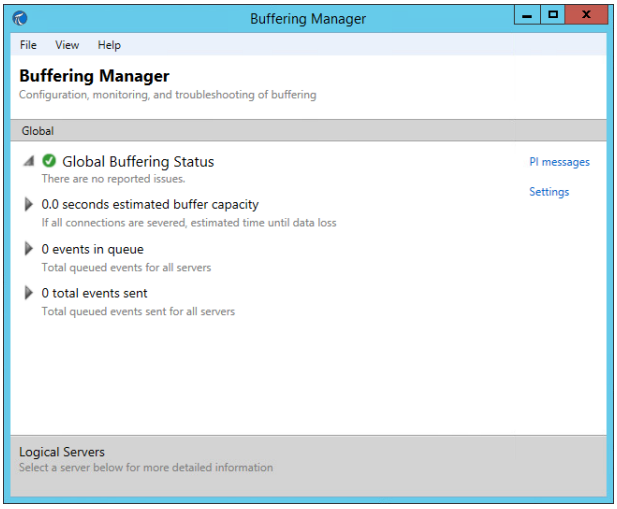
Buffering Enabled and Running

This row verifies that buffering is configured properly in your Historian application for a redundant system only. Buffering is recommended to maintain data collection in the event the connection to the server is lost.

1. From the checklist pull-down menu, select Yes or No and press Enter.
2. Observe your results and make any necessary changes.

	No; warning. Use the Notes column to address when buffering is corrected.
	Yes; pass.

IMPORTANT This procedure is executed in all interface nodes in the Data server (not on the Historian server). Open the PI Interface Configuration Utility and click Tools>Buffering.



As shown, make sure that Global Buffering Status is checked.

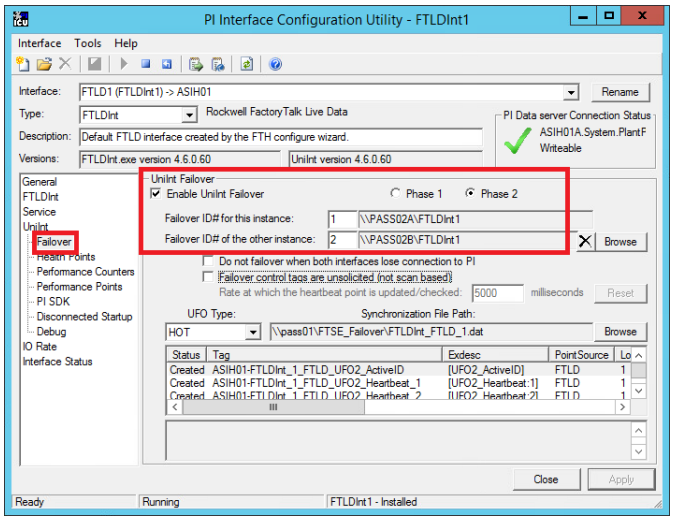
Unit Fail Over Enabled and Running

For redundant interface nodes only, this row verifies that unit failover is configured properly in your Historian application.

1. From the checklist pull-down menu, select Yes or No and press Enter.
2. Observe your results and make any necessary changes.

!	No; warning. An interface is not enabled for unit failover and not running. Write in the Notes column the interface node name with the exception.
✓	Yes; pass. All of your interfaces have unit fail over enabled and are running.

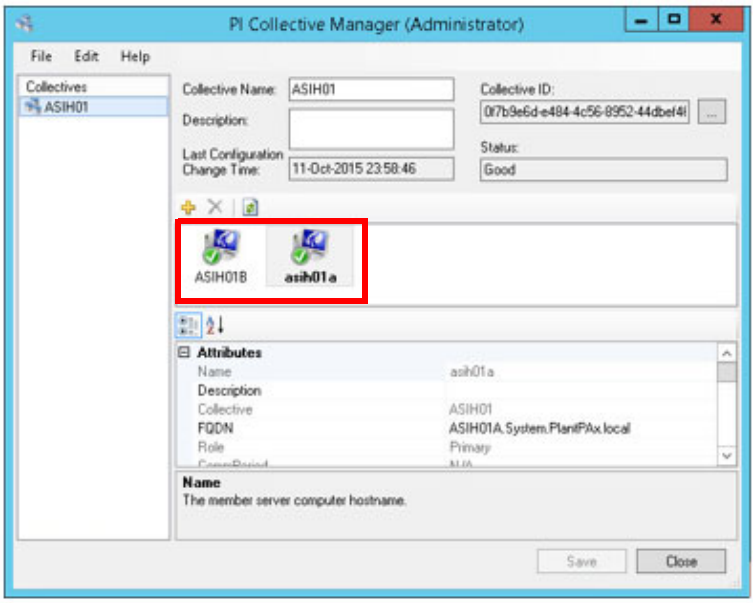
IMPORTANT This procedure is executed in all interface nodes in the Data server (not on the Historian server). Open the Interface Configuration Utility, select the interface, and choose Failover under UniInt.



Collective Enabled and Running

This row verifies that a collective is properly configured for redundant Historian systems.

For high availability purposes, a server collective consists of two FactoryTalk Historian SE servers (primary and secondary) that have the same configuration database. This combination lets you take a server offline for maintenance or an upgrade without disrupting the availability of data to the clients.



1. From the checklist pull-down menu, select Yes or No.
2. Observe your results and make any necessary changes.

	No; warning. Use the Notes column to address that you are not using a Historian collective. If you are using a collective, make a note that you are not configured according to recommendations.
	Yes; pass.

For details on how to configure a collective, see the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.

When all entry fields are verified, type the name of the person who completed the checklist and the completion date. We suggest that you store the checklist and any attachments in an accessible location to compare with future system data. Discrepancies can show potential issues that could adversely affect performance.

You can close the Microsoft Excel workbook or click another tab to continue to verify data.

Notes:

PASS Checklist

This chapter describes the verification procedures for systems servers that comprise the Process Automation System Server (PASS). The PASS is a required system element that hosts essential software components that run the system.

The purpose of the checklist is to verify your system data against PlantPAx® system design recommendations. The collection of data lets you analyze overall system performance and pinpoint any potential performance issues.

The Microsoft® Excel®, which we refer to as a checklist, has entry fields to document system design information. There are five icons that indicate the status of the entered information and actions to be taken, if necessary. The checklist data provides a snapshot of whether your system is operating efficiently.

To access the checklist, click the <PASS> tab on the Microsoft Excel workbook.

IMPORTANT Complete the PASS checklist for each PASS (or PASS-C) server on your system. To duplicate a checklist for each PASS, do the following:

- Right-click the <PASS> tab and choose Move or Copy.
- Click Create a copy and then click OK.
- Double-click the checklist name and type a name that identifies the PASS that you are verifying.

Before You Begin

The PASS checklist procedures operate under the following assumptions:

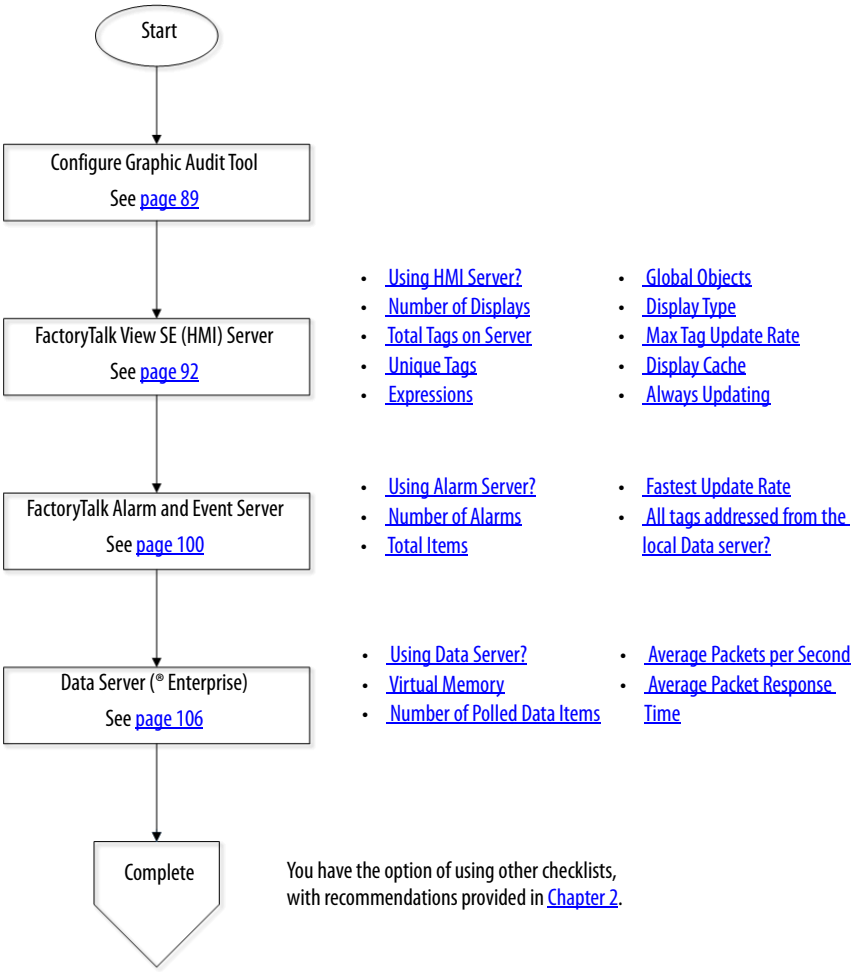
- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have access to Microsoft Excel software to complete the checklist.
- You have access to each PASS server.
- You have downloaded the Graphic Audit Tool, which examines your HMI server application running on the PASS server. See page 89.

Optional

- FactoryTalk® View displays have been downloaded as described in the Knowledgebase article 771236 and imported into your HMI server.
- A PDF printer is installed on the Engineering and/or Operator Workstation. You can print and view FactoryTalk View reports.

Click the page number or the links in the workflow for quick access to specific information.

Figure 6 - PASS Workflow



Run the Graphic Audit Tool

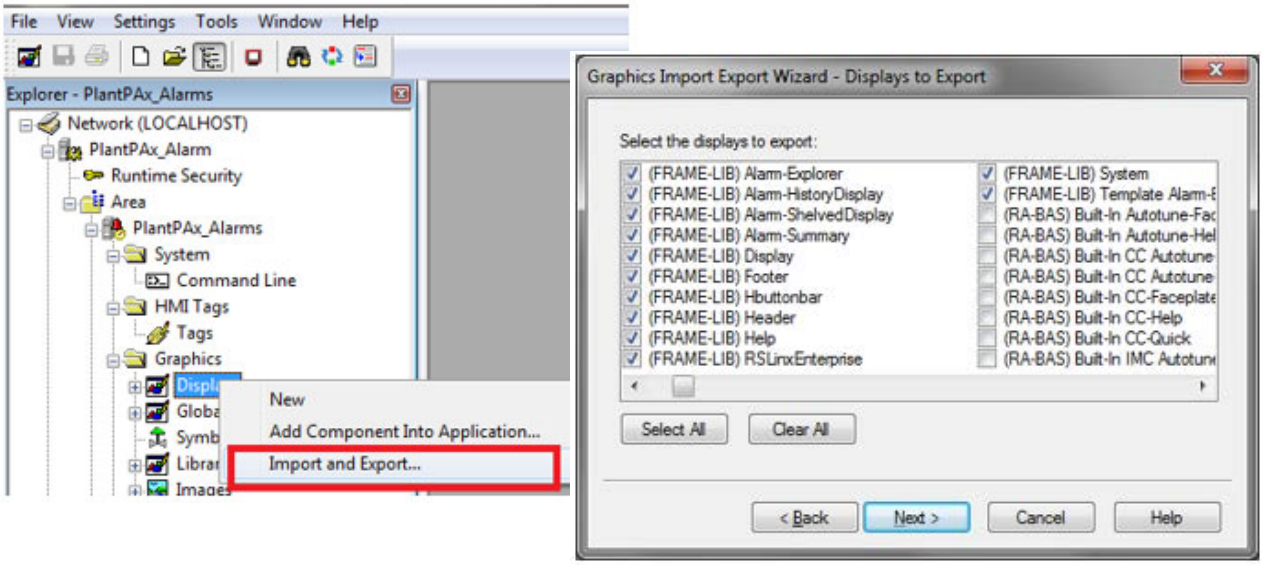
To verify your FactoryTalk View Site Edition (SE) HMI design elements, you must download the Rockwell Automation® Graphic Audit Tool. The audit tool, which is contained in the zip file within the checklist download, analyzes exported HMI displays.

The reports for the Graphic Audit Tool show color-coded information. Yellow and red warnings indicate where displays are close to or exceed recommended PlantPAx guidelines. To configure the audit tool and print results, complete these steps.

1. Before you run the audit tool, you need to export the HMI application graphic files to an XML format. In FactoryTalk View Studio, browse to the Graphics folder in your project and right-click Displays.
2. Choose 'Import and Export...'.

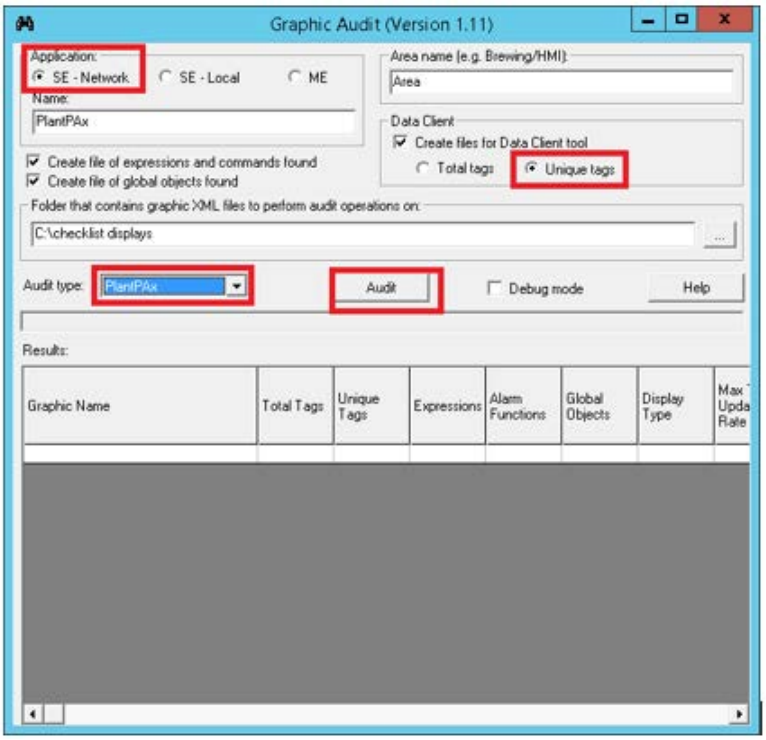
   Make note of the directory path to which you are exporting the displays. You need this information in step 5.

IMPORTANT To limit the number of library object displays from the export, de-select display names that start with (RA-BAS), (RA-EH), (RA-Seq), (RA-UI), and (RA-Lib). To de-select a display, click the box to remove a check mark.



3. Extract the Graphic Audit Tool from the zip file within the checklist download.
4. Double-click the executable file, GraphicAudit.exe.

The Graphic Audit dialog box appears.

