



# Foxboro SCADA Systems

Presented by: Patrizia Fiorentini

# Foxboro IASCADA

A Solaris Based Master Station taking the traditional SCADA Master Station to a new multi domain operational environment

Version 10 release includes

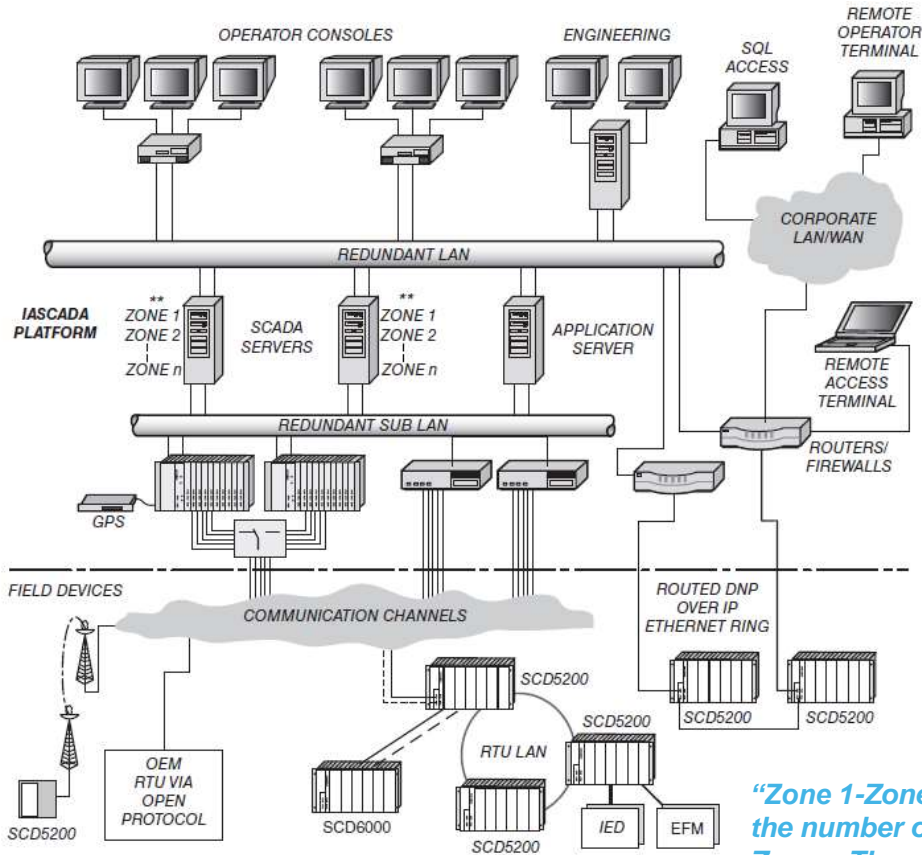
- Master station enhancements
- New multi-control center support
- Increased performance & capacity
- Incorporates key features from V7

Prior Release Version 9 (2006)

Backwards compatible with V 7.0, 8.0, & 9.0

Continuously Current Support for IASCADA  
Multi-Control Center Support Capability  
**Enhanced Virtualized HMI Domains**

# Classic Foxboro IAScADA System



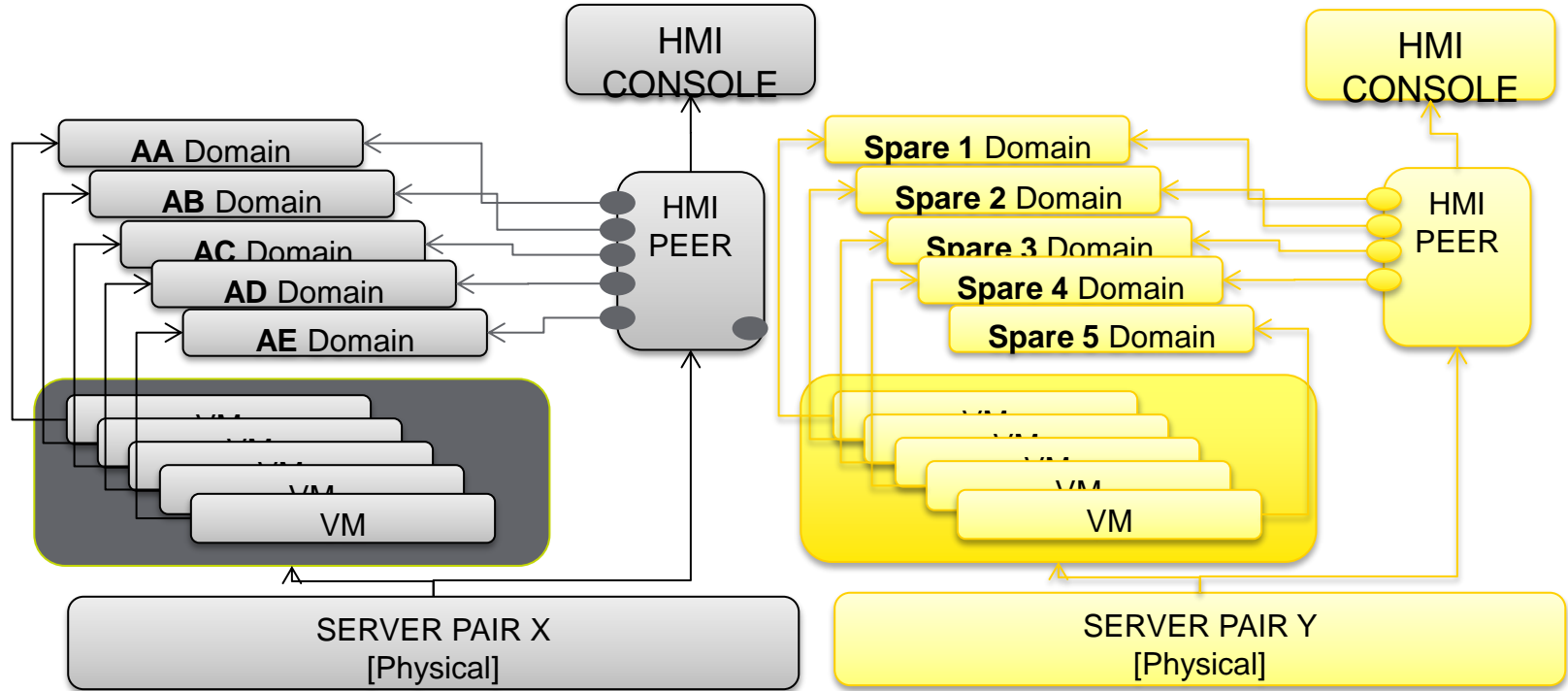
*“Zone 1-Zone n” refers to the number of Oracle Solaris Zones. The configuration depends on the server.*

## Zone

Virtualize operating system services to create isolated environments

- Processes running in one zone are not affected when monitoring or running processes in other zones

# Multi-Domain Architecture

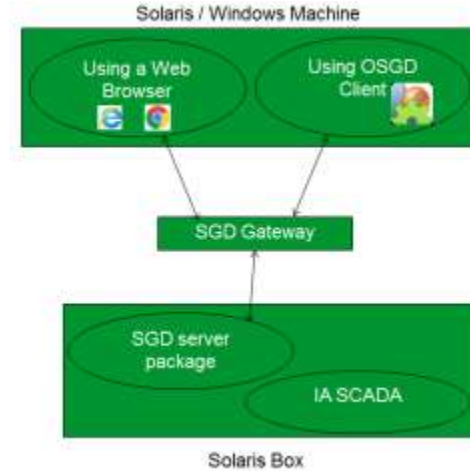


# Remote Access

- OpenText Exceed version 15.0.0.185 transforms a host computer into a functional X Window terminal, which is a Windows machine with Exceed software. The host computer must be running on the Solaris Operating System, with the SAMMI full graphics GUI package and an IASCADA database. You can run and display all the IASCADA functions on the X Window terminal.



