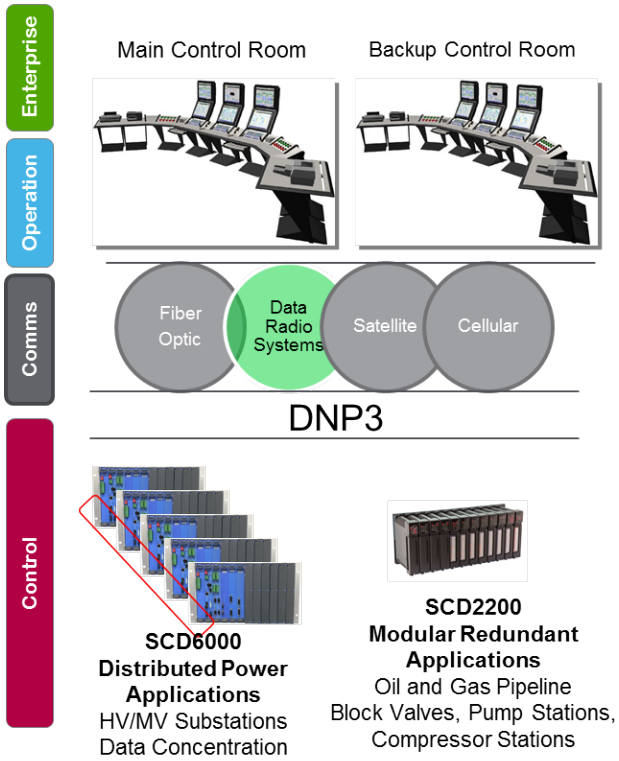
Foxboro™ SCADA

Software

PSS 41S-10H1

Product Specification

February 2020



Legal Information

Overview

EcoStruxure™ Foxboro™ SCADA is a master station software product, layered upon ArchestrA™ based system platform components. These same components are also used to support EcoStruxure™ Foxboro™ DCS control software. Foxboro SCADA technology supports all the SCADA-specific requirements related to supervisory control and data acquisition on loosely coupled serial and IP networks using industry standard protocols. You can use enterprise servers to build a scalable SCADA system with virtualization, workstations, security functions and features, and high speed LAN/WAN networking equipment.

Due to the architecture's close relationship with Foxboro DCS, you will find many references to elements of the Foxboro DCS product line in this document. The Foxboro DCS product line supplies standard industrial server-grade hardware and workstations that have been proven for use and validated with the Foxboro SCADA software components for operational excellence and compliance to security standards.

Technology

Foxboro SCADA is based on Windows Server 2012 R2 Operating Systems with SQL Server 2012 R2 and Windows 10 for Operator Workstations. It is compatible with the latest ArchestrA System Platform (ASP) 2012 R2 Patch01, ASP 2014, and ASP2014 R2 SP1. Foxboro SCADA uses the same hardware as Foxboro Process Automation System.

Foxboro SCADA is not compatible with the Foxboro Control Network but can be used with external public and private networks. Foxboro SCADA supports virtualization using Hyper-V from Windows Server 2012 R2 Standard / Windows Server 2016 Standard.

> **NOTE:** Existing users of Foxboro SCADA must continue using Windows Server 2012 R2 Standard for VM and Host.

Features

For a detailed description of the features of Foxboro SCADA, see *Rapid Configuration with ArchestrA-based SCADA Templates, page 5* through *SCADA System Manager, page 10*.