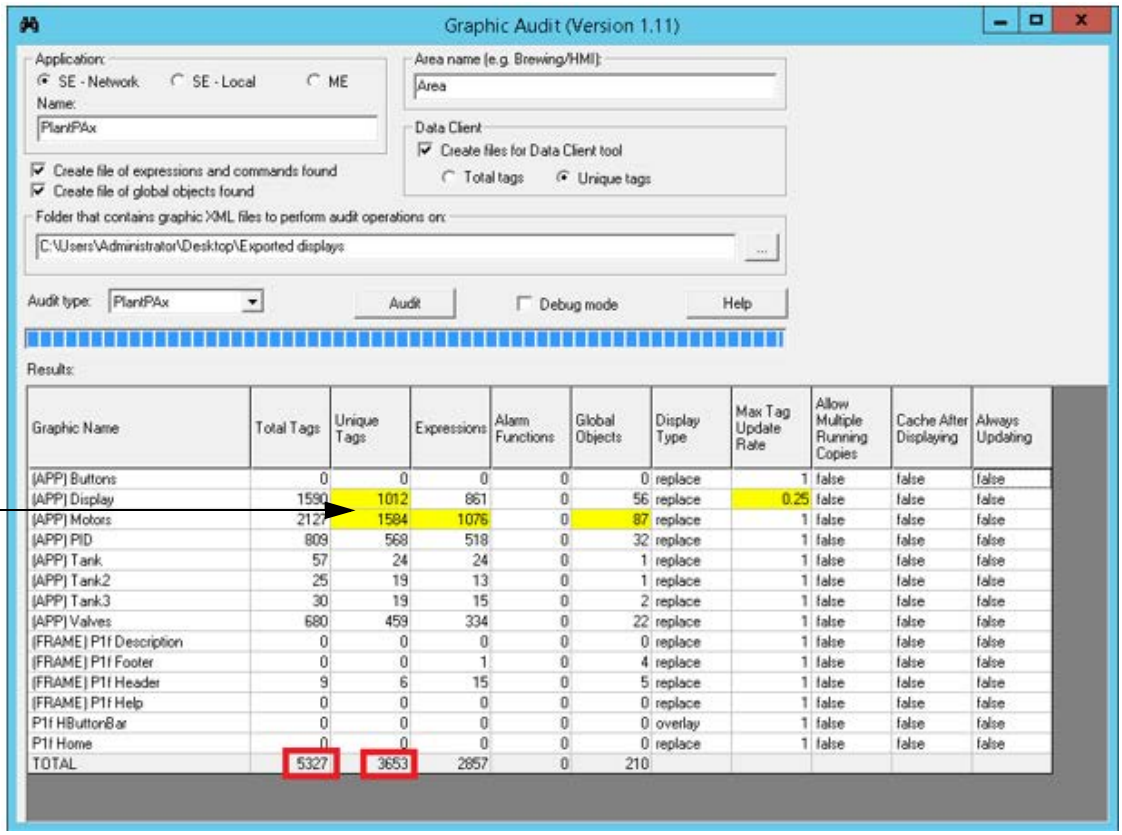


5. Complete the Graphic Audit Tool dialog box.

Field	Description
Application SE - Network SE - Local ME	Click SE - Network
Name	The Name and Area Name are used only to generate Data Client XML files and are not used in the audit operation. See Graphic Audit Tool Help.rtf file in the zip file for more details.
Area Name (for example, Brewing/HMI)	
Create file of expressions and commands found Create file of global objects found	To create the respective files, check the boxes.
Data Client Create files for Data Client tool Total tags Unique tags	To enable Create files for Data Client, check the box, and then select Unique tags.
Folder that contains graphic XML files to perform audit operations on	Click Browse (‘. . .’ ellipsis) to select the directory path where you exported your graphic XML files in step 2.
Audit type	Choose PlantPAx from the pull-down menu. This choice uses rules that are specific to the PlantPAx system.

6. To generate the report, click Audit.

The processed displays are listed in the Results pane of the Graphic Audit dialog box.



Color-coded cells indicate threshold issues.

The tool creates four Excel (.xls) files in the same directory as the XML files.

7. To print, select $AuditResults.xls in the XML file directory and click Print.

IMPORTANT A yellow warning indicates that you are above a threshold that affects your ability to meet critical system attributes for system performance. A red error indicates that you are above the supported limit of a PlantPAx system.

You **must** correct red errors. If you do not plan to adjust yellow warnings, document in the Notes column that you have reviewed and accepted any impact to system performance.

With the Audit report information, complete the PASS checklist as described in the following pages.

FactoryTalk View SE (HMI) Server

The rows in this checklist section verify that the following HMI server design attributes comply with these recommendations:

- Using HMI Server?
- Number of Displays
- Total Tags on Server
- Unique Tags
- Expressions
- Global Objects
- Display Type
- Max Tag Update Rate
- Display Cache
- Always Updating

Using HMI Server?

This row in the Notes column verifies if the PASS has an HMI server.

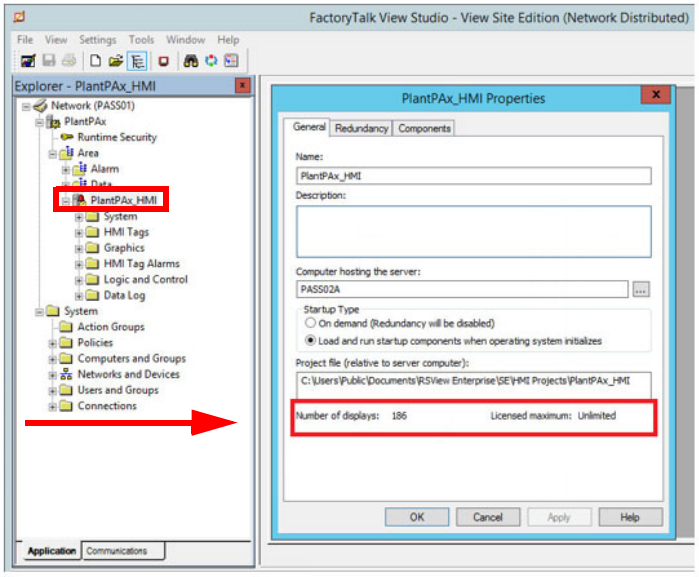
- If Yes, continue to answer the additional HMI verification fields.
- If No, proceed to FactoryTalk Alarm and Event on page 100.

If you have a redundant HMI server, you need to complete only one PASS checklist for the pair of servers.

Number of Displays

The number of displays and license type does not appear on the Graphic Audit Tool report. To view the information on the HMI Properties dialog box, complete these steps.

1. In FactoryTalk View Studio, right-click the HMI server in the Explorer pane.
2. Choose Properties.



In the checklist, verify that you are not using more screens than your license allows. If you exceed this license, there is the possibility that screens fail to display when requested.

1. Type the number of displays that appear at the bottom of the Properties dialog box.
2. Press Enter.
3. In the next row of the checklist, select the license that is shown at the bottom of the Properties dialog box.
4. Click the pull-down menu to select a display license (100, 250, or unlimited) that corresponds to the selected license type.
5. Observe your results and make any changes.

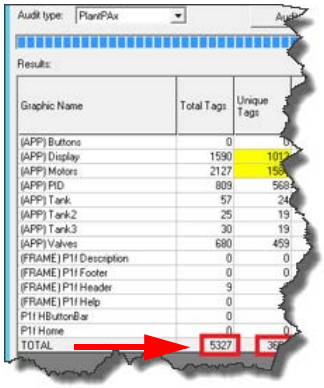
	Not complete until you enter a number of displays and choose a display license value (100, 250, unlimited).
	Pass; total number of displays does not exceed the display license.
	Fail; total number of displays exceeds the display license. Delete any unnecessary displays from the HMI server or update the license.

Use the Graphic Audit Tool information for the following checklist fields.

Total Tags on Server

The Graphic Audit Tool counts the number of tags in each graphic display and lists the results in the Total Tags column. This informational field includes values for all tags that are used in expressions, commands, and embedded variables. If the same tag is found multiple times in a graphic file, it is counted multiple times.

Type the information into the checklist row or attach the report.



The Total Tags on Server affect the data server memory loading that can impact CSAs.

Unique Tags

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx recommendations. The row verifies if any action is necessary for a yellow warning or red error for the number of unique tags on any of the displays.

1. From the checklist pull-down menu, choose Yes or No to verify if there is a yellow warning in the Unique Tags column.
2. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Simplify your display to use less than 1,000 unique tags on the display.
	No; pass.

3. From the checklist pull-down menu, choose Yes or No to verify if there is a red error in the Unique Tags column.

4. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; fail. More than 3000 unique tags are not supported.
	No; pass.

Expressions

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx system recommendations. The checklist row verifies that the number of expressions that are configured within each display aligns with system recommendations.

FactoryTalk View SE displays contain 'expressions' for each customized animation that holds simple or complex calculations to accomplish the animations. Each expression consumes memory and requires processing time to execute.

Many expressions can make the screen animate sluggishly and affect system performance.

1. From the checklist pull-down menu, choose Yes or No to verify if there is a yellow warning in the Expressions column
2. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. To use less than 1,000 expressions, simply your design.
	No; pass

3. From the checklist pull-down menu, choose Yes or No to verify if there is a red error in the Expressions column.

4. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; fail. More than 3000 expressions are not supported.
	No; pass.

Global Objects

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx recommendations. The checklist row verifies that the number of global objects on displays are within system recommendations. Many global objects on an individual display can make the screen slow to appear or animate sluggishly.

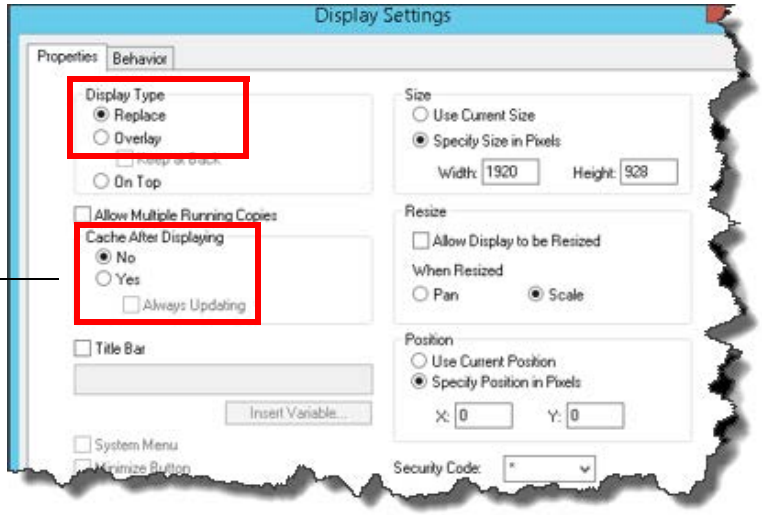
1. From the checklist pull-down menu, choose Yes or No to verify if there is a yellow warning in the Global Objects column.
2. Observe you results and make any necessary changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Simplify the display and redo the verification. Or, verify the call-up time on the display is acceptable to the operator and document in the Notes column.
	No; pass.

Display Type

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx system recommendations. This row examines the screen display types.

To conserve CPU resources, we recommend that you use 'Replace' display types. This display type closes the currently displayed screen when a new screen opens. 'Overlay' display types must be managed because multiple screens open at once consumes unnecessary memory and CPU resources.



See page 99 for details.

1. From the checklist pull-down menu, choose Yes or No to record the presence of a yellow warning in the Display Type column.
2. Observe your results and make any necessary changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Correct and reverify.
	No; pass.

Max Tag Update Rate

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx system recommendations. This row examines the rate at which tags update per display.

1. From the checklist pull-down menu, choose Yes or No to record the presence of a yellow warning in the Max Tag Update Rate column.
2. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Rate of 0.25 seconds has a possible impact on the server and controller.
	No; pass. Update rate within recommendation of 0.5 seconds.

3. From the checklist pull-down menu, choose Yes or No to record the presence of a red error in the Max Tag Update Rate column.
4. Observe your results and make any changes.

	Not complete until you select an option from the pull-down menu.
	Yes; fail. You must correct the tag update rate. For example, set the update rate within the recommendation of 0.5 seconds or 1 second, if needed, to help reduce load on the data server.
	No; pass.

Display Cache

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx system recommendations. The row examines the Cache After Displaying property of each display.

See page 97 for an example of this setting on the Display Settings dialog box.

When displays are cached, the additional memory load of this display on the view client is persistent after call-up regardless of whether the display remains visible. This action affects system load and can ultimately affect system performance.

IMPORTANT We recommend that you use Cache After Displaying for displays only frequently accessed by the operator and not applied generally. Used sparingly on these displays, this feature improves display call-up time for important displays.

1. From the checklist pull-down menu, choose Yes or No to record the presence of a yellow warning in the Display Cache column.
2. Observe your results and make any necessary changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Correct and reverify. Or, confirm this option is being used sparingly for frequently used displays where the incremental call-up time performance is needed.
	No; pass.

Always Updating

The Graphic Audit Tool color codes screen attributes that exceed PlantPAx recommendations. This property can be set only if Cache After Displaying is enabled. See Display Cache.

See page 97 for an example of the Display Settings dialog box.

When always updating, the additional controller and server load of this display is persistent after the initial call-up regardless of whether the display is visible. This action increases system load and can affect system performance.

IMPORTANT We recommend that you use Always Updating on displays only frequently accessed by the operator and not applied generally. Used sparingly on these displays, this feature improves display call-up time for important displays.

1. From the checklist pull-down menu, choose Yes or No to record the presence of a yellow warning in the Always Updating column.
2. Observe your results and make any necessary changes.

	Not complete until you select an option from the pull-down menu.
	Yes; warning. Correct and reverify. Or, confirm this option is being used sparingly for frequently used displays where the incremental call-up time performance is needed.
	No; pass.

FactoryTalk Alarm and Event

The rows in this checklist section verify that the following FactoryTalk View Alarm and Event design attributes comply with system recommendations:

- Using Alarm Server?
- Number of Alarms
- Total Items
- Fastest Update Rate
- All tags addressed from the local Data server?

Using Alarm Server?

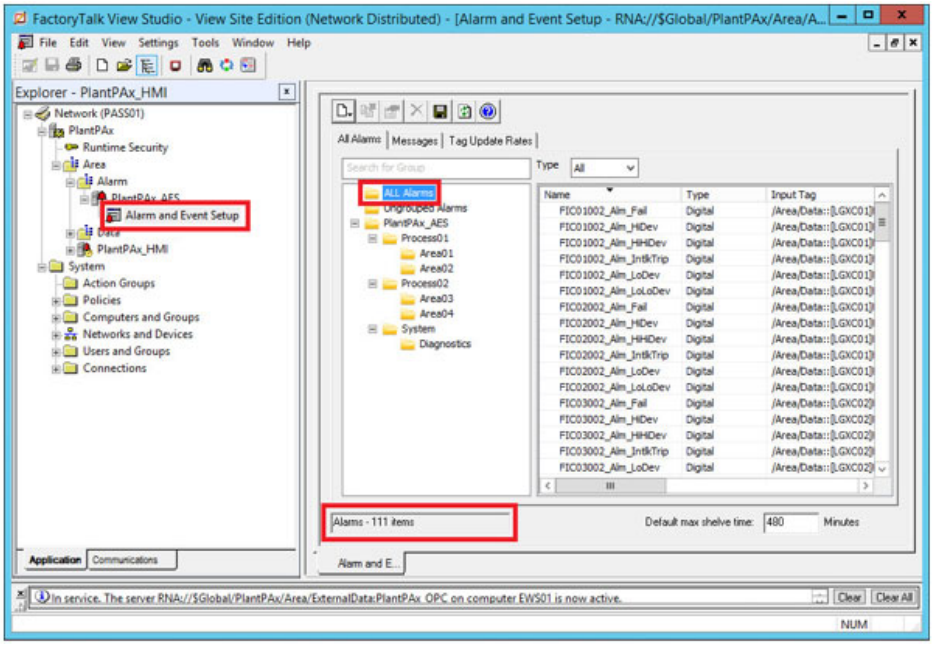
This row in the Notes column verifies if the PASS has an Alarm server.