- The “operate from anywhere” architecture uses the Oracle® Secure Global Desktop (SGD) application to support remote modem access by Windows®/Solaris stations. SGD provides secure remote access to applications and desktops that run on application servers. Each remote station has the same HMI functions as the IASCADA Master Station.



# Archive Management Display

R5\_archivemgt: Archive Management Data

013M153 Archive Station SCADA082

Archive List Total Lines 400

Date	Status
20-mar-15 05:00:00	waiting to copy to optical disk
20-mar-15 07:00:00	waiting to copy to optical disk
20-mar-15 09:00:00	waiting to copy to optical disk
20-mar-15 09:00:00	waiting to copy to optical disk
20-mar-15 10:00:00	waiting to copy to optical disk
20-mar-15 11:00:00	waiting to copy to optical disk
20-mar-15 12:00:00	waiting to copy to optical disk
20-mar-15 13:00:00	waiting to copy to optical disk
20-mar-15 14:00:00	waiting to copy to optical disk
20-mar-15 15:00:00	waiting to copy to optical disk

Local Disc

Statistics

Status Building archive\_23-mar-15\_14:00

LOFI Device Disc

Select

Current Volume ID 1w7

Set Volume ID

Set Mount Disconnect Format

Error / Status Message

Retrieval (copy From Optical to Local disk)

Start Date/Time

End Date/Time

Status

Retrieve Cancel

Enables to select a partition

LOFI Device Archive List for SCADA082

Refresh

The Default Volume is 6 3

#	PARTITION	LABEL	D	M	ARCH	START	END	EVENT	START	END
1	2	<dw2 >			43	10-Mar-15	12-Mar-15	40	09-Mar-15	21-Mar-15
2	5	<dw6 >			77	11-Mar-15	19-Mar-15	17	10-Mar-15	21-Mar-15
3	6	<dw7 >	D	M	112	12-Mar-15	20-Mar-15	34	10-Mar-15	18-Mar-15

