

# Engineered Services Scores a Touchdown at M&T Stadium using S4 Open Products

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*Integrator: Engineered Services, Inc.*

*Equipment: Schneider Electric Buildings Business Andover Controls, S4 Open: BACnet-N2 Router*

*Location: Downtown Baltimore, Maryland, USA*

## The Customer

In downtown Baltimore, near the Inner Harbor, there is a professional sports complex, sports museum, and mixed-use commercial office space operated by the Maryland Stadium Authority (MSA). The complex includes M&T Bank Stadium (home of the Baltimore Ravens), Oriole Park at Camden Yards, Camden Station sports museum, and a converted warehouse that runs along the right-field line of Oriole Park.

The project began as a proposal from Pepco Energy Services (PES) to the Maryland Stadium Authority (MSA) that consisted of a selection of Energy Conservation Measures (ECM) addressing different types of equipment and energy use. These measures were designed to reduce energy consumption and free up revenue for the current and future improvements for all four facilities. An additional goal of the project was to provide a migration path from the existing proprietary legacy Siemens and Johnsons Controls Building Automation System (BAS) to an open protocol. This would allow the integration of any manufacturer's hardware using the open protocol during future upgrades. The ideal scenario would have been to replace all of the Siemens and Johnson Controls controllers with current Continuum BACnet controllers, but that would have increased the cost enormously. The Maryland Stadium Authority will use the energy savings from this project to complete an orderly transition to BACnet over the next few years.



## The Project

Work on this project included installing Schneider Electric Buildings Business Andover Controls Continuum BACnet chiller plant controls, Continuum servers and workstations, and integrating the existing legacy Siemens and Johnson Controls controllers into the Continuum BAS. The existing Siemens BAS at Oriole Park and the Warehouse office complex consisted of 44 ALN level controllers with an additional 24 FLN networks containing 532 application controllers. The existing Johnson Controls systems consisted of 10 Metasys® N2 networks integrated with NCM supervisory controllers representing 496 N2 Field controllers with 9,300 total points.

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## Proposed Solution

The project team at Engineered Services proposed to install Andover Controls CyberStation plus the Andover Controls BCX products that would function as the building's new front end. In order to meet the customer's needs, Engineered Services had to identify the logic in the legacy Metasys® NCMs, and migrate it to the Andover Controls BCX to assume the supervisory control functions. Since neither the existing Siemens nor Johnson Controls equipment are native BACnet, a method of integrating these controllers into the Continuum BAS was necessary.



Engineered Services, Inc. had previous experience using a software driver to integrate foreign devices into the Continuum environment, but found that it did not include interfaces for all of the Johnson Controls device types that were present in the BAS in large quantities. A search for a viable solution to integrate all of the Johnson Controls devices led Engineered Services to discover the S4 Group, Inc., who had recently begun to offer the S4 Open: BACnet-N2 router through the Schneider Electric Buildings peripheral program. After direct consultation with The S4 Group, Inc, ESI identified and purchased the S4 Open: BACnet-N2 Router.

## Installation

The initial approach was to turn off all of the NCMS and their Metasys operator workstations at the same time, but it was quickly determined that a pull-the-pug transition from the existing Johnson Controls system to a fully integrated Continuum environment would not be possible with a system of this magnitude. The installation plan was amended by upgrading all of the BACnet-N2 Routers to include the Upstream N2 Interface and doing the project in phases. This change allowed the customer to keep the NCMs and their Metasys® Operator Workstation active in parallel to the development of their new head end facilitating a smooth and coordinated transition. Essentially, after a very short interruption to install each S4 Open: BACnet-N2 Router it was business as usual for the Metasys® users. The new graphical user interface, system navigation structure, trending strategies, and scheduling could be developed and tested without impacting ongoing operations. The NCMs and Metasys® Operator Workstation were removed in a phased manner. Engineered Services also used the ComBus Quick Tester, available from The S4 Group, to prepare the system for the solution and later as a diagnostic tool - this proved to be reliable and a valuable piece of equipment. The ComBus Quick Tester saved time and labor costs throughout the project.

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## Challenges

The system consisted mostly of custom Johnson Controls configurations, so the standard device type templates provided to define standard point lists would not work. However, the flexibility built into the system allowed ESI to customize the point lists to meet the installation needs.

While migrating the NCM code to the BCX, the Engineered Services team found that the Andover building level controllers could not handle BACnet timeout errors generated when N2 devices were powered off because of maintenance activities in the complex. The S4 Group, Inc. worked with Schneider Electric's support team and Engineered Services to isolate the issue and implement a workable solution. The solution was to have the S4 Open: BACnet-N2 Router intercept BACnet timeout errors and avoid sending them to the BCX. Instead, the N2 router returns a normal response to BACnet requests substituting the value 999 in the present value of the target point. The Engineered Services team included code in the BCX to look for this unique value and take appropriate action.

This feature is now a user selectable option in the BACnet Advanced Communication Settings within the BACnet-N2 Router. The option defaults to "NO" which means the router handles BACnet errors according to the BACnet standard. If it is set to "YES" then we return the value 999 for any analog point and False for any binary point when an error is encountered while reading a point returns a normal completion for write, override, or release N2 operations instead of any BACnet error that would normally be generated.

Eric Knight of Engineered Services commented, "The S4 Group worked quickly to provide a solution to aid us in bringing in the N2 points. With this level of customer support and a much needed product to make JCI systems open to outside systems, we will use the S4 Group's products in the future."

## Lesson Learned – Best Practices

The project required nine S4 Open: BACnet-N2 Routers and, at the start of the project, it was the most complex project ever undertaken by an S4 integration partner. Some of the lessons learned from this project have become best practices. "From the inception of our S4 Open Appliances we looked at it as approaching the integration as a traditional communications gateway at the N2 protocol level. Because of the lessons learned on this project, our technology is evolving to look at the N2 Router as encapsulating the entire Metasys® system, so that we can provide a more complete emulation of the BACnet environment," commented Steve Jones, managing partner of The S4 Group, Inc.

## Project Completion and Outcome

All nine of the S4 Open: BACnet-N2 Routers are installed and publishing BACnet data into our Andover Continuum system. We have an average of 800 N2 points per router. The customer is happy with the integration and is anticipating energy savings that will fund the next phase of the project.

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## About the Parties Involved

### **Engineered Services, Inc.**

#### *Automating Your Capitol*

Established in 1972, ESI has grown to specialize in the more exacting varieties of Building Automation Systems & Services such as digital facility automation, access control, systems integration, graphical user interfaces, design-build projects and much more.



ESI operates with a fully equipped, factory-trained staff of over 60 people serving thousands of customers in the District of Columbia, Maryland and Virginia. ESI has facilities in Sterling and Richmond, Virginia, and can be onsite quickly to fix your problem anywhere in our coverage area.

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### **The S4 Group, Inc.**

#### *Software Services and System Solutions*

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 <http://www.thes4group.com> or contact Steve Jones, [steve@thes4group.com](mailto:steve@thes4group.com).