- If Yes, continue to answer the additional Alarm verification fields.
- If No, proceed to Data Server (FactoryTalk Linx) on page 106.

To obtain alarm server information for the checklist, complete these steps.

1. In the FactoryTalk View Studio software, open your application, and navigate to your Alarm and Event server.
2. Double-click Alarm and Event Setup hosted on the PASS being verified and choose All Alarms.

The Alarm and Event Setup dialog box appears with data.



3. Copy the alarm values to the following checklist rows.

Number of Alarms

This checklist row lets you enter the number of alarms in your PASS server.

1. From the Alarm and Event Setup dialog box, type the number of alarms on the server.

   TIP The number of alarms is listed in the lower, left corner of the Alarm and Event Setup dialog box. See page 101 for an example.

   A FactoryTalk Alarm and Event server can have a maximum of 20,000 alarms.

2. Press Enter.
3. Observe your results and make any necessary changes.

	Not complete until an alarm value is entered.
	Pass; the number of alarms does not exceed 20,000 per server.
	Fail; the number of alarms exceeds 20,000 per server. Simplify your alarm system by deleting unnecessary alarms or move alarms to another PASS server.

Total Items

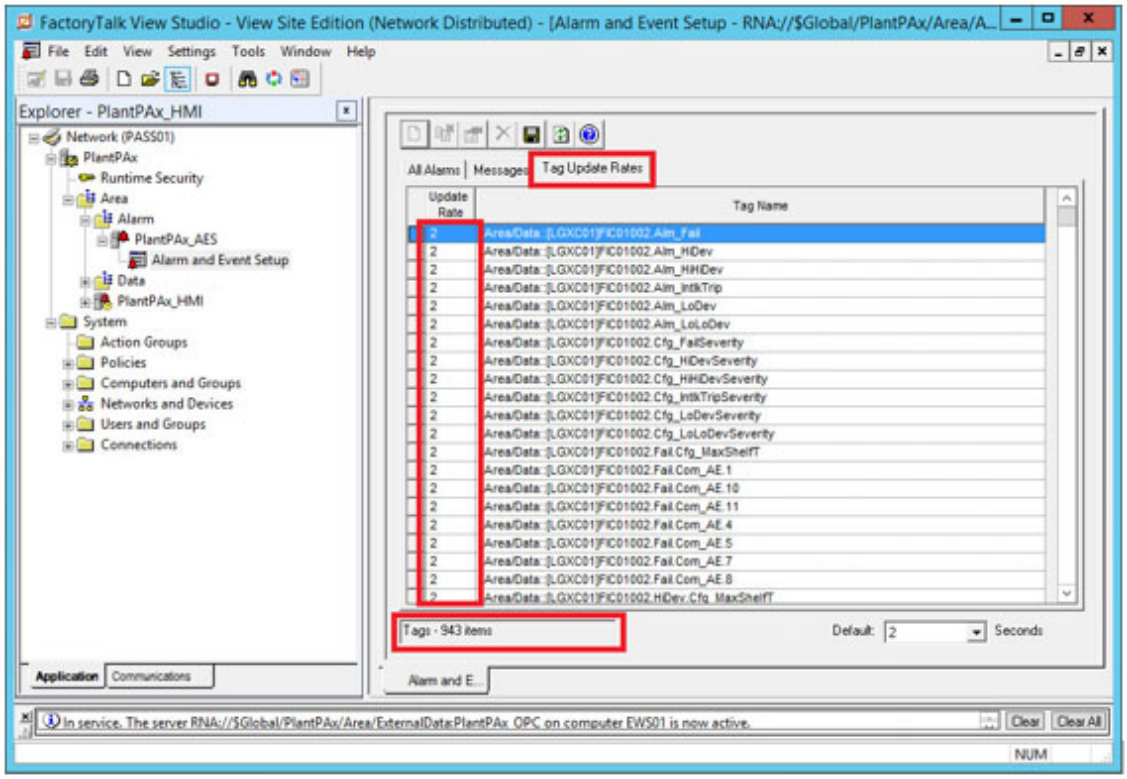
This informational field provides a total number of items on the Tag Update Rates tab of the Alarm and Event Setup dialog box. See page 102 for an example.

Type a value into the checklist row or attach a screen capture of the data.

Fastest Update Rate

The Tag Update Rates tab of the FactoryTalk Alarm and Event Setup dialog box shows the rate at which the tags in the controllers are updated. Fast update rates (lower number of seconds) increase the loading on the server.

1. Using the Alarm and Event Setup dialog box, scroll to identify the fastest update rate for any alarm on the server.
2. From the checklist pull-down menu, choose the fastest per second update rate as shown on the dialog box.



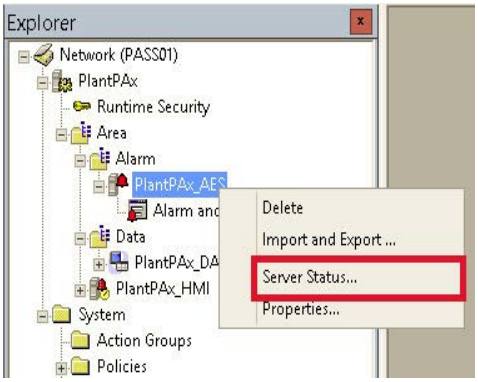
3. Observe your results and make any necessary changes.

	Not complete until a rate is chosen.
	Pass; update rate meets recommendation of 1 second. Default is 2 seconds to help reduce load on the system.
	Fail; change any alarm update rate to 1 second or slower to reduce loading on the alarm server.

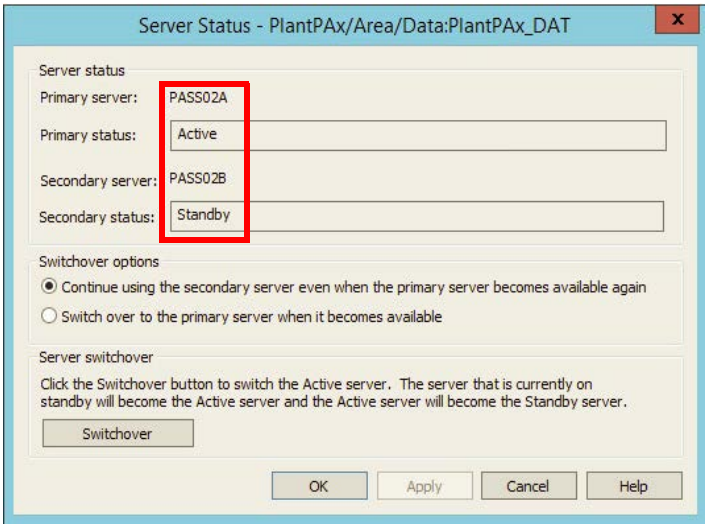
All tags addressed from the local Data server?

The checklist row makes sure that all tag names in the Alarm and Event server are scanned by a data server hosted on the same computer. To help reduce overall load on a system, complete these steps.

1. In the FactoryTalk Administration Console or FactoryTalk View SE, right-click the data server and choose Server Status.



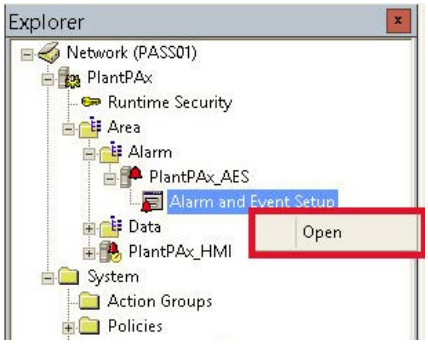
The Data server status dialog box appears.



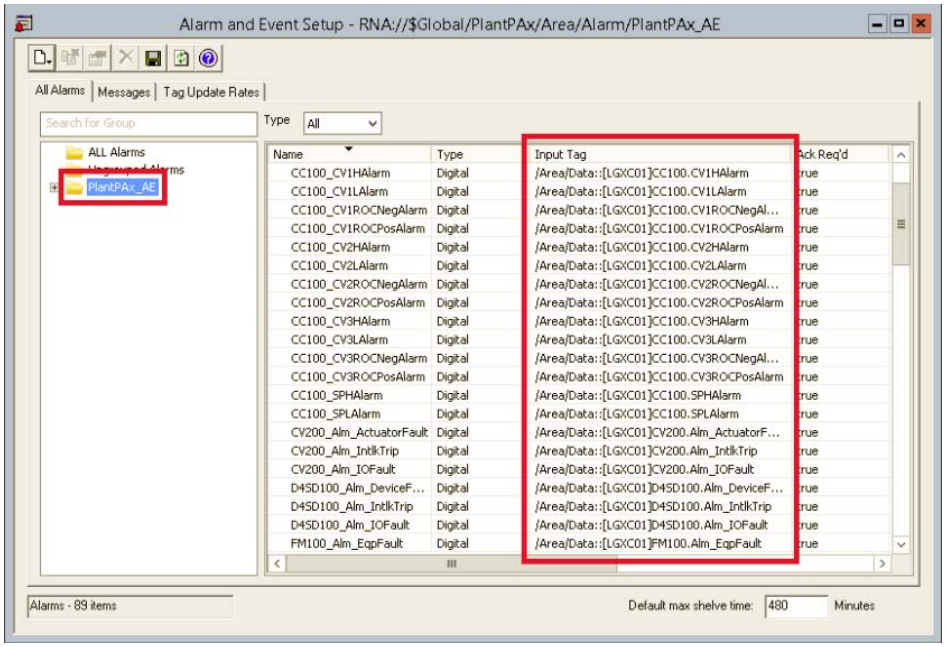
2. Observe the primary and secondary status for the Data server.

3. In the Explorer pane, open the Alarm folder and expand the Alarm server.
4. Right-click and choose Open.

   You also can double-click Alarm and Event Setup.



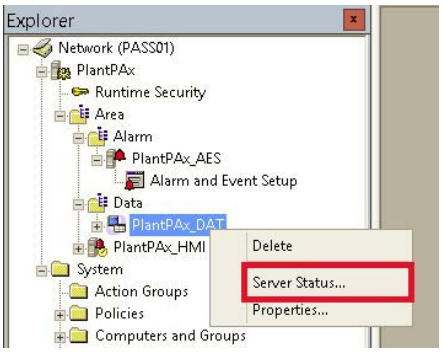
   The Alarm and Event Setup dialog box appears.



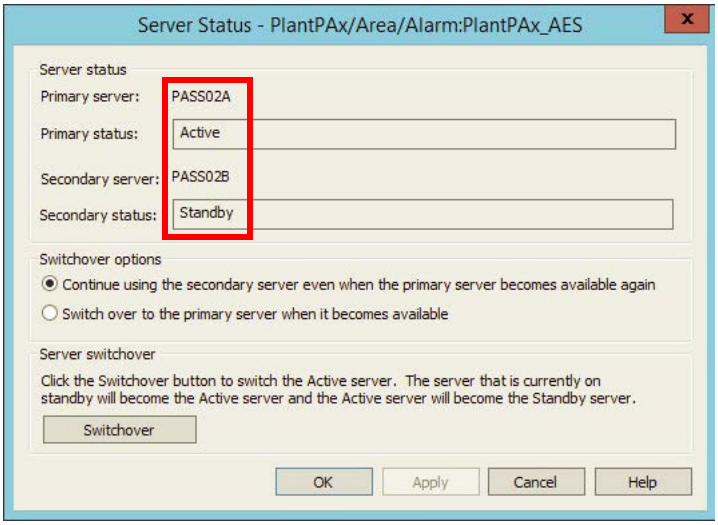
5. In the Input tag column, confirm the Alarm path is in the same computer as the Data server.

   For example, /Area/Data::[LGXC01]

6. In the Explorer pane, open the Data server and right-click Server Status.



The Alarm server status dialog box appears.



7. Evaluate the primary and secondary text boxes from both servers.
8. From the checklist pull-down menu, choose Yes or No.
9. Observe your results and make any necessary changes.

✔	Pass; the alarm server references the data server hosted on the same computer.
✘	Fail; move non-compliant alarms to the appropriate alarm server associated with the data server.

Data Server (FactoryTalk Linx)

FactoryTalk View SE software uses FactoryTalk Linx software to access tags in a controller. This checklist section verifies that the Data server complies with system recommendations.

Using Data Server?

This row in the Notes column verifies if the PASS has a Data server.

- If Yes, continue to answer the additional Data server verification fields.
- If No, click another workbook tab or close the checklist.

Before proceeding with the checklist, make sure your system is running and clients have accessed all main screens and several popup windows. This produces a maximum load, which helps to create a better representation of the system load.

Virtual Memory

Virtual Memory is a real-time indicator of the internal memory resources that FactoryTalk Linx software consumes. This value increases in proportion to the loading on the data server.

This loading can increase because of the following:

- Number of controllers
- Number of tags on scan on HMI displays
- Demand for RSLinx® Gateway OPC server, alarms, historical polling and data logs
- Display update rate of HMI displays
- Number of active HMI clients

We recommend that this value is kept under approximately 3GB. Values beyond 3 GB indicate a heavily loaded data server and can affect system performance. We suggest that you go to the Task Manager>MoreDetails, and, from the Details tab, review the memory usage for the TagSrv.exe and RSLinxNG.exe files. Evaluate the load balance and consider adding another server.

Data Server

Data server information can be gathered for the checklist by using the L_CPU faceplates or generating a Controller report. Both options leverage the L_CPU Add-On Instruction in the controller.

Option 1: Use the faceplate data from the L_CPU Add-On Instruction. Copy the FactoryTalk Linx diagnostic information from the Add-On Instruction into the checklist. Or, you can print the faceplates and attach them to the report.

For examples of diagnostic faceplates, see the L_CPU section in the Rockwell Automation® Library of Logix Diagnostic Objects Reference Manual, publication PROCES-RM003.

Option 2: We recommend that you use the report that is included with the checklist file in the Knowledgebase Answer ID 771236 at https://www.rockwellautomation.custhelp.com. The report format matches the checklist rows to let you use copy-and-paste shortcuts.