NO ERROR

Dismiss

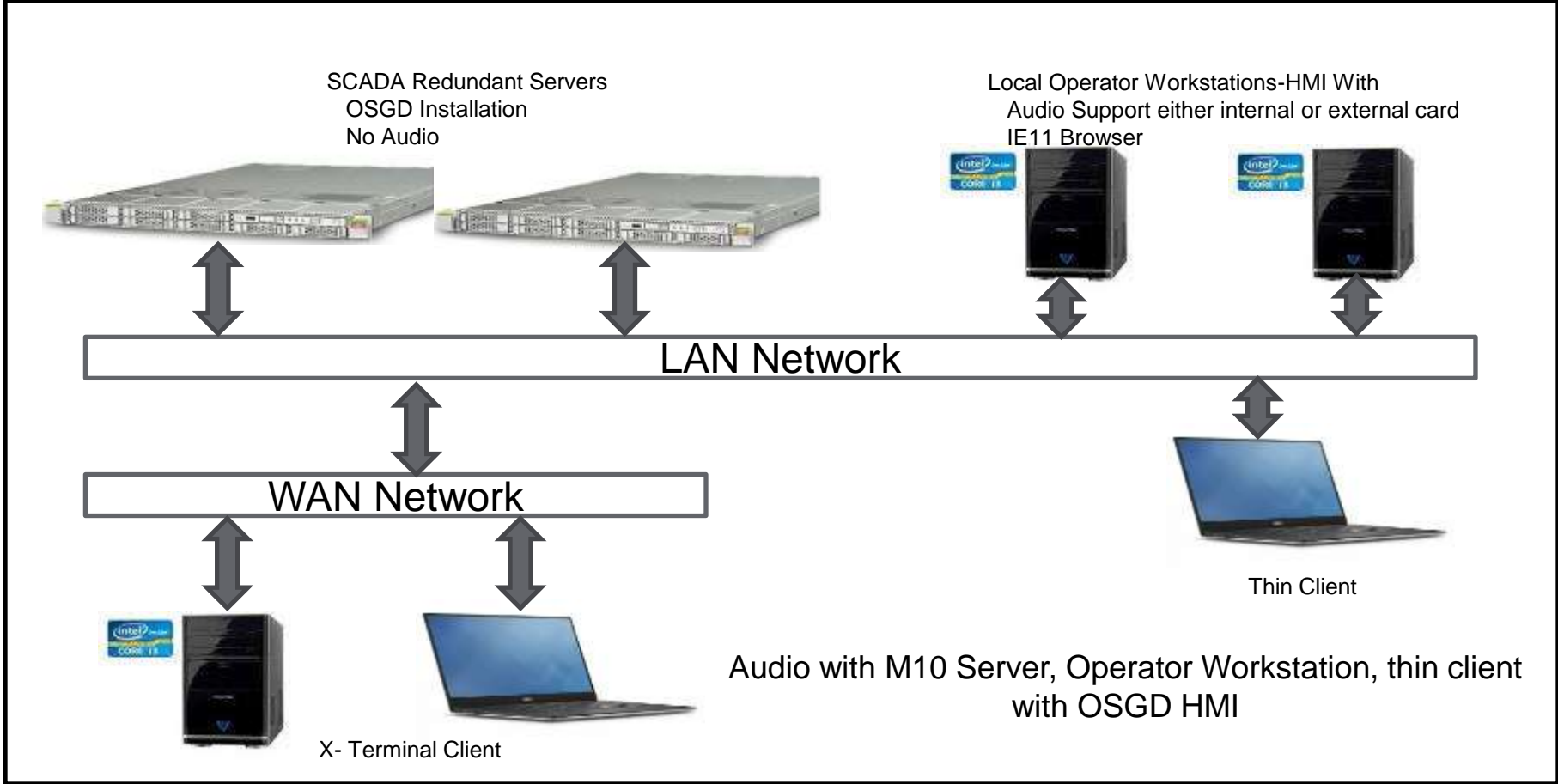
Selected and mounted

Modified to support selection of LOFI devices

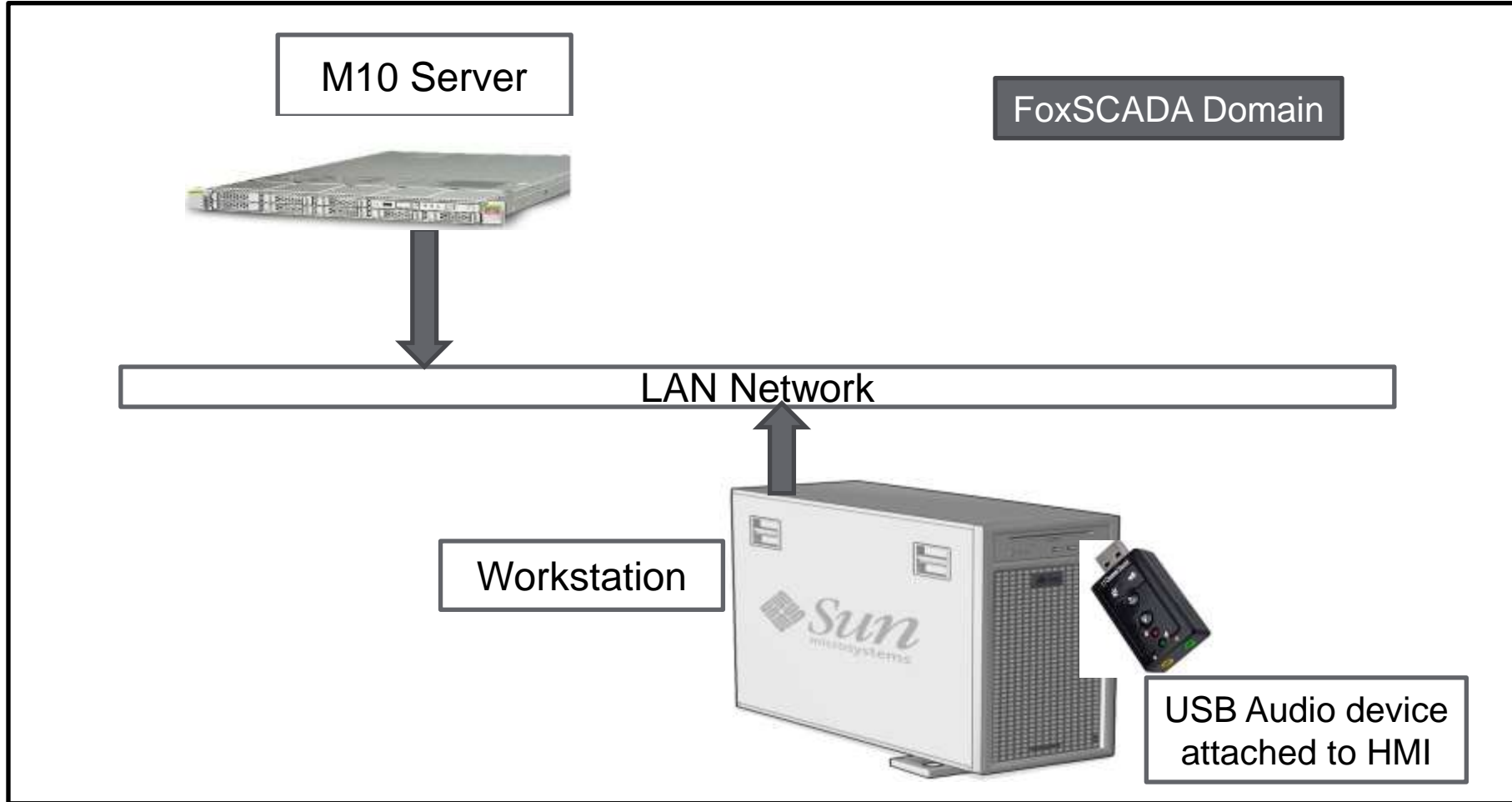
lofi (loop file interface) is a device node that makes a file accessible as a device file system



# Audible Alarms



# M10 Server and Workstation HMI in a Domain

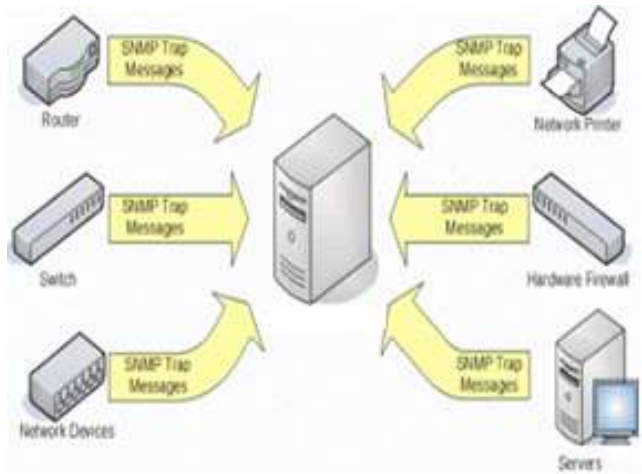




# Monitoring the system

## SNMP

Solaris 10, SUN® provides its own built-in Simple Network Management Protocol (SNMP) server, as part of their Enterprise strategy



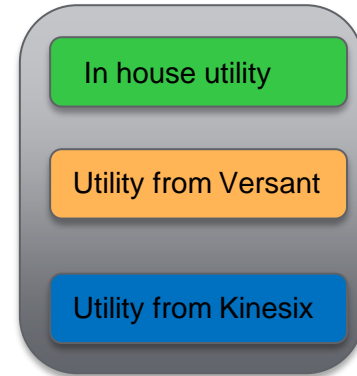
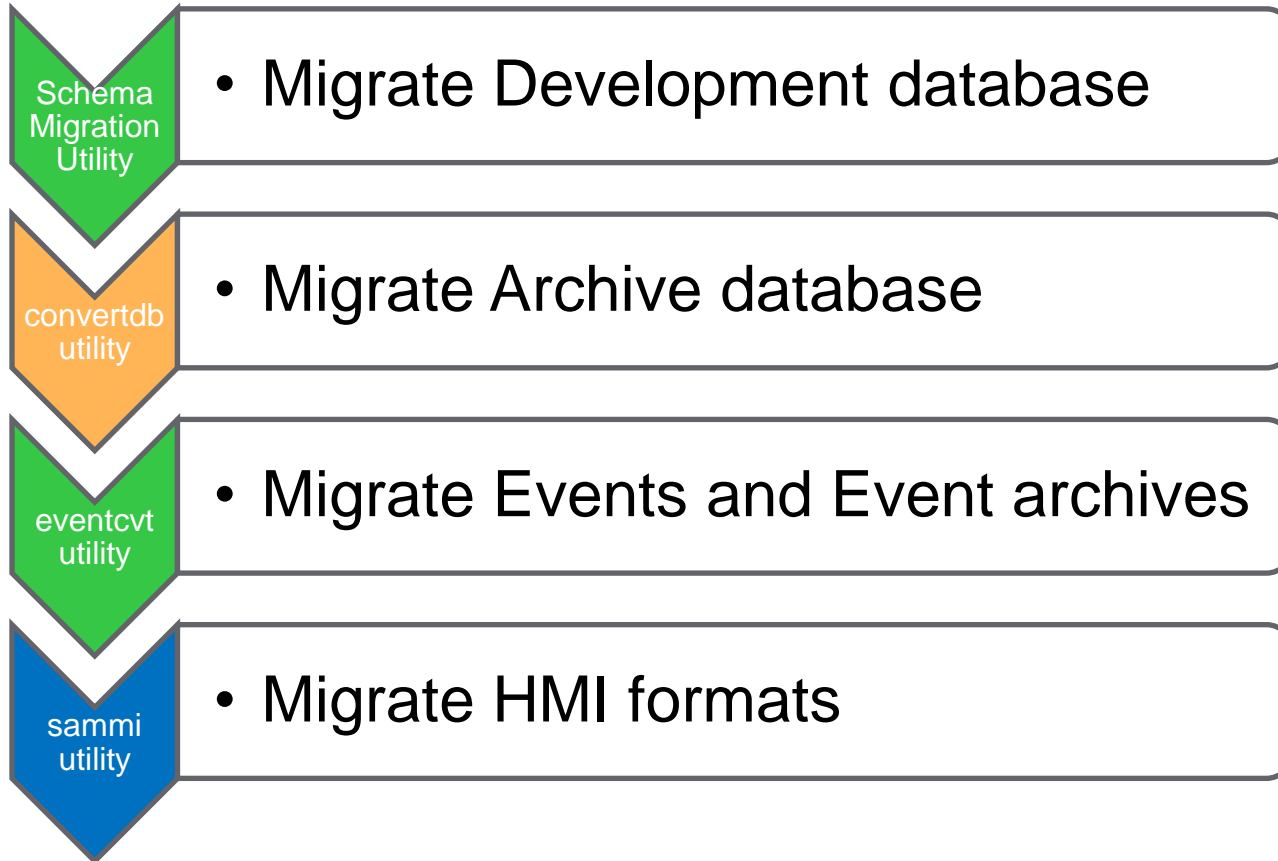
## System Monitoring (In Rev 10.0)

Enables monitoring of various system parameters of SCADA server. It also enables monitoring of the status of external IP based devices with Hostname.