Key Differentiators

Table 1 - Key Differentiators for Foxboro SCADA

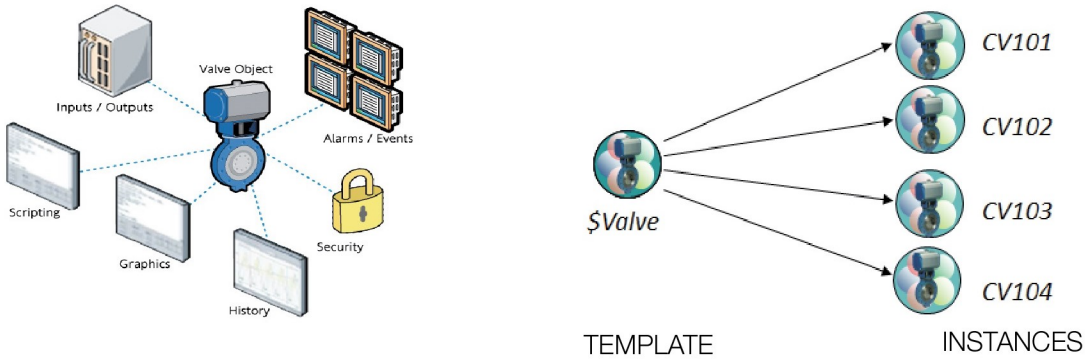
Feature	Description
DNP3 Secure Authentication V2 and V5	Supports Primary Domain Controller for user management and operations. • All critical controls are helped protected by authentication challenge and response • Aggressive and non-aggressive modes • Manual (V2) or automated (V5) key exchanges
Virtualization	Hyper V technology allows multiple SCADA servers to be allocated in a single piece of hardware, thus reducing setup cost and time for a distributed SCADA system.
Main and Backup Control Centers (Disaster Recovery)	Handles transfer and restoration of control between main and backup control centers with an advanced graphical user interface.
Multi Control Center HMI	A single workstation with multiple monitors can support main and backup control centers through the Disaster Recovery View window in the HMI.
Foxboro Style Faceplates	Objects can be grouped within a single faceplate providing a consistent look and feel with Foxboro .
Remote Device Configuration and Management	When used with Foxboro remote devices, users can remotely upload, download, and manage the device over DNP3 communication channels which helps in making it more secure using the Security Assurance version of the DNP3 protocol.
Integrated Development Environment	A single application for all System Engineering that includes I/O, communications, history, alarms/events, and HMI.
Built-In Security	Integrated, centrally managed security for Windows and Galaxy software.
InTouch Based HMI	HMI is based on WonderWare InTouch, a world-leading HMI with user-friendly visualization options.
User Configurable Alarm Visualization	The classic Three Most Recent Alarms window can be configured to dock and stay on top of other windows, helping the user take proper actions.
Extensive Quality Fields	The SCADA Analog/Discrete Template object has extensive quality fields to represent the quality of the data, communications, status, and manual overrides in relation to an object.
Sequence of Events	Sequence of events data from all RTUs is collected, stored, and displayed in a single scrollable list.
High Availability	Redundant channel management, redundant data objects, redundant Historian, multiple HMIs with consistent displays, and managed supervisory controls.
Distributed Architecture	ArchestrA Architected System allows building a scalable and reliable SCADA Solution. When combined with the backup control data center, provides High Availability.

Rapid Configuration with ArchestrA-based SCADA Templates

The ArchestrA-based SCADA Templates allow you to rapidly build the system. The design of these templates is Object-Based which is based on ArchestrA Common Services (see *ArchestrA-Based SCADA Templates, page 5*). In object-based applications, application objects contain aspects or parameters associated with the asset they represent.

For example, a Valve object will contain all events, alarms, security, calculations, data collection, integrations, communications and scripting associated with the valve. All objects can be standardized and used across all supervisory applications to drive consistency of system design and operation. The derived template concept all to define common properties and changes are propagated easily to instances.

Figure 1 - ArchestrA-Based SCADA Templates



Security

SCADA networks offer great efficiency and are widely used. However, the move from proprietary technologies to more standardized and open solutions, together with the increased number of connections between SCADA systems and the Internet, has made them more vulnerable to some types of network attacks.

Foxboro SCADA has taken measures to help ensure the network is protected and effective. As a first step towards cyber security, the DNP3 communications have adopted the Security Assurance standards (DNP3 SAv5). The V91 EcoStruxure™ Foxboro™ Virtualization Server comes with security settings that provide the user with the essential security features to administer the virtual machines acting as SCADA servers.