IMPORTANT The provided global object, display files, and images in the checklist file must be installed in the HMI before printing the report. The display files include the following:

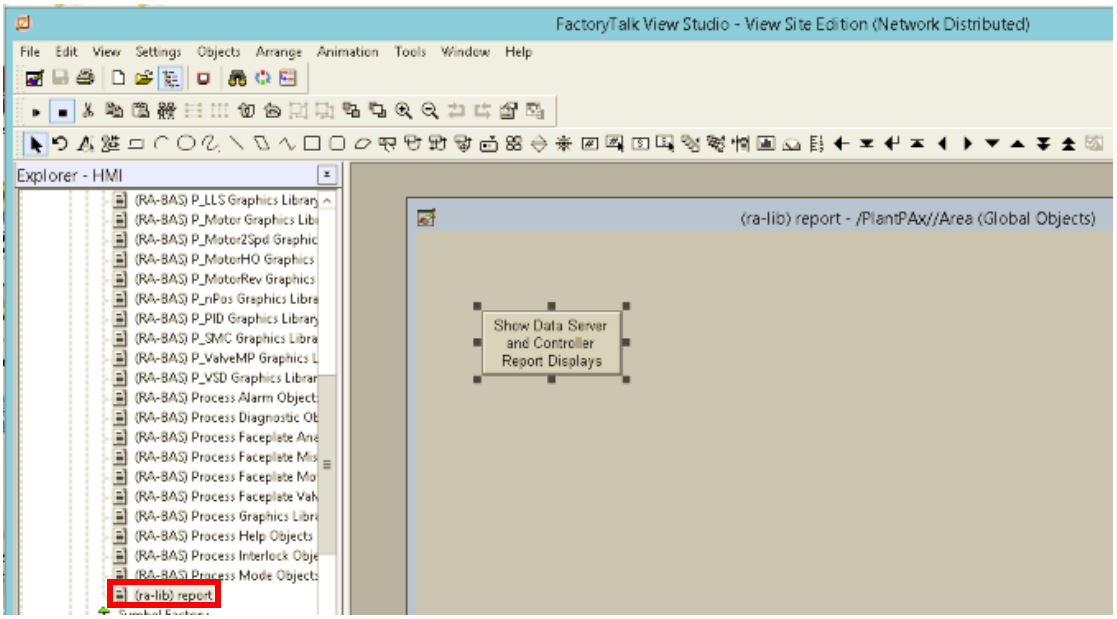
Images: icon_gray.png, icon_green.png, icon_yellow.png, icon_red.png

Global object: (RA-LIB) Report.ggfx

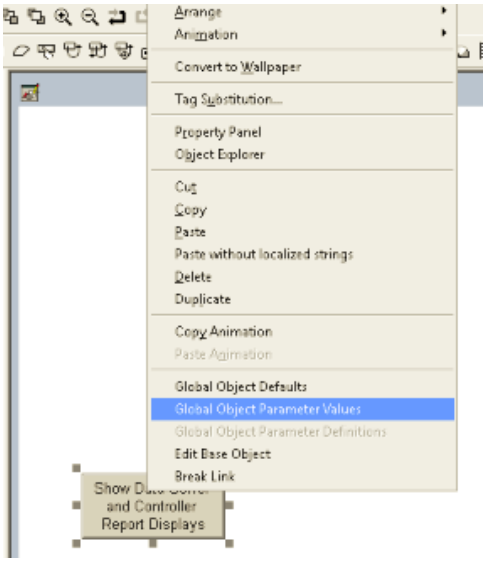
Displays: (RA-LIB) Report E.gfx, (RA-LIB) Report Controller.gfx

In addition to FactoryTalk View SE software files, the checklist file includes verification tools and instructions.

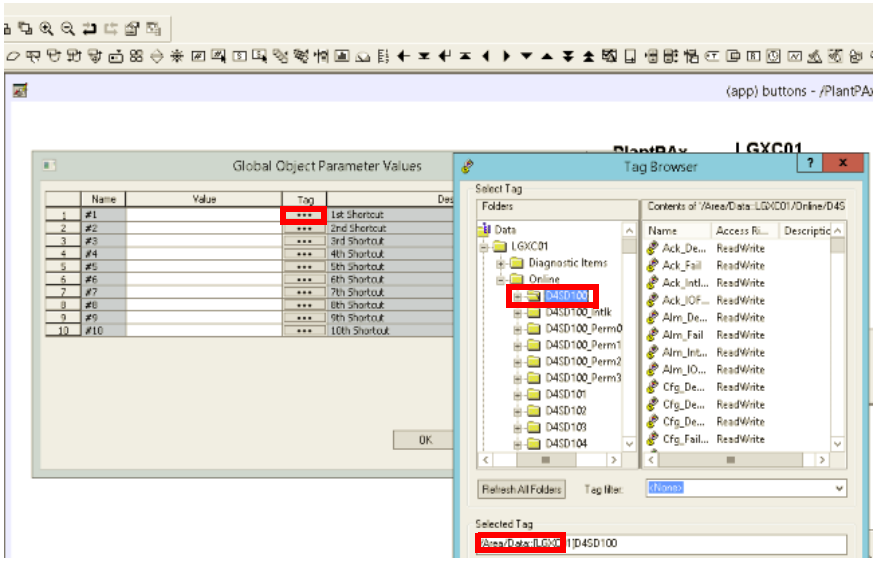
1. For procedures on importing the FactoryTalk View display files, see the Rockwell Automation Library of Process Objects Reference Manual, publication PROCES-RM002.
2. In FactoryTalk View Studio, click to open the Global Objects file (RA-LIB) Report.



3. Select the Show Data Server and Controller Report Displays button and click Ctrl+C.
4. Open a screen of your choice to place the button that accesses the report displays, and click Ctrl+V.
5. Right-click the button and choose Global Object Parameter Values.

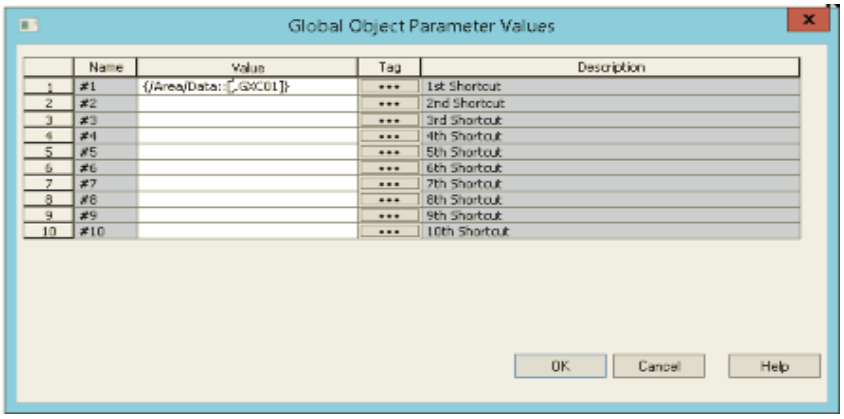


6. Complete these steps to add controller shortcuts.
   a. Under Tag on the Global Objects Parameter Values dialog box, click Browse (ellipsis '...').
   b. Select a controller shortcut and click OK.



c. Type a backing tag into the Value field of the Global Objects Parameter Values dialog box.

Insert the tag path and controller shortcut only.

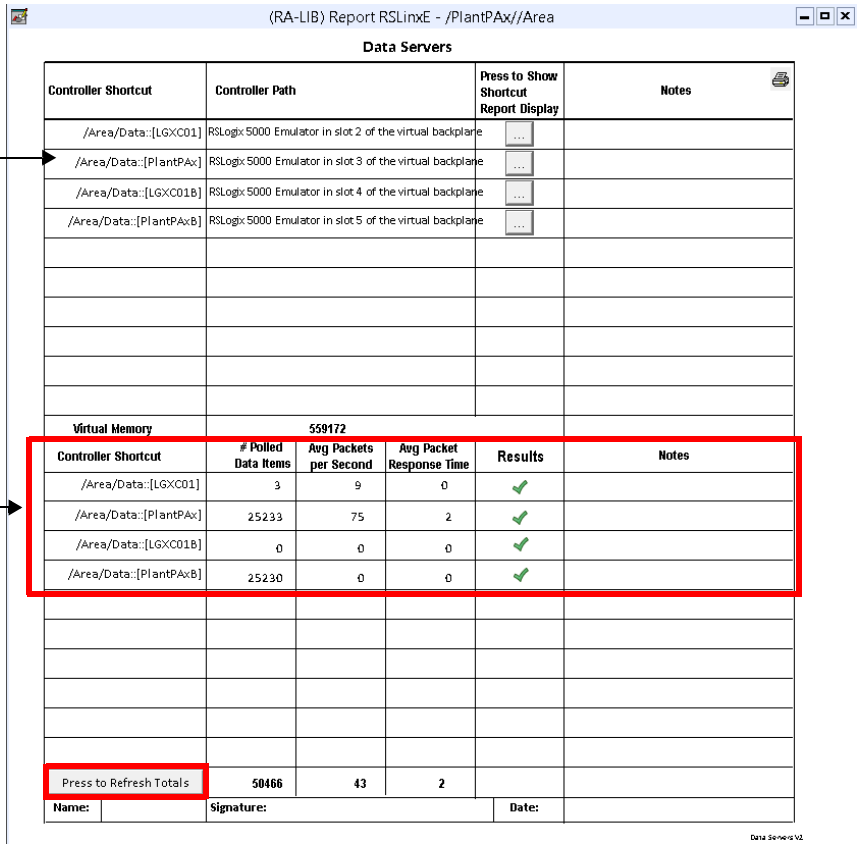


7. Run a FactoryTalk View Client session.
8. Click the Show Data Server and Controller Report Displays button.

The FactoryTalk Linx Report appears.

Controller Verification, see page 117.

Use the information in this section to complete the Checklist.



9. Click the 'Press to Refresh Totals' button.

10. Copy the report information (Avg Packets per Second, # Polled Data Items, Avg Packet Response Time, # Active Connections to Server, and Virtual Memory) into the checklist. Or, you can press the Print button and attach the printout to the checklist.
11. Observe your results.

Baseline documentation purposes only. These values set benchmarks that can be compared to future server results. The comparison can identify a potential issue.

This checklist section logs information about the design elements for the communication driver (data server). You can attach faceplate printouts from the L_CPU Add-On Instruction or generate the report for these checklist fields:

- Number of Polled Data Items
- Average Packets per Second
- Average Packet Response Time

Number of Polled Data Items

This informational row documents the number of tags that are scanned from the controller.

Average Packets per Second

This informational row documents the communication speed of data flow between the controller and data server. If your controller consistently exceeds 400 packets per second, then it is possible your controller is overloading.

Consider reducing the number of HMI data points referenced by your HMI displays from that controller. You also can lower the screen update rate if you are experiencing performance issues.

The more controllers in your system that exceed 400 packets per second of communication, the greater your chance of overloading your data server.

Average Packet Response Time

This informational row documents the average response time of messages to the controller. If your average packet response time consistently exceeds 200 milliseconds then it is possible that your communication adapter has a potential bottleneck.

Consider the following troubleshooting guidelines if your performance is not satisfactory:

- Examine your network architecture and network hardware. You could be exceeding your switch capacity or capabilities that can cause slow network performance.
- You could be using an outdated communication adapter in the path to your controller. Or, you could be exceeding the capabilities of the communication adapter.

When all entry fields are verified, type the name of the person who completed the checklist and the completion date. We suggest that you store the checklist and any attachments in an accessible location to compare with future system data. Discrepancies can show potential issues that could adversely affect performance.

You can close the Microsoft Excel workbook or click another tab to continue to verify data.

Notes:

Controller Checklist

This chapter describes verification procedures for the controllers in your system.

The purpose of the checklist is to verify your system data against PlantPAx® system design recommendations. The collection of data lets you analyze overall system performance and pinpoint any potential performance issues.

The Microsoft® Excel® worksheet, which we refer to as a checklist, has entry fields to document system design information. There are five icons that indicate the status of the entered information and actions to be taken, if necessary. The checklist data provides a snapshot of whether your system is operating efficiently.

To access the checklist, click the <Controller> tab on the Microsoft Excel workbook.

IMPORTANT Complete this checklist for each controller on your system. To duplicate a checklist for each controller, do the following:

- Right-click the <Controller> tab and choose Move or Copy.
- Click Create a copy and then click OK.
- Double-click the checklist name and type a name that identifies the controller you are verifying.

Before You Begin

The Controller checklist procedures operate under the following assumptions:

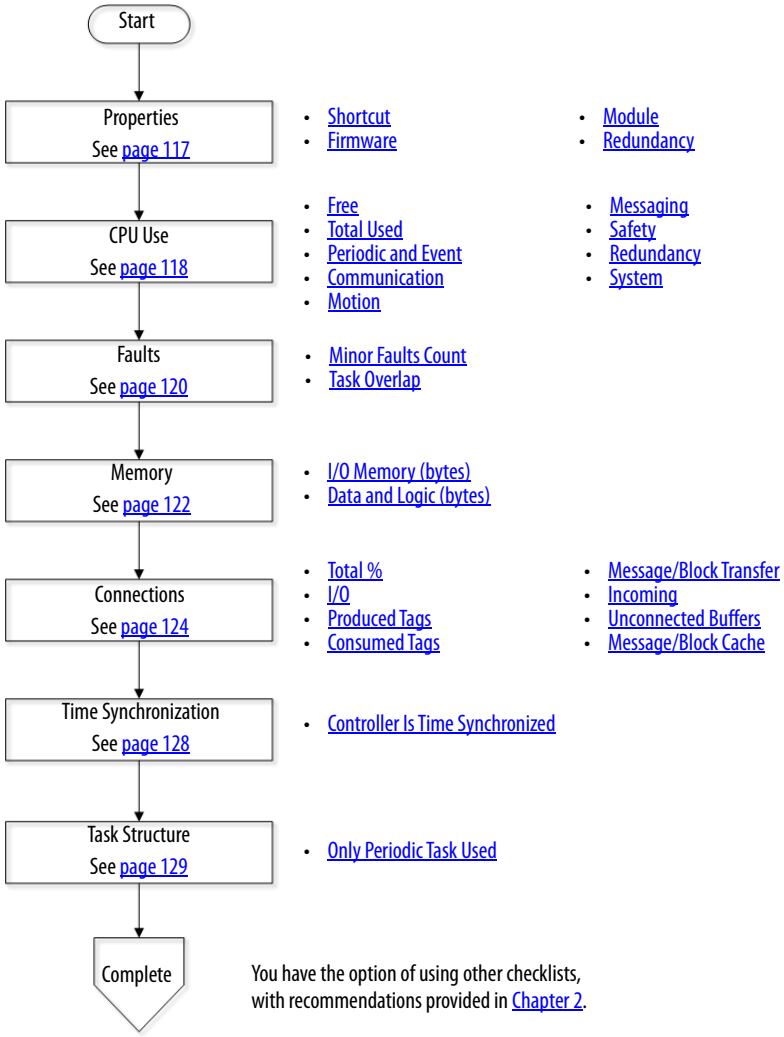
- Your PlantPAx system is operable (for example, the HMI application is running and the latest operating system patches are installed).
- You have configured and have access to the L_CPU Add-On Instruction for each controller being verified.

Optional

- The FactoryTalk® View display files (included with the workbook) are downloaded to your system. See page 115.
- A PDF printer is installed on the Engineering and/or Operator Workstation. You can print and view FactoryTalk View reports.

Click the page number or the links in the workflow for quick access to specific information.

Figure 7 - Controller Workflow



To gather information for this checklist, you have a choice of using the L_CPU Add-On Instruction faceplates or a Controller report. Both options require that the L_CPU Add-On Instruction is running in the controller to capture information.

For more details, see page 106.

The Controller report is included in the FactoryTalk View SE display files that are included in the Knowledgebase article 771236 at https://www.rockwellautomation.custhelp.com.

IMPORTANT The provided global object, display files, and images in the checklist files must be installed in the HMI before you print the Controller report. The display files include the following:

Images: icon_gray.png, icon_green.png, icon_yellow.png, icon_red.png

Global object: (RA-LIB) Report.ggfx

Displays: (RA-LIB) Report E.gfx, (RA-LIB) Report Controller.gfx

In addition to FactoryTalk View SE software files, the Knowledgebase article includes verification tools and instructions.