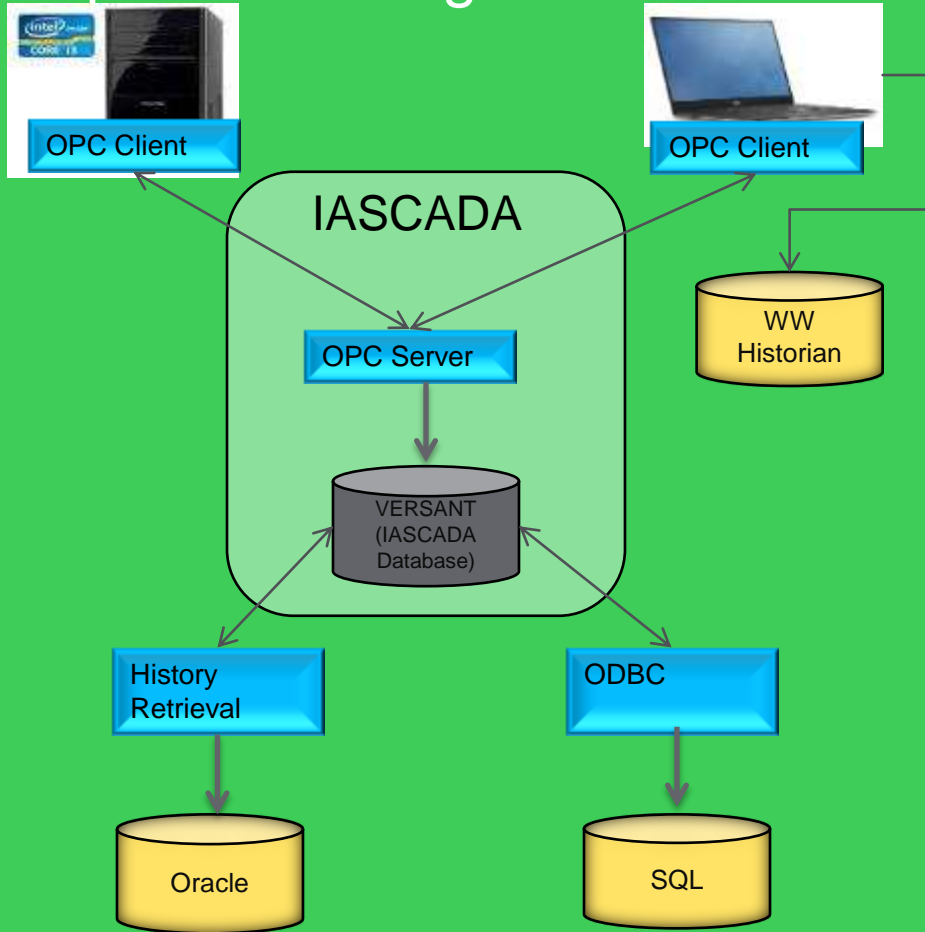
The different parameters that can be monitored are as follows:

1. CPU Temperature
2. CPU loading
3. Hard Disk Status
4. RAID Status
5. I/O Status
6. Network Status
7. CPU Usage of particular process
8. Memory usage by a particular process
9. Remote System Health status

# 4 steps Migration to Latest version



# Operation Integration



**OPC** : The IASCADA OPC DA interface application allows you to access SCADA point values and qualities from OPC DA 1.0, 2.0, and 2.1 compliant clients. The interface runs on Windows NT/2000/XP/7 and connects to IASCADA running on Sun Solaris 10.

**History Data Retrieval** : IASCADA History Data Retrieval is an application on an IASCADA system that retrieves History data periodically from the IASCADA history database and stores the collected data in an Oracle database.

**ODBC**: The ODBC SQL Interface (IASCADA\_SQL) provides an interface between the IASCADA workstation and a client application on a personal workstation

# IASCADA Rev 10.0 Applications

## IASCADA Object Interface Library (OIL)

- C package for interfacing the applications on the Solaris Master Stations to the IASCADA System

## TagSet Special Processing & Point Attribute Assignment (PAA)

- Easy interface for assigning point parameter values
- A command line utility that sets or clears a tag on an IASCADA point depending on the state of a digital point

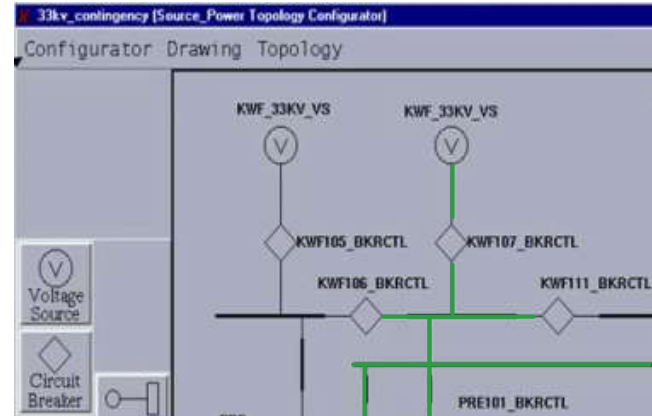
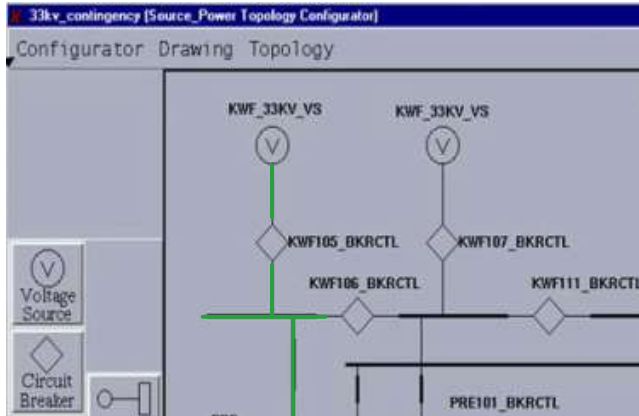
## PointStats

- Reduces its overall CPU requirements by operating in an exception manner



# Dynamic Network Coloring (DNC)

- Shows a network's connectivity by changing color segments of the network depending on their usage status
  - Example: in an electrical network where two or more power station generators (sources) are connected to a transmission line via circuit breakers, the transmission line is colored to show the generator that is feeding the line. The transmission line would change color as the circuit breakers are opened and closed.



\*Example color change. Will look different in actual software

# IASCADA General Capacity

Item	Maximum Number <sup>a</sup>
<b>DOMAIN</b>	
Stations per domain	32
Objects per domain	<b>180,000</b>
Redundant copies (total number) per object	3 <sup>b</sup>
Total redundant objects per domain	<b>60,000</b>
Open databases	Limited by hardware resources <sup>c</sup>
<b>STATION</b>	
Points per station	<b>60,000</b>
Telemetered points per FEP station	<b>50,000</b>
Alarms per station	50,000
Active off-normals per station	50,000
Active tags per station	50,000
Active channels per FEP station	200

Stated general capacity is based on the following assumptions:

- M10 servers are used
- Bandwidth of the LAN is 100 Mbps
- Each Station has a maximum of 50,000 telemetry and 10,000 manual objects.

(a) Performance is measured on M10 server Oracle Solaris Zones.

(b) The base system has been optimized to suit a single redundant server.

(c) When the user opens a non-distributed database, the full database is served from the workstation where the database is kept. This requires memory and/or swap space resources to hold the database, and CPU resources to serve clients. Though there is no software limit on the number of open databases in a workstation, too many reduces the performance of the workstation for real-time work (for example, scanning and serving real-time data).

# IASCADA System Performance

Item	Maximum Number <sup>a</sup>
<b>FEP/CORE SCADA</b>	
FEP throughput, as a total of data retrieved from all remote devices <sup>b</sup>	138 kilobytes of data per second
FEP throughput, as a total of data retrieved from all remote devices <sup>c</sup>	240 kilobytes of data per second
Average data retrieved per remote device <sup>b</sup>	200 point values per second <sup>c</sup>
Maximum publication rate, of changes in point data, for a database node to the network	250 points per second (normal) 1,000 points per second (burst load)
Maximum alarm rate	1,000 alarms per second
Maximum event rate <sup>d</sup>	1,000 events per second
<b>Calculations</b>	
Maximum calculations configurator compile time	<b>250 lines per minute</b>
Maximum number of calculated results for simple expressions (for example, $x = y + z$ ) <sup>e</sup>	500 results per second

Stated general performance is based on the following assumptions:

- M10 servers are used
- Bandwidth of the LAN is 100 Mbps
- Each Station has a maximum of 50,000 telemetry and 10,000 manual objects.



