Building Automation System Basics
With me today...

**Cassandra Beck** – Pacific Northwest Area Service Sales Manager - 14 years with Siemens

**Mike Anderson** – Service Sales Engineer for the South Puget Sound – 4 years with Siemens
Objectives

**Building Automation System Basics**

- Quick introduction to Building Automation Systems
- Service best practices
- Interoperability and Integration
- Energy monitoring and management
Dictionary Definition

**Verb:** To exercise *authority* or restraint over; *regulate*; adjust to a requirement

**Noun:** A *set of instruments* used to regulate or *guide a system* or machine

*(not just “on” / “off”)*

Common Definition

Control is a *system of components* that read *input* variables, process a *set of instructions* and send *outputs* to achieve a desired *outcome*
BAS Basics – Common Terms

- **BAS** – Building Automation System
- **BACS** – Building Automation and Control System
- **BMS** – Building Management System
- **EMS** – Energy Management System
- **EMCS** – Energy Management Control System
- **DDC** – Direct Digital Control
What can BAS control?

- Temperature
- Pressure
- Lighting
- Building Security
- Modes of Operation
- Humidity
- Air Flow
- Fire and Life Safety
- Energy Efficiency
- Daily or Seasonal

Building Technologies
Basic Instrumentation

- Damper Actuator
  - Open/Close
  - Modulate

- Valve
  - Open/Close
  - Modulate

- Current Switch
  - Status

- VFD
  - Start / Stop
  - Modulate

- Temp. Sensor
  - Status
Architecture

Enterprise Level
- Paging

Operator Level
- Internet HTML, HTTP, XML
- Historical Reporting
- E-mail
- BACnet IP

BAS Network Level
- BACnet MS/TP

Controller Level
- BAS BASICS

Devices Level
- Building Technologies
Yesterday to Tomorrow

Building Development ⇒ Technology Development ⇒ User Needs

- Single purpose to **Multipurpose**
- Offices to **Flexible Work Space**
- Bed Towers to **Treatment Centers**
- Classrooms to **High Tech Learning**
- Server Rooms to **Data Centers**
Yesterday to Tomorrow

Building Development ⇒ Technology Development ⇒ User Needs

Reference: “A Short History of the Second American Revolution” by Dilys Winegrad and Atsushi Akera
Yesterday to Tomorrow

Building Development ⇒ Technology Development ⇒ User Needs

- Safety
- Environmental quality
- Precise control
- Complex energy management
- Data collection
BAS Considerations

System and vendor capabilities…

- Backwards and forwards compatibility
- Access to training and troubleshooting tools
- Interoperability and integration capabilities
- Expandability
- Migration plans and lifecycle management
- Open or proprietary protocol
- Maintenance and support services
- Remote access and remote alarm notification
- Other in-house capabilities
- References
Most vendors strive to develop a service partnership through service agreements with their customers. Common services include:

- Software Updates
- Inspection and maintenance of software and hardware
- System health assessments
- Lifecycle management
- Energy management and continuous commissioning
- Customer training
- Remote services
Benefits of a good service partnership

- Saves money!
- Maintained systems last longer
- Reduced risk of system failures and downtime
- Improved occupant comfort
- Improved energy efficiency
Integration and Interoperability

Integrated Management Station

- Power Management
- Fire Safety
- Lighting Management
- BAS (Comfort)
- Energy Efficiency
- Access Management
- Video Management
- Intrusion Detection

Enterprise Interfaces

- Smart consumption
- Work space management
- Asset & maintenance
- Energy management
- Energy procurement
- Sustainability
Integration and Interoperability

- **Protocol** – Set of rules to follow – agreed upon format to send and receive messages between computing devices

- **Standard Protocol** – Developed with public input and cooperation – open to anyone without components owned by an enterprise – governed by an independent body, certified by standards bodies (i.e. ANSI, ISO)
What is PICS?

*Protocol Implementation Conformance Statement*

- BACnet spec sheet with a list of the device's BACnet capabilities
- Required for every BACnet device

Contains:

- General product description
- Details of product's BACnet capabilities
- Which LAN options are available
- Several other items relating to character sets and special functionality

*PICS is the place to start to determine device capabilities*
Process:

- A BACnet manufacturer submits to BTL for compliance testing a BACnet device along with its PICS.
- If the device meets the minimum requirements for BTL certification and correctly implements all BIBBs, object types, data link layer and network options listed in its PICS, the BTL mark is awarded.

http://www.bacnetinternational.net/btl
Leverage BAS to reduce energy:

- Optimizing sequences
- Energy tracking and reporting
- Public facing dashboards to promote energy efficient practices and behaviors
- Sub-metering
- Smart consumption
- Utility bill management
- Continuous monitoring based commissioning
Building Commissioning

Operational costs will naturally escalate throughout the building’s lifecycle.
Implementing an EBCx project lowers operational costs significantly.
Supply-side services such as energy procurement consulting further lowers operational costs.
Without demand-side and supply-side ongoing services, operational costs can rise to original levels.
Savings persist through implementation of MBCx including ongoing demand and supply-side services.
Savings increase as additional opportunities are identified and additional FIMs are implemented.
The costs of the CxA Program is always a fraction of the value added.
Thank you for your attention!

Mike Anderson
Service Sales Engineer
425-281-8825
mikeanderson@siemens.com

Siemens Industry, Inc.
Infrastructure & Cities Sector