- Supports setup of Primary Domain Controller for user management and operations.
- Combines security with area of responsibility as defined in ArchestrA Galaxy.
- Windows Firewall and optional Network ACL.

  NOTE: Network ACL is compatible with the McAfee anti-virus software version 8.8.

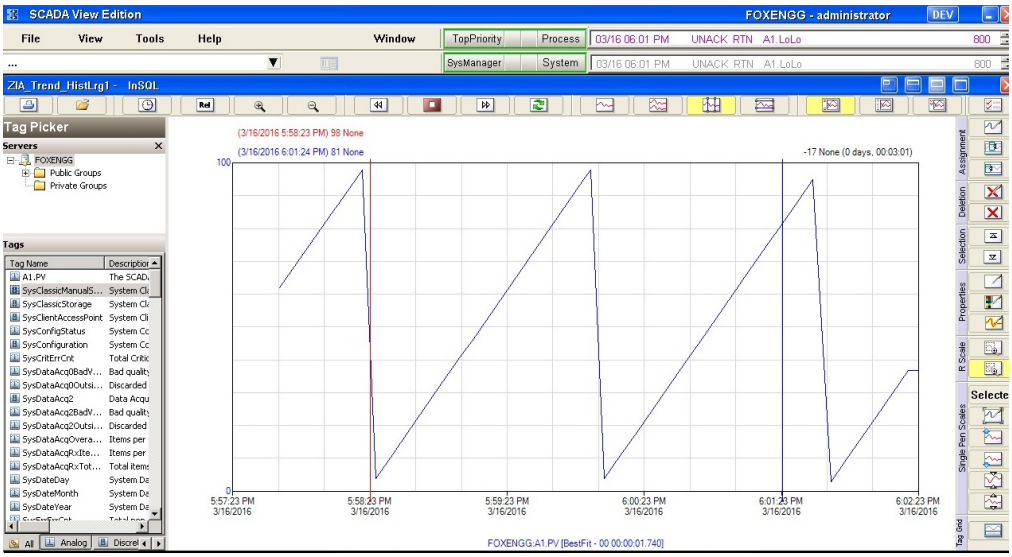
InTouch-based HMI

The SCADA Human Machine Interface extensions provide this functionality:

- Main/Backup Control Center Control Panel
- List Processing, including Off-Normal List, Modifier List, and Safety Tagging List
- Three Most Recent Alarm Window
- Alarm History
- Real-time Sequence of Events History
- Display Notations
- Enhanced Operator Tagging System
- Foxboro SCADA Faceplates that work with the Enhanced SCADA Application Objects
- Extended Quality Attribute (DPQualityA and DPQualityB) Animations, including foreground, background, and blinking Runtime Annotation
- Software Tagging
- Network Monitoring Window
- Full HD support for View SCADA

Advanced Historical Trend with ScratchPad

The ScratchPad Trend windows are used to view historical data from the Historian. Any points being historized can be added to these trends. Up to four ScratchPad trends can be shown on each graph.



Built-In Displays

The Foxboro SCADA HMI includes a set of built in displays. This includes the process and system alarm summary and history modes, system status, point detail through faceplates, and an extensive set of configuration and diagnostic displays for DNP3, GESRTP protocols through Smart symbols.

Core SCADA Application Object Features

SCADA objects offer a number of enhancements and features for both analog and discrete tag processing, including:

- Control Reservations and Authorizations
- Alarm Level Enable and Disable
- Advanced Warm-up of Object Attributes over Object Deployments
- 64 Bits of Extended Quality Information
- Extensive animation and tagging of values based on extended quality
- Operator Safety, Software Tags and Tag Notes
- Off-Normal State Definition and List Collector Processing
- Network Monitoring

AGA Calculations

The Industry Application Objects package includes templates enabling the Foxboro SCADA System to perform flow and energy calculations in the standard methods of the American Gas Association. The package allows the flexibility of using on-site and offsite methods.