# IASCADA Technical outlook

IASCADA Update Phase1	IASCADA Update 2	IASCADA Update 3
Versant 8	Versant 8	Versant 9
Solaris 10 Server	Solaris 10 Server	Linux Server
		New GUI for Configuration Tools
Sammi 6.7.9	Linux HMI (SAMMI 7)	Linux HMI (SAMMI 7)

Project Features	Project Features	Project Features
<ul style="list-style-type: none"> <li>• Same functions available released with IASCADA 10</li> <li>• Upgrade to Versant 8</li> <li>• No change in Solaris OS and Sammi</li> </ul>	<ul style="list-style-type: none"> <li>• Same functions available released with IASCADA Update 1</li> <li>• Move SCADA HMI to Linux OS</li> <li>• Upgrade SCADA HMI to SAMMI 7.</li> <li>• Drop support of UNIX SCADA HMI</li> </ul>	<ul style="list-style-type: none"> <li>• Database configurator in Linux</li> <li>• IASCADA Protocol unit in Linux</li> <li>• IASCADA CoreSCADA engine in Linux</li> <li>• IASCADA Historian in Linux</li> <li>• DNP3 - FTA integration to IASCADA – Linux</li> <li>• Implement IASCADA Applications in Linux</li> </ul>



## Further contact for Unix based systems

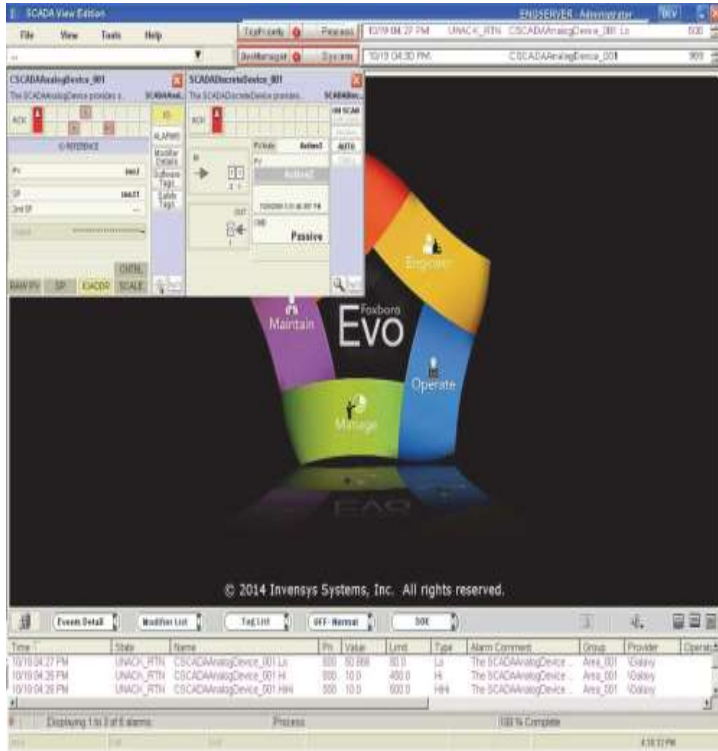
Please contact Chris Smith with any questions or comments at [Chris.J.Smith@Schneider-Electric.com](mailto:Chris.J.Smith@Schneider-Electric.com)

# Foxboro Evo SCADA

Life Is On



# Foxboro SCADA

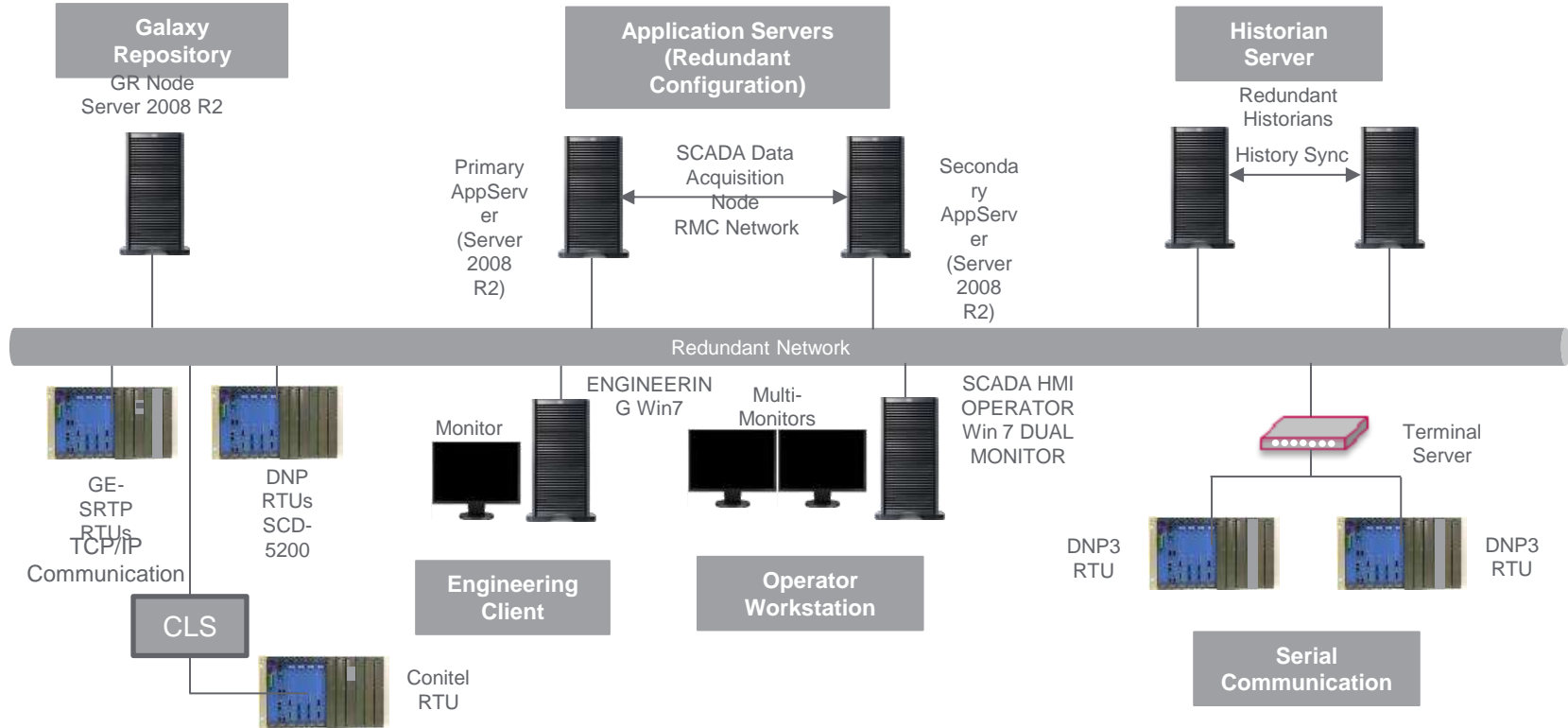


Foxboro® SCADA is a module of the Foxboro Evo™ Process Automation System.

Comprises a set of Archestra® application objects that provide a fully featured secure SCADA Master Station for operating SCADA systems within the context of the Foxboro Evo system.

Large scale SCADA systems can be built quickly using PC-based workstations, enterprise servers, and high speed LAN/WAN networking equipment.