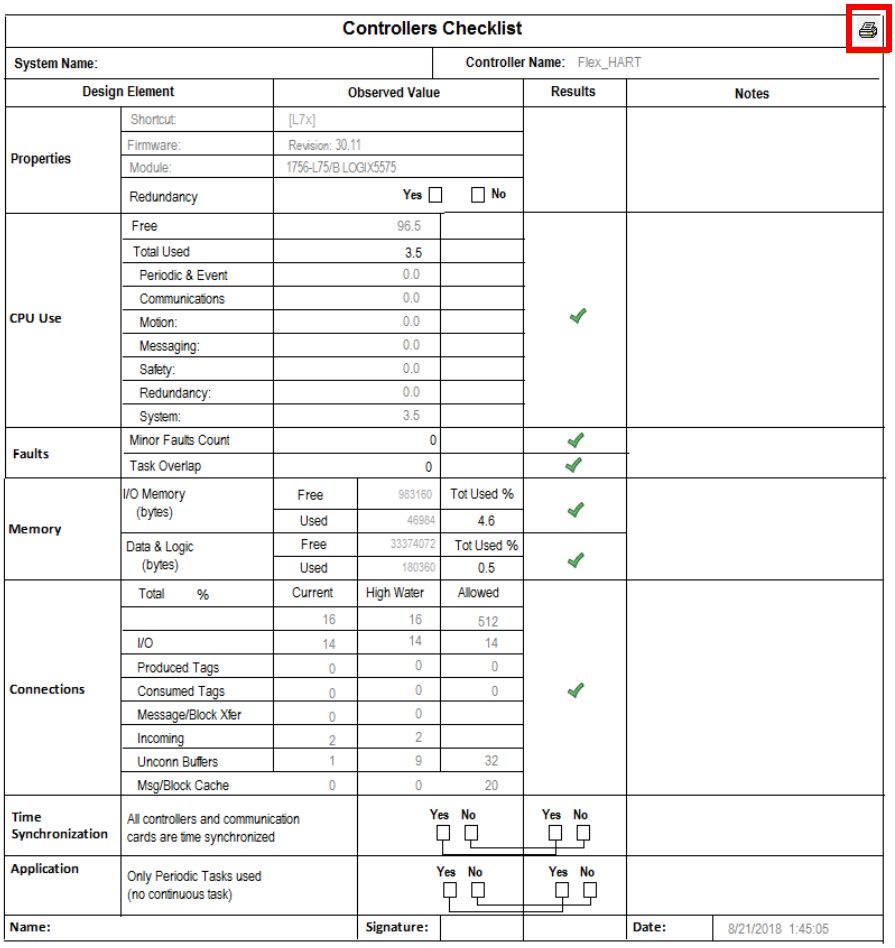
1. Run a FactoryTalk View Client session.
2. Click the Show Data Server and Controller Report Displays button.

   The ® Enterprise Report appears.

Controller Shortcut	Controller Path	Press to Show Shortcut Report Display
/Area/Data::[LGXC01]	RSLogix 5000 Emulator in slot 2 of the virtual backplane	...
/Area/Data::[PlantPAx]	RSLogix 5000 Emulator in slot 3 of the virtual backplane	...
/Area/Data::[LGXC01B]	RSLogix 5000 Emulator in slot 4 of the virtual backplane	...
/Area/Data::[PlantPAxB]	RSLogix 5000 Emulator in slot 5 of the virtual backplane	...

3. In the report, click the 'Press to Show Shortcut Report Display' button.

The Controllers Checklist appears.



Controllers Checklist

System Name: **Controller Name:** Flex_HART

Design Element		Observed Value			Results	Notes
Properties	Shortcut:	[L7x]				
	Firmware:	Revision: 30.11				
	Module:	1756-L75/B LOGIX5575				
	Redundancy	Yes ☐ ☐ No				
CPU Use	Free	96.5			✔	
	Total Used	3.5				
	Periodic & Event	0.0				
	Communications	0.0				
	Motion:	0.0				
	Messaging:	0.0				
	Safety:	0.0				
	Redundancy:	0.0				
	System:	3.5				
Faults	Minor Faults Count	0			✔	
	Task Overlap	0			✔	
Memory	I/O Memory (bytes)	Free	983160	Tot Used %	✔	
		Used	46984	4.6		
	Data & Logic (bytes)	Free	33374072	Tot Used %	✔	
		Used	180360	0.5		
Connections	Total %	Current	High Water	Allowed	✔	
		16	16	512		
	I/O	14	14	14		
	Produced Tags	0	0	0		
	Consumed Tags	0	0	0		
	Message/Block Xfer	0	0			
	Incoming	2	2			
	Unconn Buffers	1	9	32		
	Msg/Block Cache	0	0	20		
Time Synchronization	All controllers and communication cards are time synchronized		Yes ☐ No ☐		Yes ☐ No ☐	
Application	Only Periodic Tasks used (no continuous task)		Yes ☐ No ☐		Yes ☐ No ☐	

Name: **Signature:** **Date:** 8/21/2018 1:45:05

You can click the Print button and attach the report to the worksheet.

Properties

We recommend that you use the FactoryTalk View SE (Controller report) display that is provided with the checklist files for your convenience. The Controller report is organized to match the checklist rows. Otherwise, the information from the L_CPU faceplates must be manually entered into the checklist.

To use the L_CPU faceplates, see the Rockwell Automation® Library of Logix Diagnostic Objects Reference Manual, publication PROCES-RM003.

The following rows in this checklist section provide baseline information:

- Shortcut
- Firmware
- Module
- Redundancy

Shortcut

The Shortcut field provides entry of the computer location for the controller that is being verified.

Firmware

The Firmware field provides entry of the controller firmware revision (major.minor).

Module

The Module field provides entry of the controller catalog number. For example, 1756-L75/A LOGIX 5575.

Redundancy

This row denotes if you are using a redundant controller. The Yes or No answer affects the Total Used CPU field.

TIP A secondary controller must be synced with the primary controller for accurate CPU usage values.

CPU Use

We recommend CPU load in a production environment to be 75% or less. It's important to keep 25% CPU capacity as reserve to handle online edits, data server switchover, and so on.

The rows in this checklist section verify that the following CPU design attributes comply with these system recommendations:

- Free
- Total Used
- Periodic and Event
- Communication
- Motion
- Messaging
- Safety
- Redundancy
- System

Free

This informational row provides entry of the amount of unused CPU resources. Use the L_CPU Usage faceplate or the Controller report display (that you imported) to get the information.

Total Used

This row, which works with the Redundancy field, verifies that the total CPU used for the controller is within the PlantPAx system recommendations.

1. In the checklist, type a number to indicate the total percentage of CPU usage.
2. Press Enter.
3. Observe your results and make any necessary changes.

	Not complete until a percentage of CPU usage is entered.
	Pass; at least 50% of free CPU usage for redundant controllers and at least 25% for simplex controllers.
	Fail; review your configuration, scan rates, and controller assignments and make necessary changes to fall within recommended limits.

IMPORTANT If the total CPU use exceeds recommendations, review the following subcategories of CPU use to determine which CPU function seems to use a large portion.

You can attach the L_CPU faceplate or the controller report with the values for the subcategories.

Periodic and Event

This informational row documents the amount of CPU resources for periodic and event tasks.

A properly sized controller is when the execution time of all tasks is less than half of the faster task rate. Because PlantPAx recommendations specify no Continuous task, then this category is the amount of CPU time that is needed to run all of your application code in the controller.

IMPORTANT The CPU percentages do not necessarily add up to 100% because of the variability between execution cycles of the listed tasks and rounding errors. For details, see 'Estimate Controller CPU Utilization'; in the PlantPAx DCS Reference Manual, publication PROCES-RM001.

Communication

This informational row provides entry of the CPU percentage that is being used to respond to communication requests.

Motion

This informational row provides entry of the percentage of CPU usage that is being used for motion.

Messaging

This informational row documents the percentage of CPU assigned to process messages.

Safety

This informational row documents the percentage of CPU that is being used for safety tasks.

Redundancy

This informational row documents the percentage of CPU that is being used for redundancy processing.

System

This informational row documents the percentage of system resources.

Faults

The rows in this checklist section use the following design attributes to verify that minor faults are resolved:

- Minor Faults Count
- Task Overlap

Minor Faults Count

This row shows the number of minor faults that have occurred within the controller. We recommend that all minor faults are corrected to make sure that the controller operates as intended and to reduce a potential impact to performance.

1. Type the number of faults, if applicable.
2. Press Enter.
3. Observe your results and make necessary changes.

	Not complete until a number is entered.
	Pass; no minor faults.
	Fail; minor faults must be resolved and cleared. After clearing the minor faults, monitor for a period of time (at least several controller scans) before reverifying.

Task Overlap

This row records if a task overlap has occurred. Make sure to reset minor fault counts to zero.

1. From the checklist pull-down menu, click Yes or No if the Task Overlap indicator shows on the faceplate or display.
2. Observe your results and make necessary changes.

	Not complete until an option is entered.
	No task overlap is occurring.
	Fail; a task overlap is occurring and must be resolved. Make changes such as simplifying programs, lengthening the period, or raising the relative priority of your more important tasks.

Memory

The rows in this checklist section verify that the memory allocation is within PlantPAx requirements for the following attributes:

- I/O Memory (bytes)
- Data and Logic (bytes)

IMPORTANT These values are displayed on the checklist controller display, or offline on the Memory tab of the Controller Properties dialog box in the Studio 5000 Logix Designer® application. For details, see the PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001.

I/O Memory (bytes)

The PlantPAx system requires the free I/O memory to be a minimum of 25% for simplex controllers. We recommend greater than 50% free memory for redundant controllers.

1. Type the total free I/O memory in bytes.
2. Type the total used I/O memory in bytes.
3. Type the Total% from the Checklist Controller display.

   You can also manually calculate the Total% = Used/(Used + Free) * 100%.
4. Press Enter.
5. Observe your results and make any changes.

	Not complete until a percentage is entered.
	Warning; I/O memory exceeds 50% for redundant controllers and 75% for simplex controllers. To reduce the number of I/O modules that are scanned by this controller, make system changes.
	Pass; I/O Memory is at least 50% for redundant controllers and at least 25% for simplex controllers.

Data and Logic (bytes)

The PlantPAx system requires the free data and logic memory to be a minimum of 25% for simplex controllers. We recommend greater than 50% free memory for redundant controllers.

1. Type the total free data and logic memory in bytes.
2. Type the total used data and logic memory in bytes.
3. Type the Total% from the Checklist Controller display.

   You can also manually calculate the Total% = Used/(Used + Free) * 100%.
4. Press Enter.
5. Observe your results and make any changes.

	Not complete until a percentage is entered.
	Warning; data and logic memory exceeds 50% for redundant controllers and 25% for simplex controllers. Upgrade controller for more memory or make necessary application changes to reduce load.
	Pass; data and logic memory is at least 50% for redundant controllers and 25% for simplex controllers.

Connections

The rows in this checklist section verify that the following connection elements are currently operating with at least 50% free connections. In addition, the total number of all connections can be no more than 50% of the total allowable connections.

- Total %
- I/O
- Produced Tags
- Consumed Tags
- Message/Block Transfer
- Incoming
- Unconnected Buffers
- Message/Block Cache

TIP Produced/consumed tags and messages are the two options for communication between controllers. To compare the differences, see Chapter 3 in the PlantPAx Distributed Control System Reference Manual, publication PROCES-RM001.

Total %

This row verifies if the total percentage of the connections is less than 50% of the allowed connections.

1. Type a number for the total percentage of the connections.
2. Type the current percentage, high water (maximum), and allowed percentages.
3. Press Enter.
4. Observe your results and make any changes.

	Not complete until a percentage is entered.
	Warning; make necessary application changes to reduce the changes below the recommended limit.
	Pass; total connections that are used are <50% of the allowed connections.

I/O

This row verifies if the total percentage of the I/O connections is less than 50% of the allowed connections.

1. Type a number for the current number of connections, high water (maximum), and allowed.
2. Press Enter.
3. Observe your results and make any changes.

	Not complete until a number is entered.
	Warning; the number of I/O connections > 50% of I/O connections allowed. Devices appearing in the I/O tree that communicate to this controller contribute to the number of I/O connections used. Simplify your I/O tree/structure to communicate to fewer devices to lower the I/O connections.
	Pass; I/O connections are < 50%.

Produced Tags

This row verifies if the total percentage of the produced tag connections is less than 50% of the allowed connections. Make sure the number of consumers that are configured for a produced tag is the actual number of controllers consuming it to reduce the number of connections to the controller.

1. Type a number for the current number of produced tag connections, high water (maximum), and allowed.
2. Press Enter.
3. Observe your results and make any changes.

	Not complete until a number is entered.
	Warning; the number of connections that are used to produce tags exceeds 50% of the controller capacity (but you can use 100% capacity of the communication bridge). Reduce connections by consolidating tags into one structure or tag, or by deleting all but the most crucial produced tags. Also make sure that the number of maximum consumers that are configured for a produced tag is set to th e minimum needed.
	Pass; produced tag connections that are used are <50% capacity.

Consumed Tags

This row verifies if the total percentage of the consumed tag connections is less than 50% of the allowed connections.

1. Type a number for the current number of consumed tag connections, high water (maximum), and allowed.
2. Press Enter.
3. Observe your results and make any changes.

	Not complete until a number is entered.
	Warning; the number of connections that are used to consumed tags exceeds 50% capacity. Reduce connections by consolidating tags into one structure or tag, or by deleting all but the most crucial consumed tags. Also make sure that the number of maximum consumers that are configured for a consumed tag is set to the minimum needed.
	Pass; consumed tag connections that are used are <50% capacity.

Message/Block Transfer

This informational row lists the number of Message and Block Transfer connections. This allowable connection is not available from the controller.

Incoming

This informational row lists the number of Incoming connections. This allowable incoming connection is not available from the controller.

Unconnected Buffers

This row verifies that the number of unconnected buffers used are <50% allowed.

1. Type a number for the current number of Unconnected buffers, high water (maximum), and allowed.
2. Press Enter.

3. Observe your results and make any changes.

	Not complete until a number is entered.
	Warning; the number of message and block transfer connections due to unconnected buffers is > 50% of allowable connections. Simplify your communications to remote devices by using unconnected messages and block transfer communications by unchecking the 'Cache connection' to lower the usage. Consider combining multiple messages or block transfers to the same devices into the same message.
	Pass.

Message/Block Cache

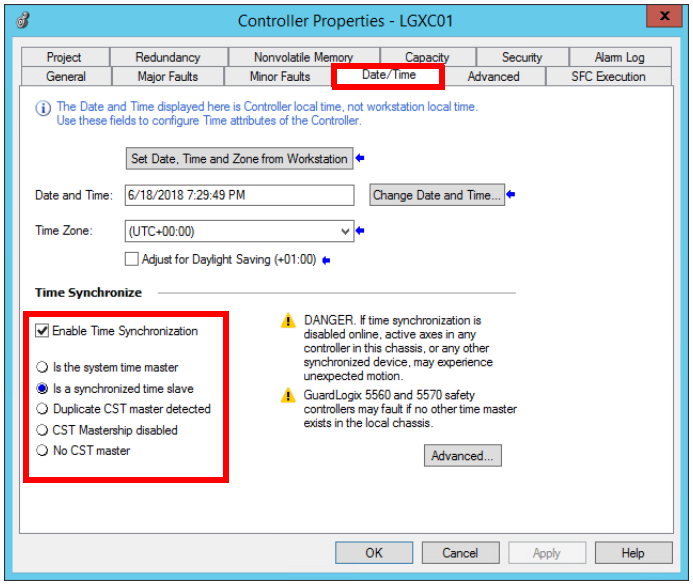
This row verifies that messages and block caches that are used are <50% allowed.

1. Type a number for the current number of Message and Block Cache connections, high water (maximum), and allowed.
2. Press Enter.
3. Observe your results and make any changes.

