

# Wunderlich–Malec N2 Integration

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## *S4 Open: BACnet-N2 Router Case Study*

### **Customer**

The customer is a pharmaceuticals company in the Denver, Colorado metro area. As a worldwide leader in generics, their product has a reputation for exceptional quality and is available to 90 percent of people across the world.

### **Project Overview**

This project was unique because of both its size and complexity. Wunderlich–Malec needed to demonstrate expertise in process control, building automation, the pharmaceutical industry processes and procedures, and FDA regulations- in addition to the technical expertise necessary to meet the customer’s functional and operational requirements. Wunderlich–Malec had a long term relationship with the customer and previously provided general automation support and system integration for GMP systems for this facility. The bulk of their previous work was related to industrial controls (PLC, SCADA, and HMI), as well as commissioning and qualification support.

They also had to demonstrate the ability to implement their proposed solution with minimal interruption to product manufacturing and with no risk to product yields or quality. Meeting these goals meant using technology from multiple vertical markets and integrating them into one cohesive solution.

### **Initial Situation**

The goal of the project was to replace/upgrade all of the software and hardware within the facility that were nearing the end of their useful lifecycle.

- Prior to this project, the BMS for the generic pharmaceutical facility utilized Johnson Controls Metasys® software called M5 Metasys for Validated Environments (MVE) for graphics, trending, alarming, and field device programming. The basic functionality of the Metasys® M5 Metasys software that was currently being used needed to be improved upon.
- Ten Johnson Controls Network Control Modules (NCMs) were used at the site to act as supervisory controllers for approximately 366 field devices. Each supervisory controller had its own N2 network that served dedicated areas of the site.
- Most importantly, validation, security and audit trail features and procedures were in place since the BMS system is a FDA validated GMP-critical system with regulatory requirements including 21 CFR Part 11.

### **Customer Needs/Requirements**

The customer expressed several needs and requirements for the job:

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- Maintain installed base of N2 field device controllers
- Provide programming capability from a single workstation to the installed base (ten networks) of N2 field device controllers.
- Replace the JCI Metasys® M5 Metasys for Validated Environments system with ICONICS Genesis64 SCADA
- Ensure an upgrade path (BACnet) exists for future projects, knowing that the proprietary N2 communication protocol support/hardware had been phased out by JCI.
- Ensure the upgraded BMS could be successfully commissioned, qualified, and validated in parallel with the legacy JCI Metasys® M5 system.
- Some added features are also desirable with an eye toward future capabilities and expandability.
- Provide an open architecture BMS platform utilizing new technology, eliminating the dependence on any single vendor for sustaining support.

## **Solution**

This upgrade project will maintain communications to the existing N2 field devices, but add BACnet communication networks so industry standard BACnet is available for future field device upgrades.

Site Preparation – Each existing N2 bus was validated for proper operation and verified to be electrically within specification using the ComBus Quick Tester. One of our ten N2 networks was marginal. The ComBus Quick Tester enabled the engineers to pinpoint where on the N2 network the problems were located; the issue was addressed by inserting a B&B serial repeater.

Pre-integration bench testing – Wunderlich–Malec invested an extensive amount of time bench testing the solution prior to performing the integrations in order to insure that the project goals were met with minimal interruption to operational systems and production schedules.

Phase 1 – Establish multi-dimensional integration between the legacy Metasys® system and the new technology being introduced.

- Use the Upstream N2 Interface of the S4 Open: BACnet-N2 Routers paired with each legacy NCM for connectivity to the legacy NCM supervisory capabilities.
- Use the BACnet IP port of the BACnet-N2 Router as the interface to new JACE-6 controllers which eventually replaced the NCM controllers.
- Use the Downstream N2 interface of the BACnet-N2 Router for connectivity to legacy N2 network field controllers.