# Sample Configuration of Foxboro SCADA

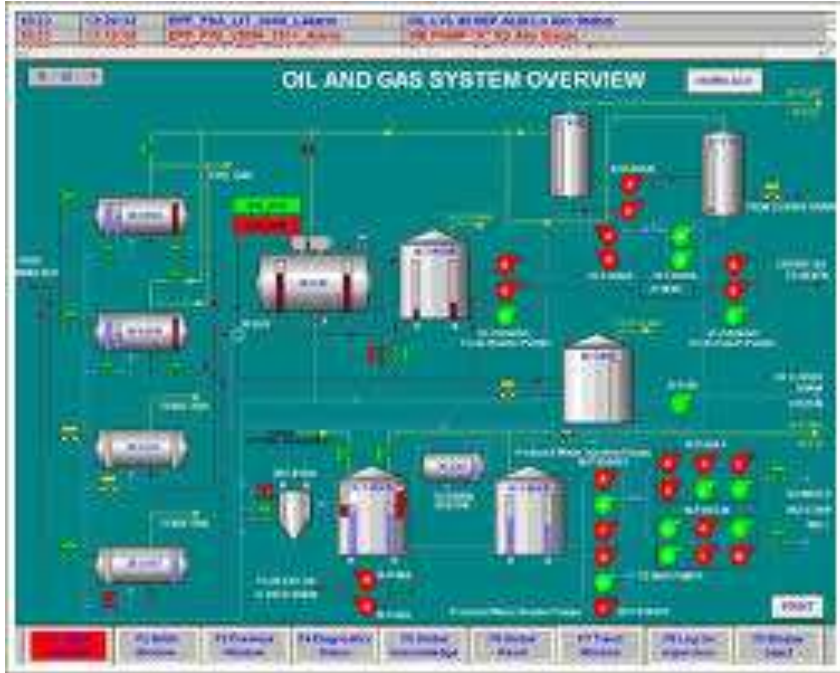


# Major Offerings



- Combined Power of Wonderware® and Foxboro experience which helps build large scale SCADA systems quickly
- Simple and Evolutionary engineering
- Quick integration with third party drivers and solutions at any time
- Foxboro SCADA is an open software product with protocols and communications management objects used to integrate with other Foxboro and third party SCADA products

# Differentiators



- Operations Improvement
- Reduced Maintenance Costs
- Operational Security
- Ability to Virtualize Complete System
- Support for DNP3 Secure V5
- Disaster Recovery - VM & Servers Status Display and control through SCADA HMI -Ability to improve Operational Business Continuity



# Features

- Human Machine Interface
- SCADA Application Objects
- Industry Application Objects
- DNP3 Master Protocol with Secure Authentication V5 and V2 (backward compatible)
- Device Integration Objects
- Disaster Recovery with Centralized Virtual Management using Domain Controller
- Foxboro Evo G9: High Performance Servers
- Redundant Historian
- SCADA System Manager
- Redundant Communications
- Multi-Drop Serial Communications
- RTU Remote File Management System

# Security Measures in Foxboro SCADA



- Foxboro SCADA ensures the network is safe, secure and effective.
- DNP3 communication is now made secure as a configuration.
- V91 Server Virtualization Host comes with the security settings through which the virtual machines that act as SCADA server are secure.

# Integrated Solution



OIL and GAS



Power

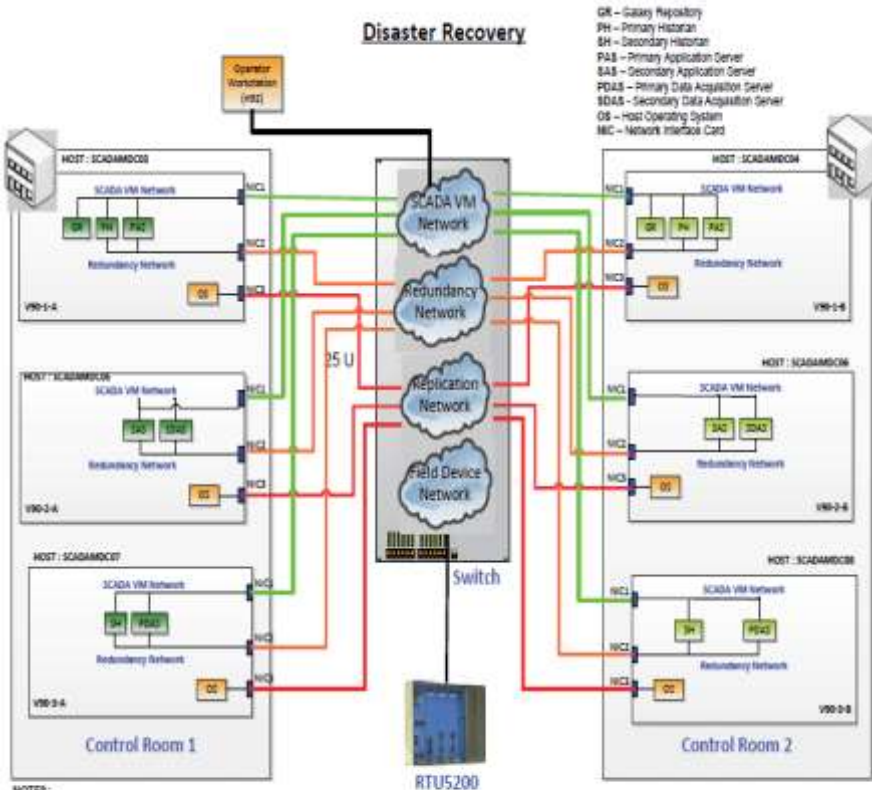


Water Management

- Excellent references globally building SCADA systems in Oil and Gas, with projects that range from small well head control to large scale pipeline product transmission pipelines and multi-utility projects.



# Disaster recovery



NOTES:  
 1. The primary & redundant nodes are connected to the SCADA VM network.  
 2. The redundant node is connected to the Redundancy network for engine redundancy.  
 3. SCADA VM network, Redundancy network, & host OS are independently connected to a physical NIC.  
 4. The field device network is connected to the SCADA VM network.  
 5. The host OS can be connected to the Replication network for disaster recovery.  
 6. All networks are connect to switch.

- Centralized Virtual Management – Manage all Host and Virtual Machines through Hyper-V .
- Supports Disaster recovery through Virtualization and Hyper-V.
- The V91 Virtualization Host and windows Server 2012 R2 combination allows to setup a Multiple Control center
- Continuous Replication to reduce data loss during the switchover.
- Disaster Recovery View in HMI and options to choose between Planned and Un-Planned failover of control centers