	Not complete until a number is entered.
	Warning; the number of message and block transfer cache connections is > 50% of allowable connections. Simplify your communications to remote devices by using messages and block transfer communications in a cached manner to lower the connections that are used. Consider combining multiple messages or block transfers to the same devices into the same message.
	Pass.

Time Synchronization

This row in the checklist verifies that the controller is configured for time synchronization. For details on the protocols that are used for time synching controllers to a master, see the PlantPAx DCS Infrastructure Configuration User Manual, publication PROCES-UM001.



Controller Is Time Synchronized

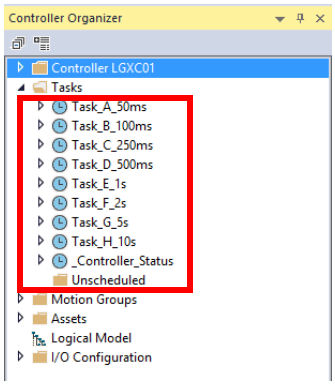
This row verifies that the controller is configured to reference the same time for any event or alarm that occurs in the system.

1. From the checklist pull-down menu, choose Yes or No to indicate whether the controller is configured for time synchronization.
2. Observe your results and make any changes.

	Not complete until an option is synchronized.
	No; warning. A controller can fail to synchronize because of several factors, including: • Not configured for time synchronization • Lack of network access to a time master • Time synchronization settings are configured incorrectly
	Yes; pass.

Task Structure

This row verifies that periodic tasks only are used. Periodic tasks have a clock icon in front of the task in the Controller Organizer.



Using only periodic tasks provides the following:

- Improves predictability of the controller CPU availability for communication to the system
- Provides a more accurate view of the controller loading at runtime. With continuous task, controller loading is always 100%
- Reduces the amount of task switching that improves overall application and system performance
- Allow any free time by the controller to be used for HMI communication

Only Periodic Task Used

On the checklist, complete these steps.

1. From the pull-down menu, choose Yes or No to indicate whether the controller is configured for periodic tasks only.
2. Observe your results and make any necessary changes.

	Not complete until an option is chosen.
	Pass.
	Fail; you must move code in the continuous task to a periodic task. Delete the continuous task.

When all entry fields are verified, type the name of the person who completed the checklist and the completion date. We suggest that you store the checklist and any attachments in an accessible location to compare with future system data. Discrepancies can show potential issues that could adversely affect performance.

Notes:

Troubleshooting Scenarios

This chapter provides recommendations for how to resolve issues in a PlantPAx® system. We provide several scenarios with procedures to show how to narrow the scope of an issue to find a solution.

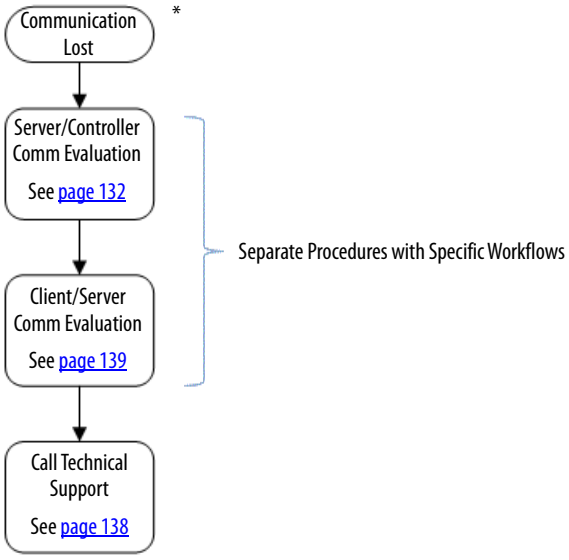
Obviously we cannot include every scenario for application challenges. The checklists that are described in this manual help assist with monitoring and maintaining optimal system performance. You also have the option of calling a Rockwell Automation® Technical Support representative 24 hours, 7 days a week.

The workflows in this chapter illustrate how to identify the cause of an issue to assist technical support if you are unable to find a solution. We describe how to tackle two common issues: lost communication for HMI displays and sluggish HMI performance. Wire frames on HMI displays indicate that you are experiencing some type of communication loss or you cannot connect to the server.

HMI Communication Lost

Figure 8 shows a basic workflow to correct lost communication. To target the root cause, proceed through the high-level flow that focuses on areas to be examined. Click the link or go to the respective page for specific information on each topic to identify an issue.

Figure 8 - Resolve Lost Communication



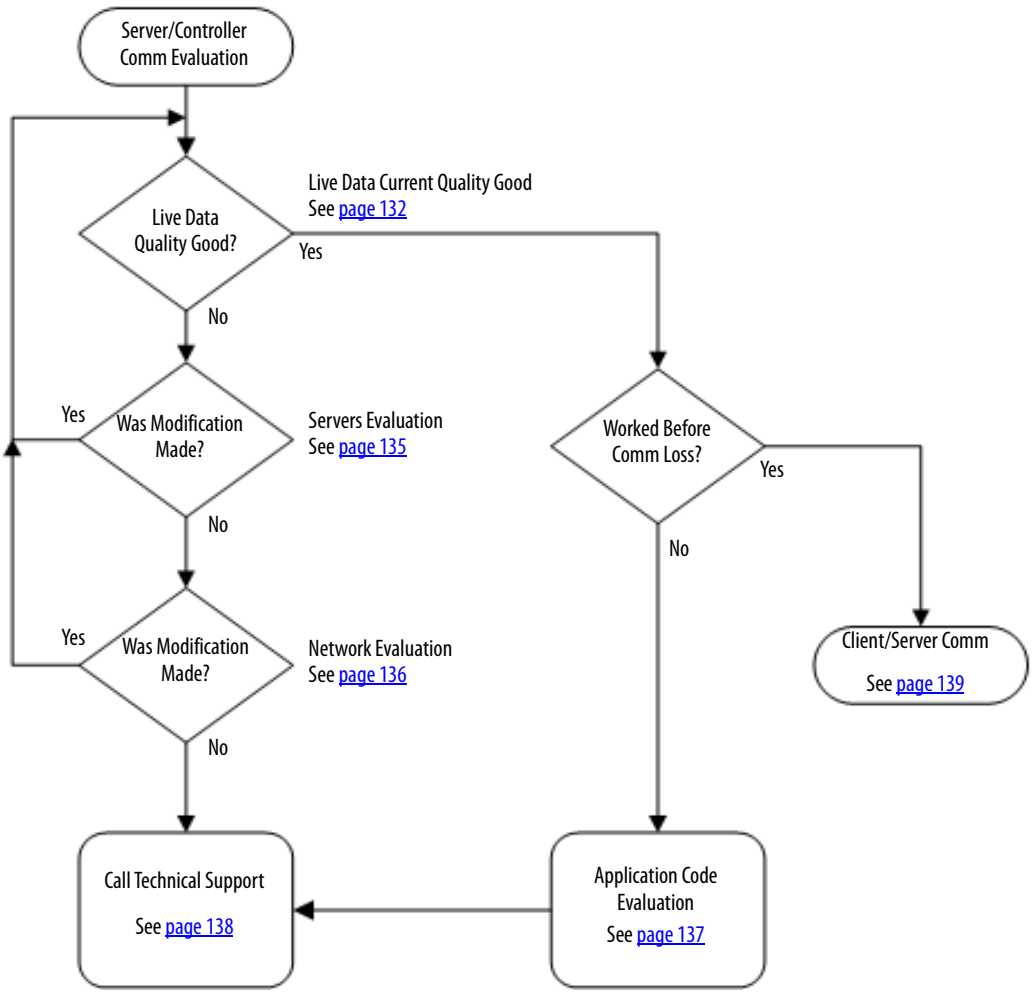
* If you cannot open a FactoryTalk® View SE client application on your OWS, go directly to the Client/Server Communication Evaluation section on page 139.

Server and Controller Communication Evaluation

Figure 9 shows how to diagnose a loss of communication between the (PASS) server and the controller. Make sure that the server has good quality communication with the controller and follow down the workflow to rule out any network issues.

Click the link or go to the respective page for specific information on each topic. If the server checks out okay, then you have the option to go to the client computer for additional troubleshooting or to call Technical Support.

Figure 9 - Resolve Server to Controller Communication

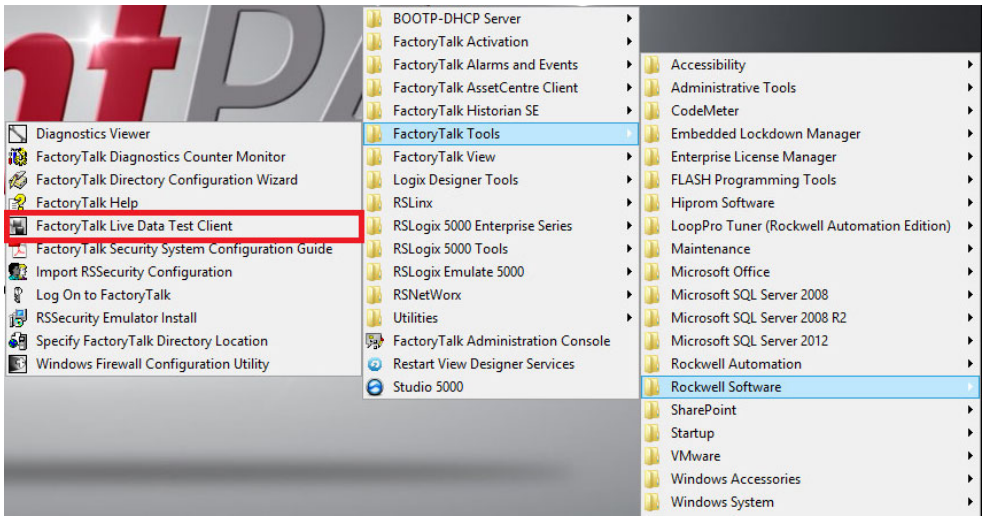


Live Data Current Quality Good

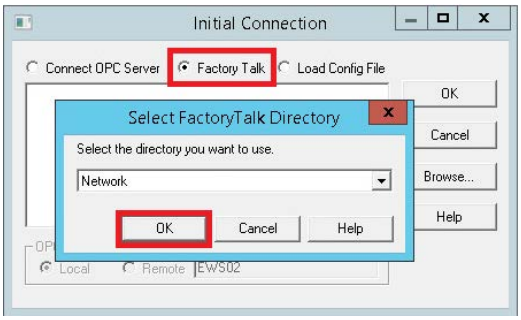
This procedure examines whether the controller communication is available at the server level. If the current quality is 'good', then you can rule out that the server is not talking to the controller.

Complete these steps.

1. From the Engineering workstation or any client machine, click the Programs menu and choose Rockwell Software®>FactoryTalk Tools>FactoryTalk Live Data Test Client.



The Initial Connection dialog box appears.

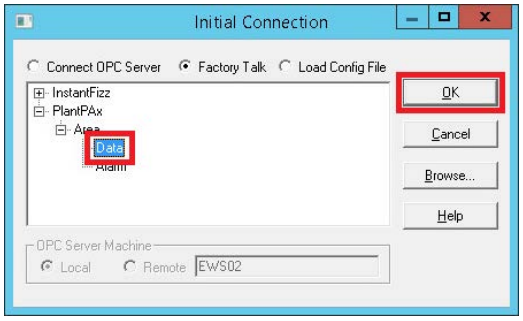


2. Click FactoryTalk.

   The Select FactoryTalk Directory popup window appears.

3. From the pull-down menu, make sure that you select Network and click OK.

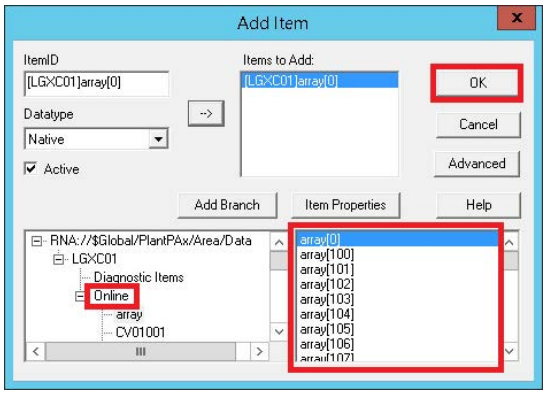
4. From the Initial Connection dialog box, browse to the data server area and click OK.



The Create Group dialog box appears.

5. Use the default or type your own group name and click OK.

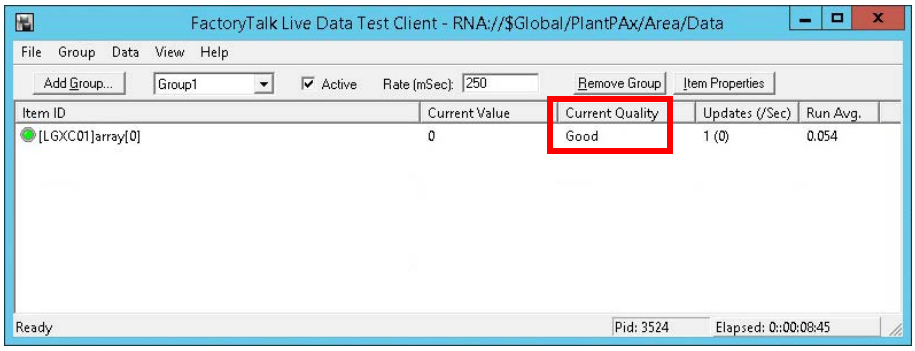
6. In the lower, left pane of the Add Item dialog box, browse to the controller, and select Online.



7. In the right pane, if no tags appear then proceed to Servers Evaluation on page 135. Otherwise, click any tag in the controller.

8. Click OK.

   The FactoryTalk Live Data Test Client dialog box appears.



9. Check that the Current Quality is 'Good'.

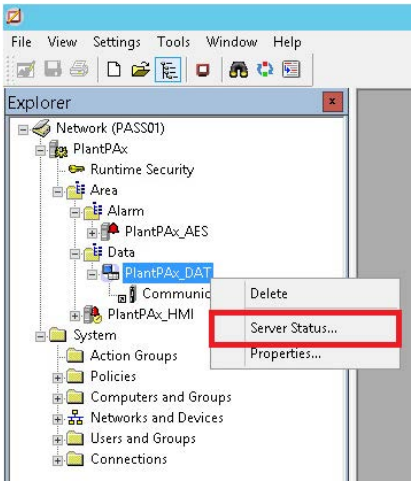
   The 'Good' status indicates that you have communication from the server to the controller.

   If the status is 'Bad', then proceed to Servers Evaluation.

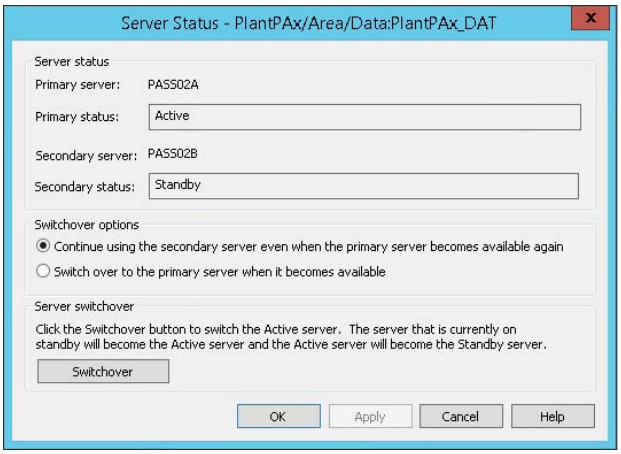
Servers Evaluation

This procedure verifies that at least one server has active status. Complete these steps for the Data server and HMI server.