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- Utilize the JACE-6 controllers to serve BACnet points to the ICONICS Genesis64 system via a Kepware KepserverEX OPC server.
- Develop BACnet communication standards between JACE-6 and ICONICS utilizing inherent BACnet functionality (Override at various priorities, Set Out of Service, and monitored Present Value and Status Flags – Alarm, Override, Fault, and Out of Service)

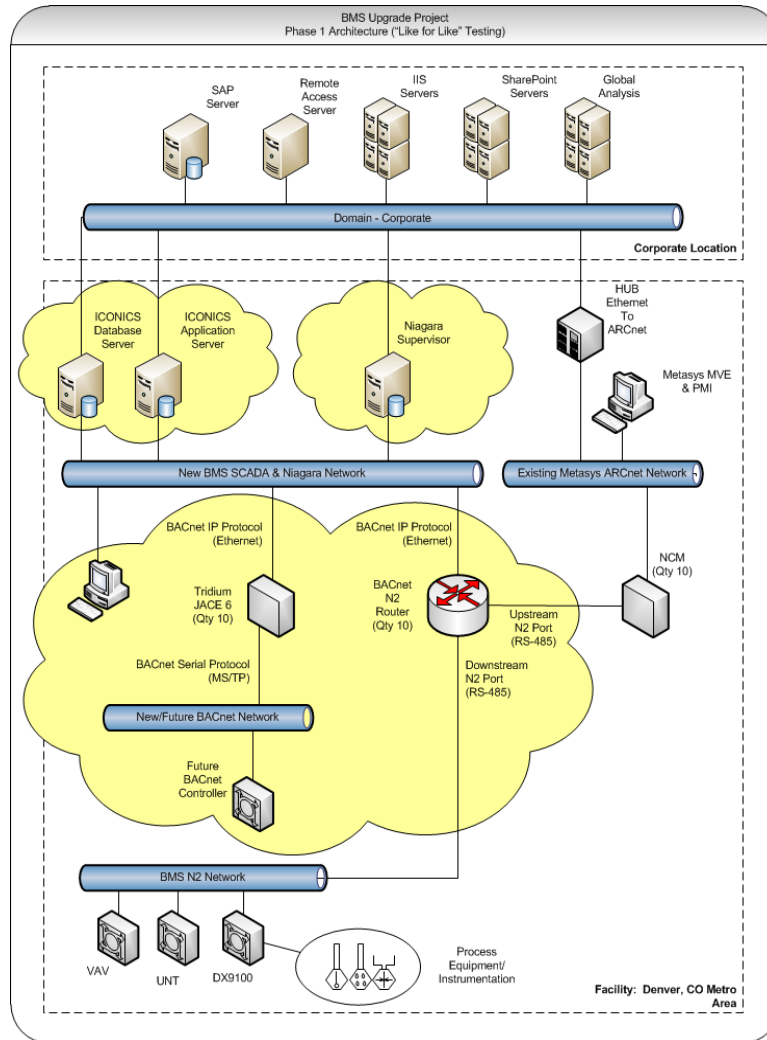
This phase was used to ensure “like for like” functionality as we ran the legacy JCI M5 Metasys System in parallel with the new ICONICS Genesis64 system.

Phase 2 – Phase out the legacy NCM supervisory controllers and replace Metasys® configuration and commissioning capabilities.

- Establish a PC based “engineering workstation” to host JCI’s HVAC Pro and GX-9100 configuration and commissioning utilities. The engineering workstation is considered a shared resource for all Metasys® networks in the facility. A unique communication solution allowed the operator to target the desired N2 bus providing the ability to communicate (e.g., program and configure) with any N2 device in the facility.
- Phase out the NCM in use on each Metasys® network as all NCM based services and logic were moved to the JACE-6 controllers.
- Use the Upstream N2 Interface of the BACnet-N2 Router for the connectivity from the Engineering Workstation for ongoing N2 device maintenance and support.

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## Results

All project design and operational goals were met and this system is now in production. It has been fully qualified and validated.

- Provided “like for like” functionality
- Ensure the upgraded BMS could be successfully commissioned, qualified, and validated

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## About The Parties Involved

### Wunderlich–Malec

- Previously provided general automation support and system integration for GMP systems. The bulk of our work was related to industrial controls (PLC, SCADA, and HMI), as well as commissioning and qualification support. Industrial control systems, commercial control systems, system Integration, and life-science experience.
- Experience integrating a variety of platforms (hardware and software) from a variety of vendors.
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### The S4 Group, Inc.

The S4 Group, Inc. is an innovator in software and network appliance development. Products include the S4 Open family of network appliances that enable the opening up of legacy BAS systems and integrating them into open protocols such as BACnet and OPC.

For additional information, please visit our website at [www.thes4group.com](http://www.thes4group.com) or contact Steve Jones, [steve@thes4group.com](mailto:steve@thes4group.com).