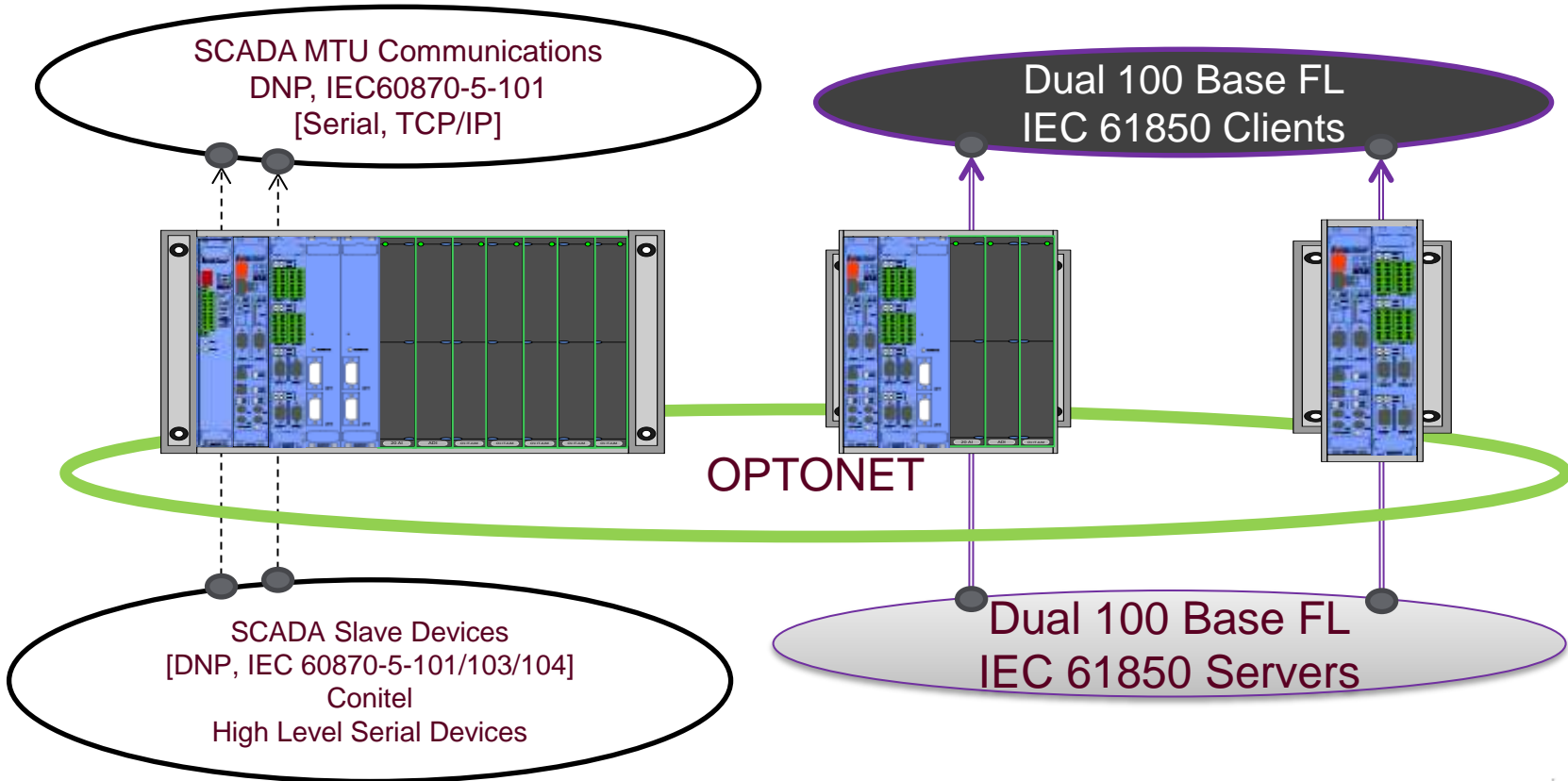
Life Is On



**Schneider**  
Electric

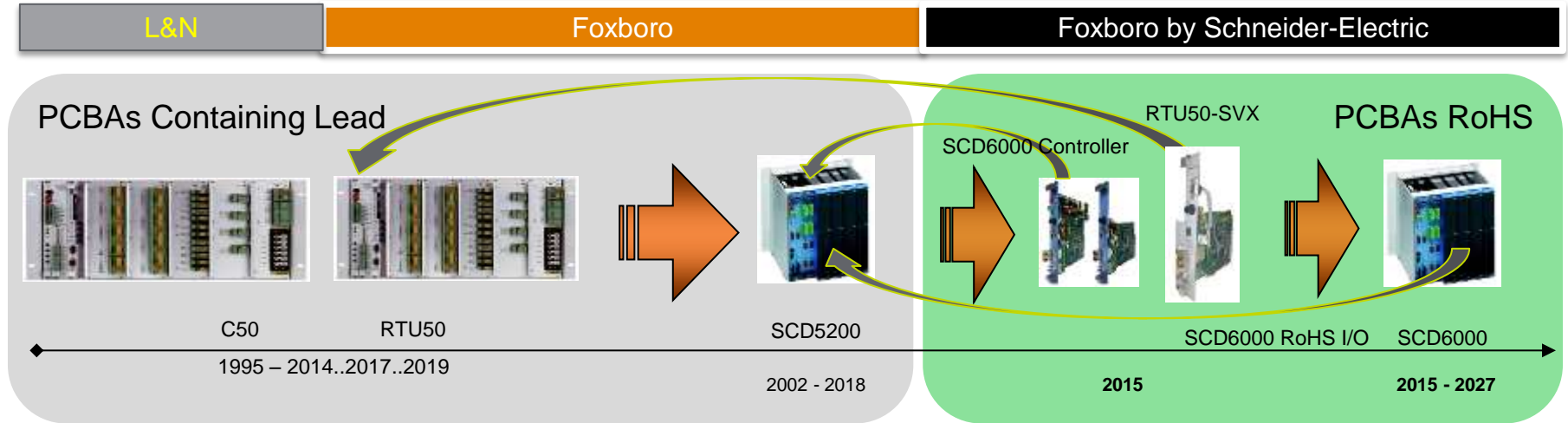
# SCD6000 – Transition Architectures for Lifetime Support

# SCD6000 Architectural Overview





# Development of the SCD 6000



## SCD6000 Released 6 months ahead of original plan

- Preserve and extends RTU50 and SCD5200 installations
- Enables forward propagation of end user IP
- Provides a new Secure Platform
- RoHS compliant

## SCD6000 IO Modules are RoHS Compliant

- Part Numbers can be used with SCD5200
- SY-xxxxxxxR [Rsuffix on Part Number]
- RTU50-SVX used to upgrade RTU50 systems is a RoHS compliant Processor

## SCD6000 Replaces and Extends RTU50

- Part Numbers can be used with SCD5200
- SY-xxxxxxxR [Rsuffix on Part Number]
- RTU50-SVX used to upgrade RTU50 systems is a RoHS compliant Processor

# TRANSITION PLAN for ELECTROBUS RTUs

## 20 Year Support Lifetime expected

Product	Launch as Preferred	Transition to Available	Transition to Mature	Transition to Lifetime
SCD6000	1 May 2015	1 Jan 2023	1 Jan 2030	1 Jan 2036
SCD5200	1 Jan 2002	1 Jan 2016 ***	1 Jul 2017 *, **	1 Jan 2022
RTU50	1 Jan 1993	1 Jan 2002	1 Sep 2012	1 Sep 2014
RTU50-SVX ***	Not Applicable	1 May 2015	1 Jan 2018	1 Jan 2020

Note \*: 1 Jul 2017 – RoHS Directive in Force – Hardware can no longer be ordered through buyautomation

Note \*\*: SCD6000 IO Modules used instead of SCD5200 IO Modules.

Note \*\*\* : Issues associated with SCD5200 will be fixed in the SCD6000 and selectively backported to the SCD5200

Note \*\*\* : RTU50 CPU replacement – Lifetime expectation 5 years

# SCD6000 Ports Transition for RTU50 and SCD5200

## SCD6000

- **Dual SFP [100BaseT] Ports**
- **Single 100BaseT Port for Local Connectivity and Engineering**
- **Single Serial Comms RS232**
- **High Performance CPU module**
  - **More Memory, VxWorks OS, Faster Processor [Spear1380]**

New SCD6000

- migrate serial diagnostic to Ethernet based diagnostic connections
- migrate HLSI Serial use of main port to secondary port
- use SFP type Transceivers for Main Connections
- Export and Import Database to New Structure
- Upload and recompile SALL programs with the new Compiler