1. In the FactoryTalk Administration Console or FactoryTalk View Studio, right-click the Data server and choose Server Status.



   The Data server status dialog box appears.



2. Make sure that the status is 'Active' for at least one of the servers.
3. Repeats 1...2 for the HMI server.

   In step 1, right-click the HMI server and choose Server Status.

Was Modification Made?

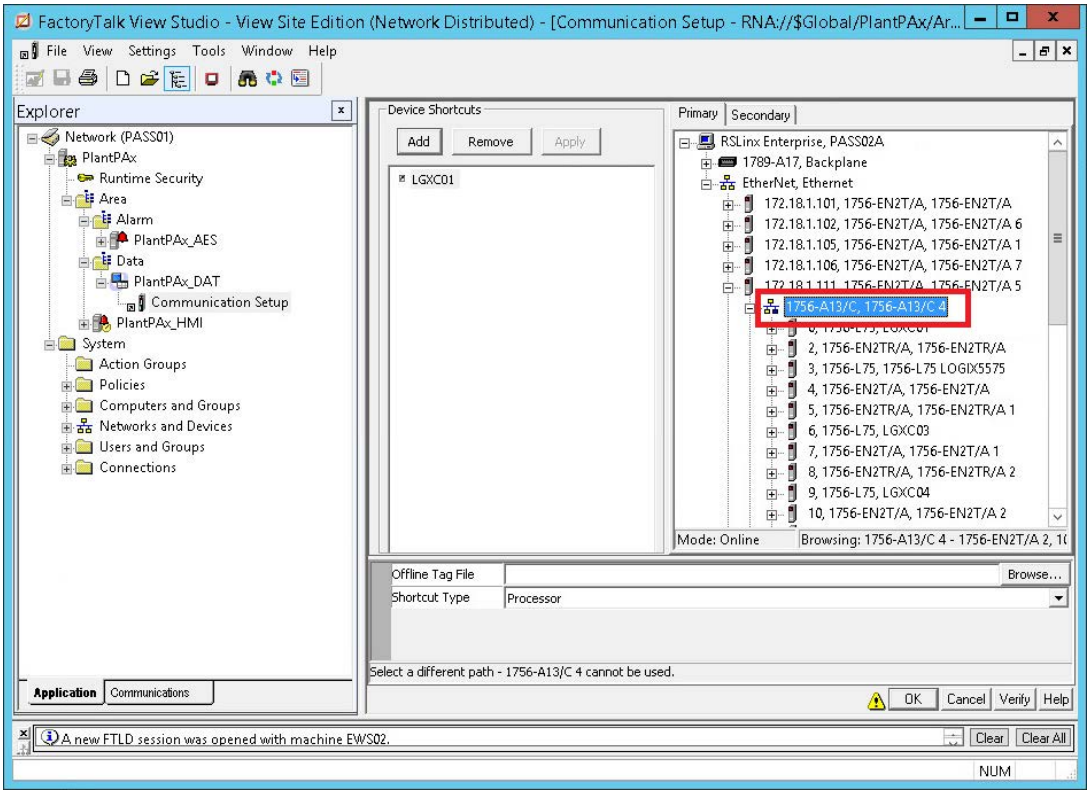
If you found an issue and made a correction, go back and redo the Live Data procedure. Reverify that communication has been established between the server and controller.

Network Evaluation

Now you are analyzing whether the shortcut to the controller is valid. An incorrect path affects the controller communication to the server.

TIP In a redundant system, perform these steps for the Primary and Secondary servers.

1. In the FactoryTalk Administration Console or FactoryTalk View Studio, open the Communications Setup.



2. Click the controller shortcut.

   If the shortcut does not highlight the correct controller, then select the correct controller and save the shortcut.

3. With the correct shortcut selected, expand the backplane.

   If you can browse, then you have communication to the controller. Proceed to Was Modification Made? on page 137.

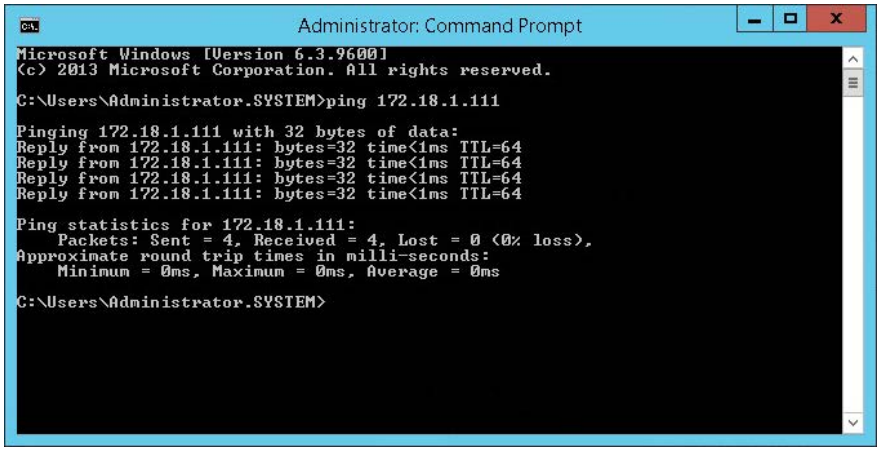
   If you cannot browse, then try to ping the controller from the PASS server.

4. To ping the controller, do the following:
   a. Click Start and type CMD into the Search text box.

      A command prompt opens.

   b. Type 'Ping xxx.yyy.zzz.aaa', where the letters represent the IP address of the communication adapter.

5. If the adapter responds, a similar display appears as shown.



6. If your device does not respond, a 'Request Timed Out' message appears.

   If the ping is successful, proceed to the next diagnostic action.

7. Repeat steps 2...6 if you are using a redundant Data server.

Was Modification Made?

If you found an issue and made a correction, go back and redo the Live Data procedure. Reverify that communication has been established between the server and controller.

Review Application Code Formatting

If the server and controller are communicating and the problem still exists, we recommend that you check the project application code. Project components could be incorrectly configured.

Verify proper Live Data syntax for the following project elements:

- FactoryTalk View SE or FactoryTalk View ME:
  - Display parameter files
  - Display values, expressions, and animations
  - Global object parameters
  - Command buttons and macros
  - Data logger
  - Event detector
  - Derived tags

Contact Technical Support

Call a Rockwell Automation Technical Support representative if the problem still exists after checking the following:

- Server communication status
- Controller shortcut
- Application code syntax

Email technical support the most recent data that is compiled from the PlantPAx checklists.

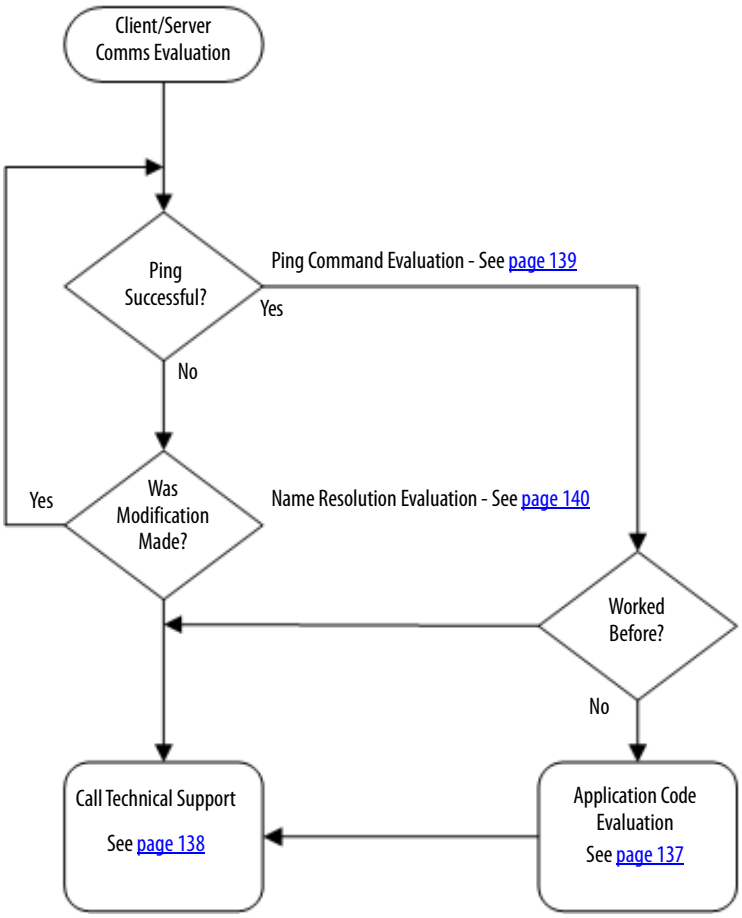
IMPORTANT If the size of the information packet cannot be sent via email, a technical support representative can help you post your information to the Rockwell Automation FTP site.

Client and Server Communication Evaluation

Figure 10 shows a workflow to resolve lost communication between a (PASS) server and a client. Work through the diagnostic activities until you identify an issue.

Click the link or go to the respective page for specific information on each topic. If the issue still exists, contact Technical Support with the details you have compiled to help with a resolution.

Figure 10 - Resolve Server to Client Communication



Ping Command Evaluation

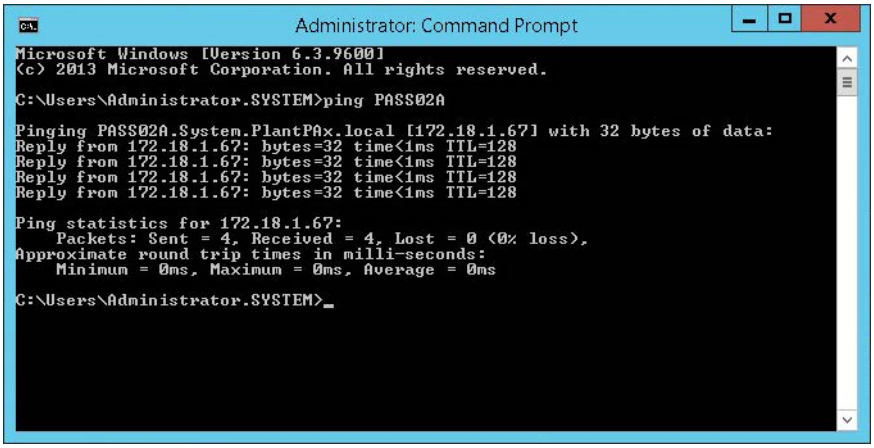
To check if the client computer is communicating with the server, start by pinging the computer.

Complete these steps.

1. Click Start and type CMD into the Search text box.

   A command prompt opens.
2. Type 'Ping (and server name)'.

3. If the controller responds, a display appears similar to the following:



4. If your device does not respond, a 'Request Timed Out' message appears.

   If the ping is successful, check your application code for proper syntax. See page 137.

   Also, make sure the firewall rules are not blocking the communication.

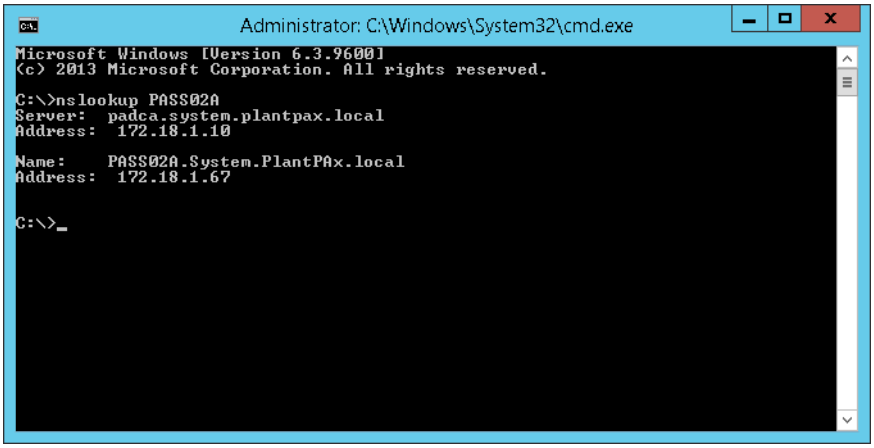
Name Resolution Evaluation

This procedure verifies the mappings of IP addresses to host names. The steps apply if you are using a domain or a work group, with the latter explained last.

1. At the Command Prompt, type the NSLookup and server name and press Enter.
2. Type the name of the server that is being pinged.

   If you receive the message 'DNS Request Timed Out', you typically do not have the Reverse Lookup Zone configured.

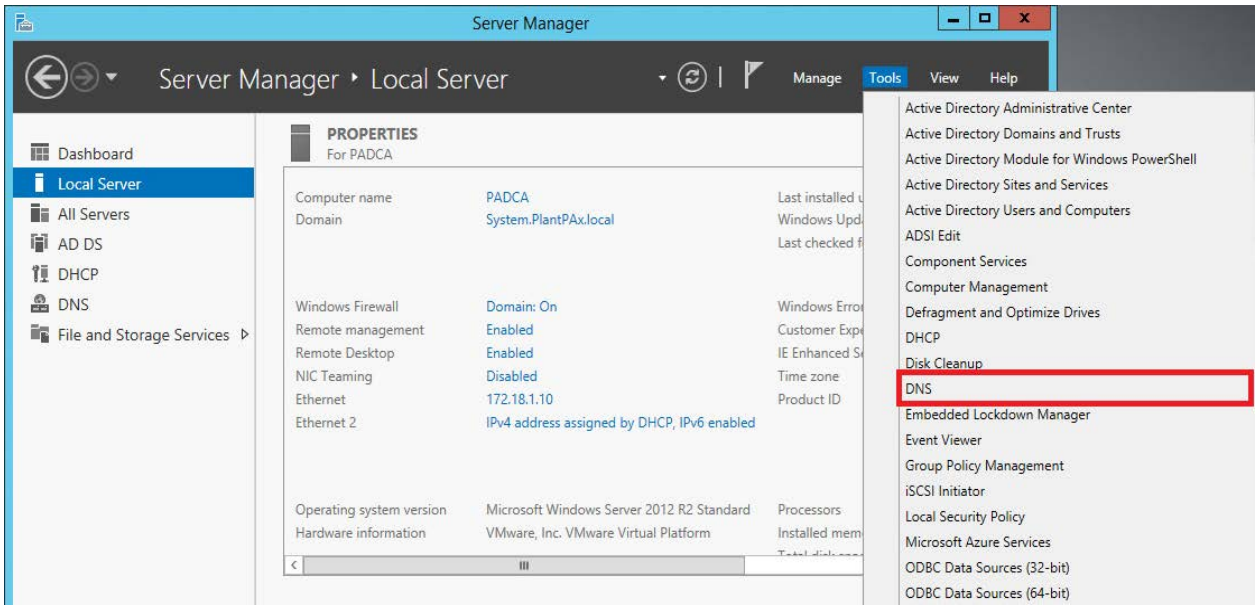
   If the NSLookup ping provides the server name and IP address (as shown in the example), the server communication issue still exists.