- Computations of Instantaneous mass flow, super compressibility, volumetric flow, and energy flow for natural gas using equations defined in AGA reports 3,5,7,8, and 9
- Calculations are based on US units and Precision of up to six digits after the decimal
- Integrated with HMI Faceplate functions
- Super-compressibility factor using AGA 8 or NX- 19

DNP3 Master Protocol

Foxboro SCADA DNP3 Data Acquisition Server communicates with the DNP3 compatible RTUs using the DNP3 protocol. The DNP3 Device Integration objects provide extensive configuration options which allow connecting to a wide range of RTUs:

- Ethernet communications using TCP/IP for one-to-one
- Serial communications with one-to-one and one-to-many slave or multi-drop mode
- The Secure Authentication feature enhancement allows the user to help protect data against threats
  - Optional Unsecured
  - V2 - Pre-Shared Key
  - V5 - Pre-Shared Key
  - V5 - Remote Key Change: Symmetric Method and Asymmetric Method

Device Integration Objects

SCADA Device Integration Objects are device drivers that include or provide support for these additional protocols:

- GE SRTP (Ge-Fanuc PLCs) Drivers
- Inter-Control Center Protocol (ICCP) Master
- Leeds and Northrup Conitel Protocol using Communication Line Server (CLS)
- SNMP for SCADA System Management for peripheral devices
- NTP (monitoring) and synchronization, drift monitoring, and alarming
- Compatible with Modbus driver MBTCP 3.0 SP1 DI Objects

Virtualization by Means of V91 Foxboro DCS Virtualization Server

These are the advantages of virtualized systems:

- Create and run Foxboro SCADA Server software on virtual machines (VMs)
- Cost effective and recommended as fewer physical hosts servers are required
- Easily scalable
- Enhanced security with local V91 security settings pack (see PSS 31H-4V91)

Figure 2 - V91 Server

Backup Control Center/Disaster Recovery

The solution to disaster recovery is provided by taking the advantage of latest Windows technology:

- Windows Server 2012 R2 Standard Virtualization / Windows Server 2016 Standard
- Hyper-V replication
- Virtualization Replication Network

In practice, most backup control centers are located at different geographical locations from the main control room. For this reason, the use of V91 servers and their virtualization technologies is recommended to support high availability operations and the transfer of control to and from the backup control centers.

The Foxboro SCADA virtualized solution provides full replication and backup of all application software used in the SCADA system at the machine and operating system level.

Virtual Replication Network

The main and backup control enters are connected by a Virtual Replication Network (VRN). The VRN is used to reduce data loss during the switchover process.

In the current release, the Control Centers switchover is automated and the status of the Disaster recovery setup can be monitored using the Disaster Recovery View window in the HMI. The command from the HMI for a planned switchover will help eliminate all the manual steps involved in Hyper-V Manager. The system also supports Unplanned Failover when the main Control Center SCADA system becomes unavailable.

SCADA System Manager

Foxboro SCADA provides a diagnostic tool for SNMP-connected peripheral devices used in the System, such as switches, routers, and printers. The function is included as a Microsoft Management Console (MMC) snap-in integrated with the ArchestrA System Management Console.

The SCADA System Manager implements the SNMP Data Acquisition Server to connect to these devices and retrieve the data. The users need to configure SNMP MIB Level 1. The information derived from the SNMP MIB data can be used to populate points that then allow you to alarm for critical conditions, such as printer alarms like toner low, no paper, paper jam, and tray open.