Migration Activities for RTU50 and SCD5200

Life Is On

**Schneider**  
Electric

# RTU50 – SCD5200 Migration Strategy

Function	Feature	RTU50	SCD5200	SCD6000
Euro/China RoHs Directive	Lead Free Modules	NO	NO	YES
CPU	Electrobus/Optonet	P30E [64MB]	COPE/COE[64MB]	COPE/COE
BUS Hardware	Electrobus	1 to 4 files	1 File	1 File
	Optobus	1 – 8 files	Not Supported	Not Supported
	Optonet	1 – 50 files	1 – 50 files	1 – 63 Nodes
Engineering	SALL / IDF	Yes	Yes	Yes
Protocols	Wisp+	Yes	Yes	No
	Conitel	Yes	Yes	Yes
	LN57	Yes	No	No
	DNP	Yes	Yes	Yes
	DNP Secure IEC62351-5	<b>No</b>	<b>No</b>	Yes
	IEC 60870-5-101/103/104	Yes	Yes	Yes
Intelligent Bus	IEC 61850 Client	Yes	Yes	Yes
Intelligent Bus	IEC 61850 Server	Yes	Yes	Yes

# RTU50 – SCD6000 Migration Strategy

Main Use	Feature	RTU50	SCD5200	SCD6000
T/D	Wide Range [24-164]	YES	YES	Ultra Wide PS
T/D		P30E	COPE/COE	COPE/COE
T/D		Use Optonet	Optonet	Optonet
	Electrobus Extn.	Use Optonet	Optonet	Optonet
	8-12 Ch Serial Module	12 Channel	8 Channel	Functional Rationalization at least 4 ports programmable with intelligence on board
	Dual V11	YES	YES	
	Dual V28	YES	YES	
Legacy 1200 Baud	Dual V23	YES	NO	NO
Distribution	Dual Glass Optical	YES	YES	YES
Transmission	32DI/4AI	YES	YES	YES
Transmission	20AI	YES	YES	YES
Transmission AGC	4 AO [Setpoint]	YES	YES	YES
Distribution 11/33kV	IO [24DI/6AI/8DO]	NO	YES	YES
General	DO	12 CH [1A]	12CH[1A]	12CH[1A]
{Distribution}	CTVT MODULE[PQ]	3CT/4VT / 2DO	3CT/4VT / 2DO	3CT/4VT / 2DO

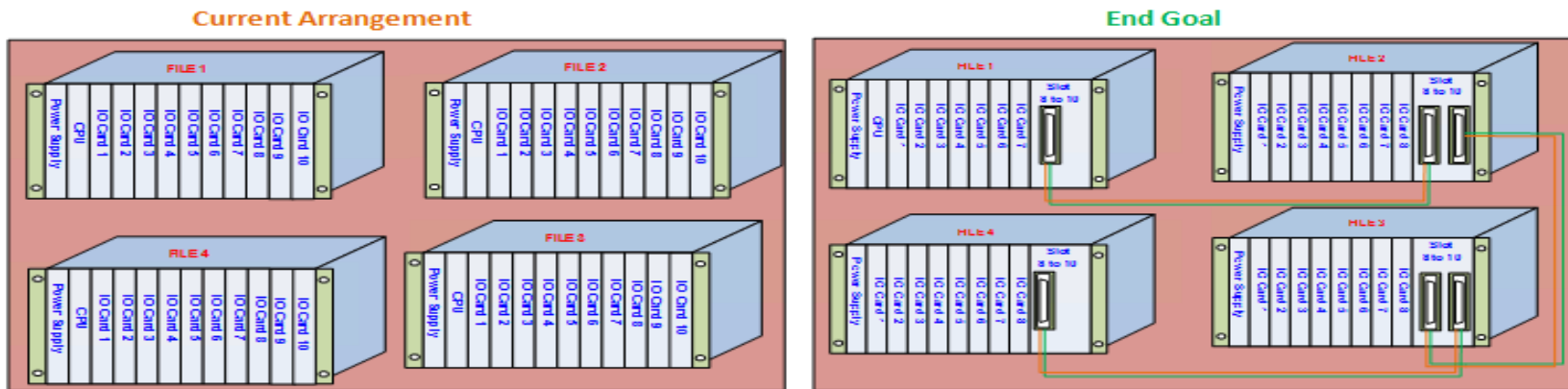
# Functionality not supported by SCD6000

Optobus	Condensed Package Headless IO RTU50 Systems
<b>Irigbgen</b>	<b>IRIG-B Generator on a V28 DCB</b>
LN57	Ln57 Protocol on various DCB - currently configured with the old DOS configurator
ISAGraf Programming	Win 7 and 64Bit combination not supporting older version of ISAGraf. Decision to drop ISAGraf pending possible integration with a new IEC1131 Editor at a later date.

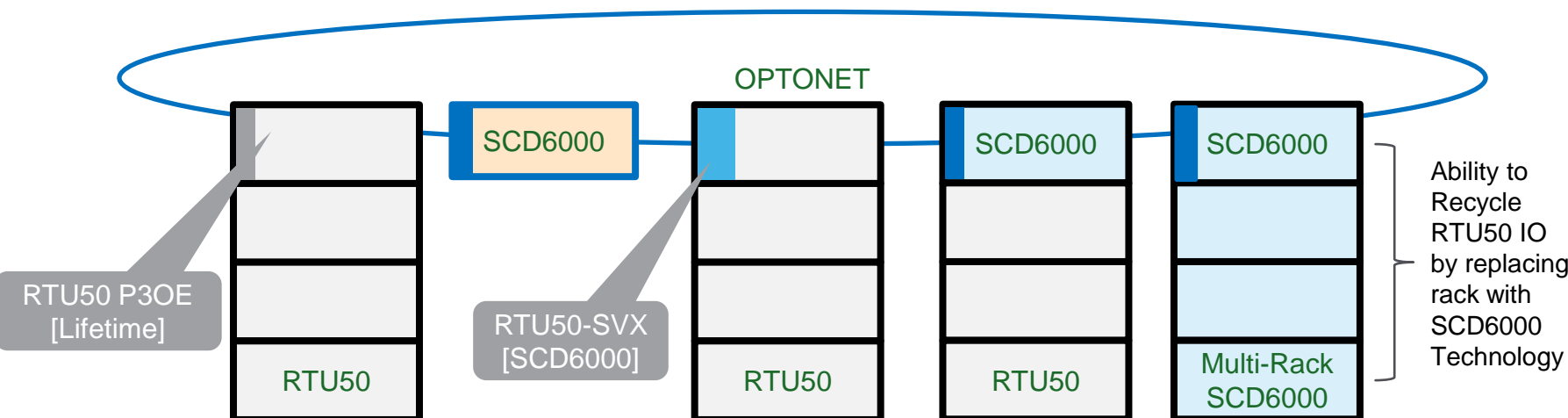
# Multi-Rack SCD6000 – [New Rack Extenders] – Q12017

- **Background:**

- I/O module expansion up to 24 modules with 4 Chassis can be achieved using Electrobus Expansion Boards in RTU50 product line. This arrangement requires only one CPU module, in the First Chassis which reduces the overall system cost.
- RTU50 product line is declared as ‘Lifetime’ and customers have been advised to migrate to SCD5200/SCD6000. I/O expansion is not possible with the current arrangement and making the system costlier as each chassis require a separate CPU module.
- Below figure gives the current arrangement where each chassis require a separate CPU module.



# Hybrid Architectures with SCD6000 Technology



IEC61850	Min 64MB	Min 256MB		
OPTONET Compatibility	SY111205	SY111207		

- Transitions**
- Removes Serial Com1 Port – Replaced with Ethernet 100BaseT
  - Diagnostic LEDs no longer used



Life Is On

**Schneider**  
Electric

# Applications in IASCADA

- ▣ **Part of base product**
  - ▣ **Generic**
    - File Transfer Agent
    - System Monitor Agent
- ▣ **Released as part of IASCADA Rev 10.0**
  - ▣ **Generic**
    - Alarm pager
    - History Data Retrieval to Oracle DB
    - ODBC/SQL
    - OPC DA Server
    - PointAttributeSet
    - PointStats
    - Retrospective History
    - Tagset
    - Zone Archiver (Archiver Server)
  - ▣ **Power**
    - DNC (Dynamic Network Colouring)