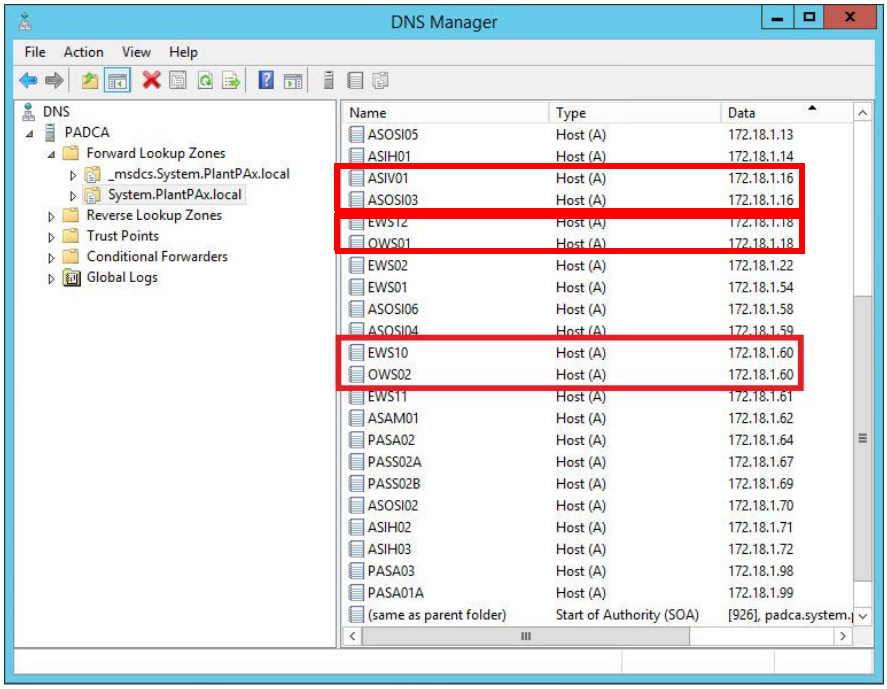
   If the NSLookup ping does not provide a server name and IP address, then proceed with the following instructions on page 141.

To verify that components do not have duplicate IP addresses, complete these steps.

1. From a DNS server, click Tools on the main menu and choose DNS.



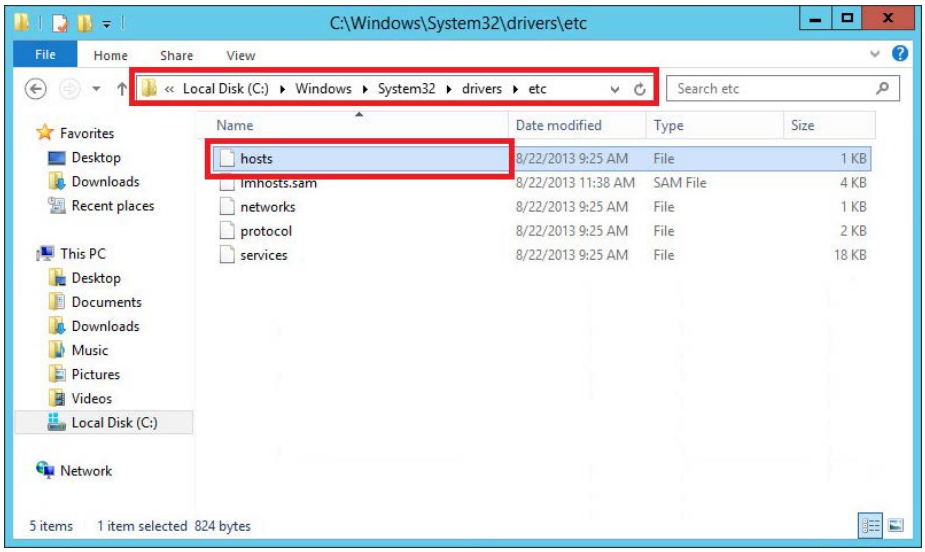
The DNS Manager display appears.



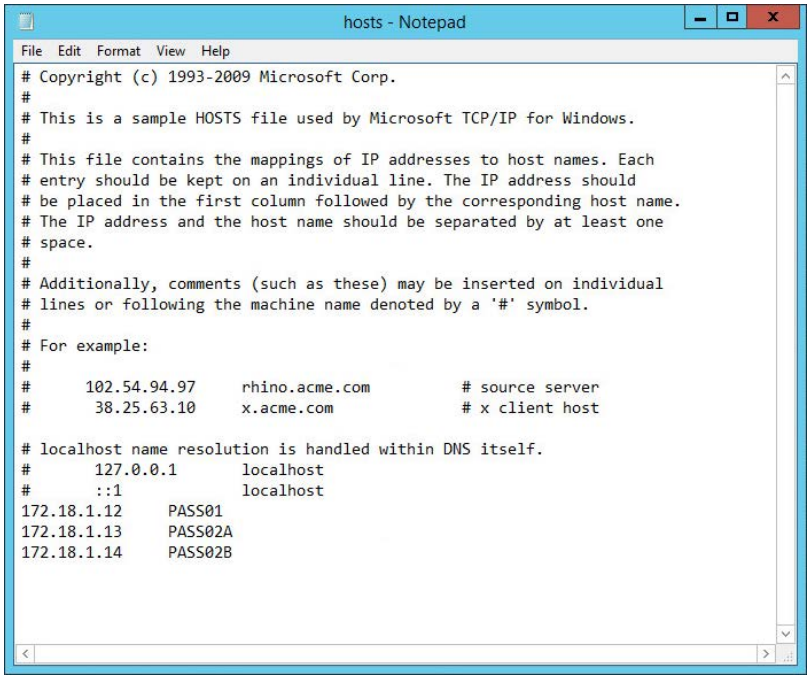
2. Verify each name has its own IP address to make sure that you are pinging the correct server via the client.

   The example DNS Manager display shows several ‘bad’ computer names with the same IP address.

3. If you are using a workgroup, open the hosts folder in your Windows local hard disk drive.



4. Using Notepad, open the hosts file.



5. Verify each name has its own IP address to make sure that you are pinging the correct server via the client.

Was Modification Made?

If you found an issue and made a correction, go back and ping the client computer again.

Review Application Code Formatting

If the server and controller are communicating and the problem still exists, we recommend that you check the project application code. See page 137.

Contact Technical Support

Call a Rockwell Automation technical support representative if the problem still exists. See page 138.

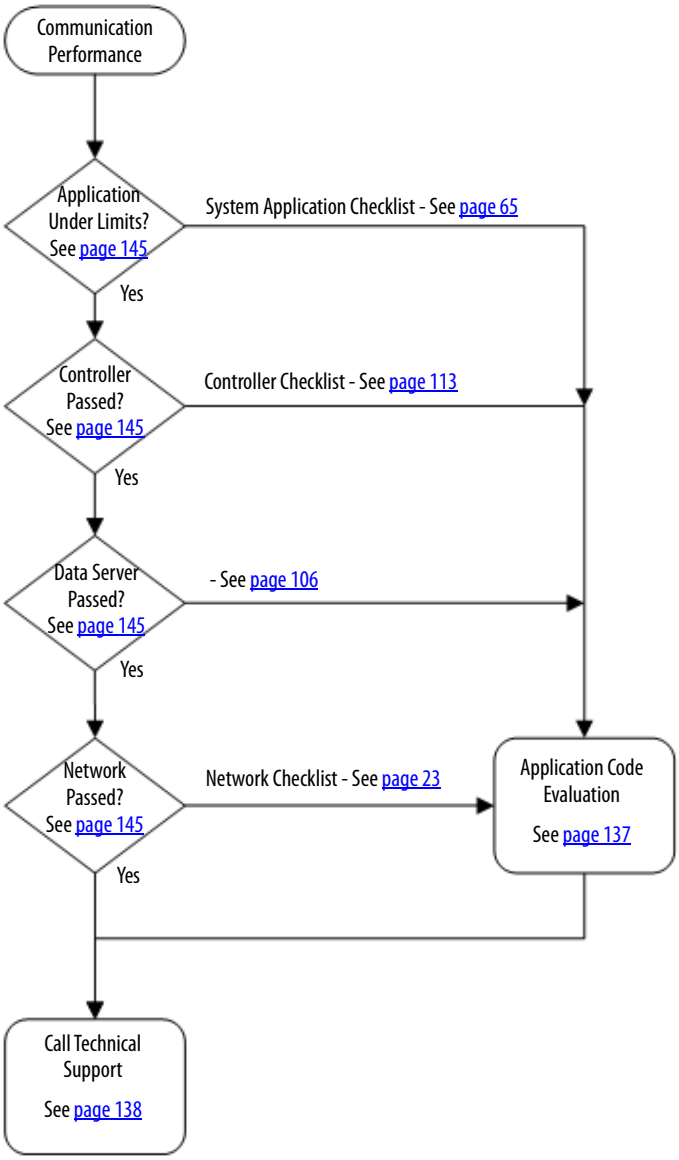
HMI Display Access is Slow

Figure 11 shows a workflow to resolve sluggish HMI displays. To target the root cause, work through the diagnostic activities until you identify an issue.

Click the link or go to the respective page for specific information on each topic. You also can access a checklist that is associated with a topic. The checklist data evaluates whether elements are properly configured and follow PlantPAx system guidelines.

If the issue still exists, contact Technical Support with the details that you have compiled to help with a resolution.

Figure 11 - Resolve Slow HMI Display Callup



Application Under Limits?

A good starting point is to verify that your system design is within the sizing recommendations for a PlantPAx system. Design attributes include the number of servers, number of assets, and so forth.

To verify design attributes, see the System Architecture Checklist on page 65.

Controller Passed?

The next step is to check whether your controllers have the CPU and memory usage as prescribed by the PlantPAx guidelines. These percentages vary depending on whether your application uses simplex or redundant controllers.

For details, see the Controller Checklist on page 113.

Data Server Passed?

If the application design and controller setup are properly configured, check the Data server. Verify that the server is communicating data from the controllers to the HMI server and operator workstation.

For details, see the FactoryTalk Linx worksheet section on page 106.

Network Passed?

The health of the network is critical whether you are using a virtual or traditional operating system. There is a tool for analyzing network infrastructure.

For details, see the System Infrastructure Checklist on page 15.

Review Application Code Formatting

For details, see page 137.

Contact Technical Support

For details, see page 138.

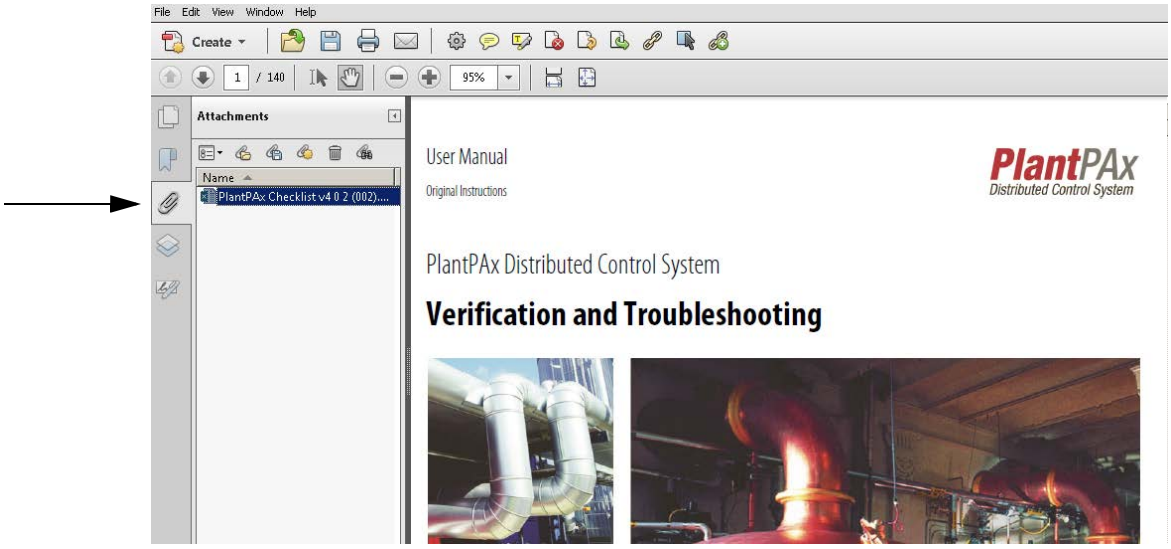
Notes:

Access the Attachment

The Microsoft® Excel workbook that is attached to this PDF file contains five worksheets for verifying PlantPAx® system recommendations. Each tab at the bottom of the Excel® workbook accesses a checklist worksheet that is designed to evaluate design guidelines.

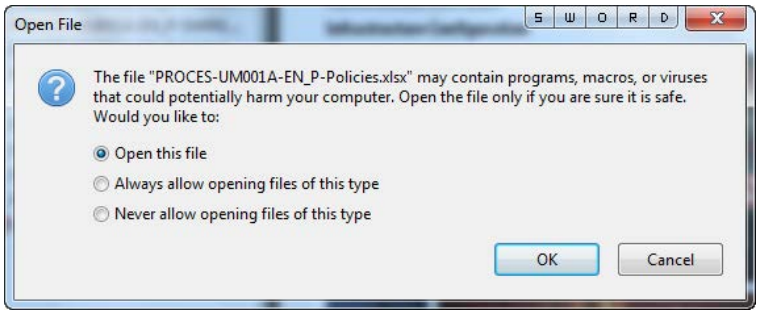
To use the Microsoft Excel workbook, click the Attachments link (the paper clip) and double-click the file.

See How to Use Attachments on page 148.



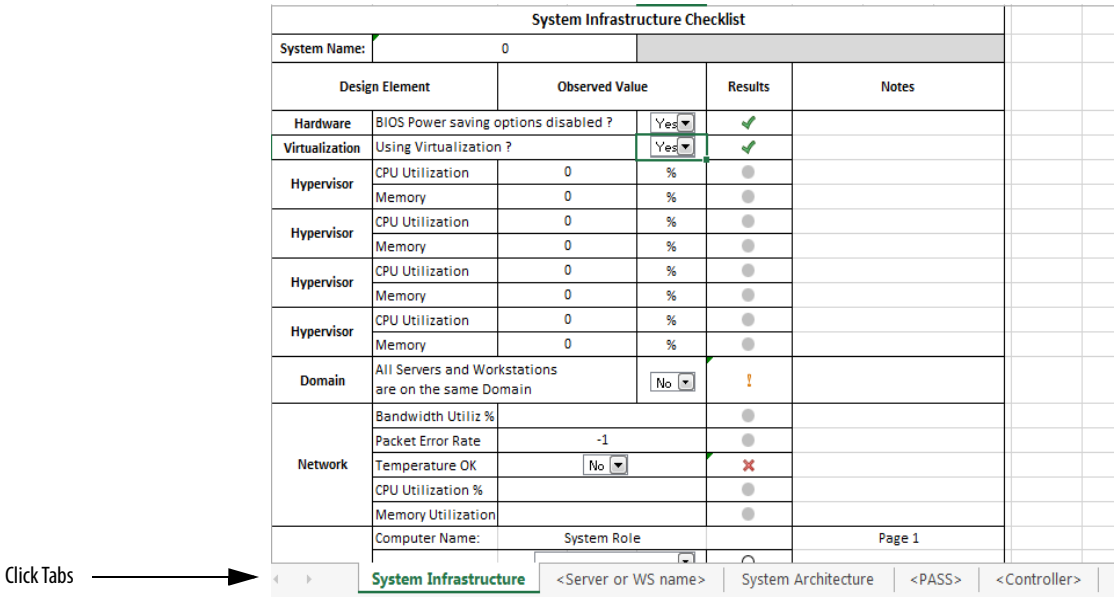
Open Content

As a precaution when you open programs or files, select one of the choices and click OK.



How to Use Attachments

The Microsoft Excel workbook contains several tabs to access checklist worksheets. Click a desired tab and complete the electronic form.



For details on the checklist and icon descriptions, see page 14.

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Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

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