Sizing and Performance

See *EcoStruxure™ Foxboro™ SCADA Deployment Guide* (B0750PH) for detailed sizing and performance figures for these configurations

- Foxboro SCADA with 80 DNP3 Slaves (RTUs) Over TCP/IP (Virtual)
- Foxboro SCADA with 200 DNP3 Slaves (RTUs) in Multi-Drop Connection

Figure 3 - Foxboro SCADA with 80 DNP3 Slaves (RTUs) over TCP/IP - Virtual Setup

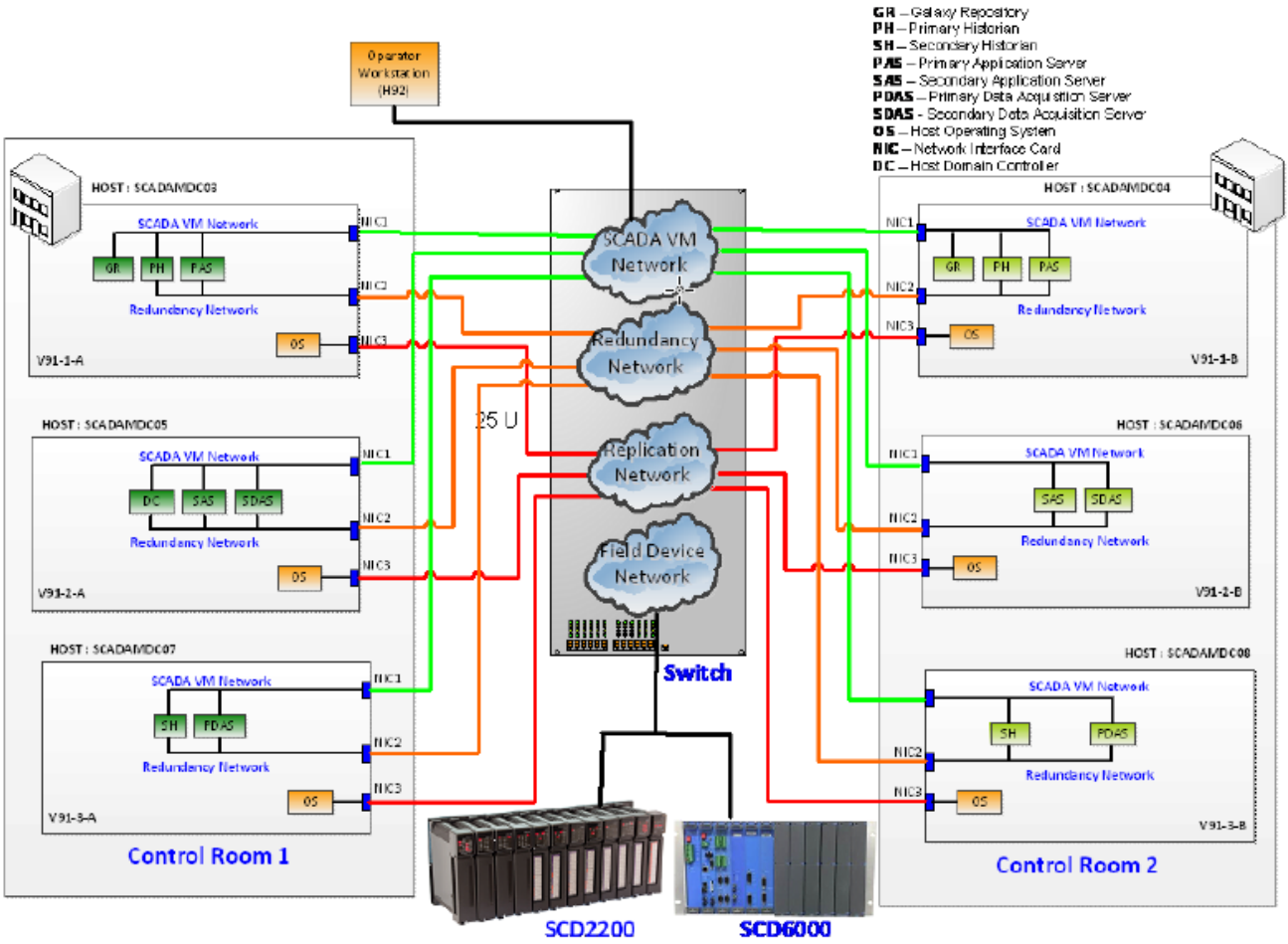
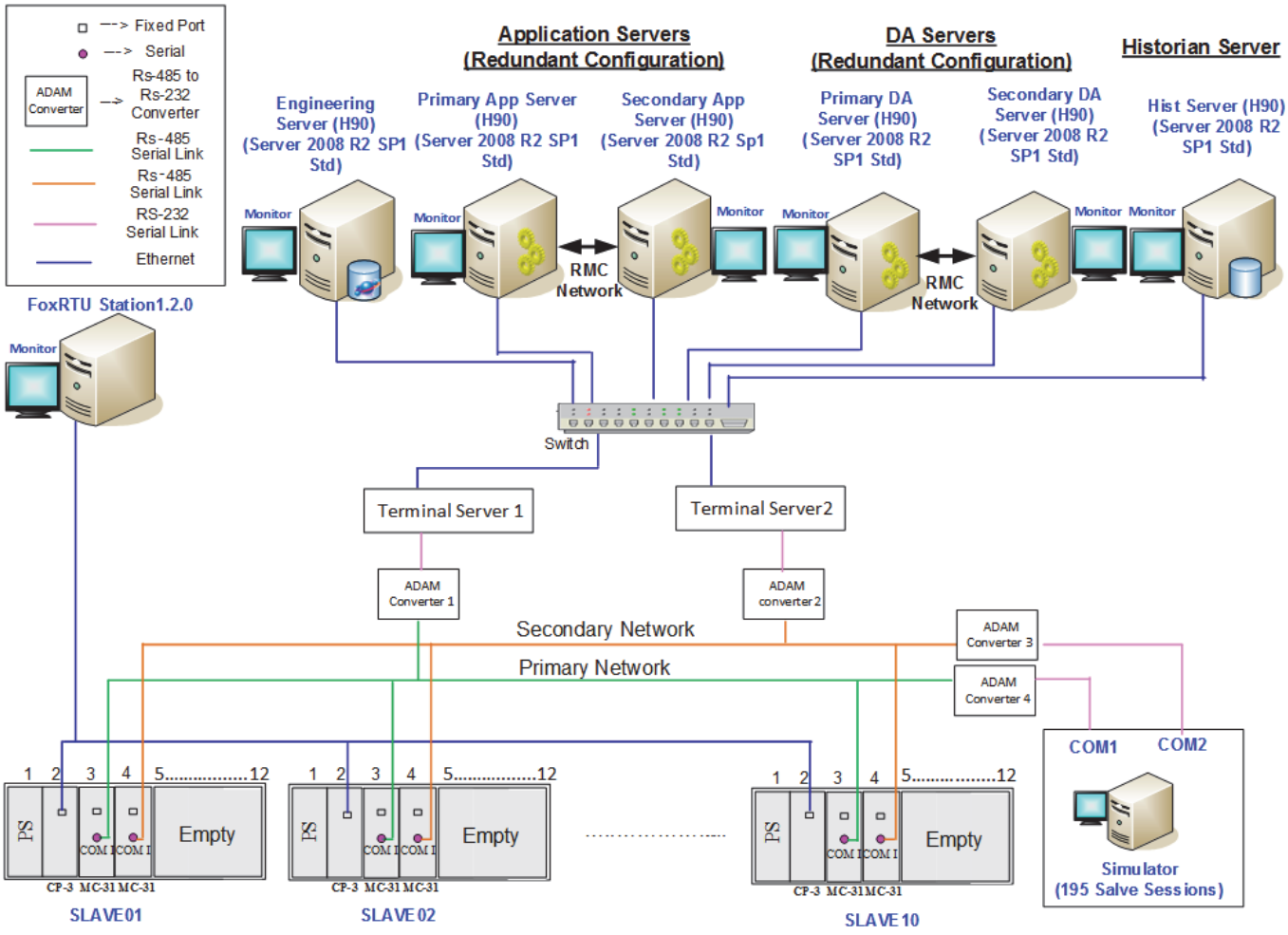


Figure 4 - Foxboro SCADA with 200 DNP3 Slaves (RTUs) in Serial Multi-Drop Connection



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