

BEYOND

SMART CITIES

BUILDING AUTOMATION & CONTROL SYSTEM

CEM REFRESHER TRAINING

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

ENERGY MANAGEMENT SPECIALIST CURRICULUM

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COMMISSIONING THE BUILDING

AUTOMATION SYSTEM

FOR ENERGY MANAGEMENT SPECIALIST

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WHAT SHOULD YOU LEARN

Know how to integrate the BAS into the commissioning process

Know the tools and techniques to specify the right BAS to meet the owner's needs

Know how to request and review graphics submittals, network integration diagrams, and BAS programming

Know how to functionally test BAS graphics, point naming, and trend setup for consistency and usability

WHY COMMISSION THE BAS?



- ✓ The Building Automation System (BAS) is the most touched component of the mechanical system
- ✓ Smart Building systems are more connected, more integrated
- ✓ Largely ignored by the commissioning process - Selected by the trades, not considered a maintainable asset
- ✓ Opportunity to provide significant value to the owner/operator

BAS COMMISSIONING PHASES

- ✓ Pre-Design Phase - Specifications , Network Architecture
- ✓ Design Phase - Submittal Review ,Reviews and Bench Testing
- ✓ Construction Phase - IT Coordination , Functional Performance Testing (FPTs)

BAS/GRAPHICS SPECIFICATION



Pre-Design Phase – Specifying the BAS

- ✓ Owner's Project Requirements (OPR) / Basis of Design (BOD)
 - Choose the BAS that fits the OPR/BOD
 - The BAS is typically ignored in the BOD
 - The CxA should push for more definition
- ✓ Questions to guide the BAS selection and network design
 - ✓ What systems are to be integrated?
 - Lighting? Room Scheduling? Metering?
 - Additional systems will require an open protocols or gateways for integration
 - ✓ How complex is the sequence of operations?
 - The CxA should push for more definition

PRE-DESIGN PHASE – SPECIFYING THE BAS



- ✓ IT and Networking requirements?
 - Will the BAS reside on the enterprise network or be stand alone?
 - Who will manage the BAS network and security?
 - IT staff is typically preferable to building operations, but will have their own standards for security and communication protocols
- ✓ Open vs. Proprietary architectures
 - Integration with existing enterprise systems
 - Serviceability and vendor networks
- ✓ Are analytics being used? Where will they live?
 - Local analytics will require additional servers
 - Cloud-Based analytics will require specific, secure protocols and internet connectivity

DESIGN PHASE – PROVIDE A BAS/GRAPHICS SPECIFICATION



- ✓ You can only commission to a specification or design
- ✓ Get specific
 - Communication protocols
 - Network guidelines
 - Interoperability
 - Trended Points
 - Graphics screenshots

- ✓ Specify equipment and point naming standards

- ✓ Performance Requirements

NETWORK ARCHITECTURE - DESIGN PHASE



- ✓ Coordination is necessary between the Owner's IT team and the controls contractor

- ✓ Define what protocols are to be used
 - Secure vs. Unsecure
 - Routable vs. Non-routable
 - Proprietary vs. Open

- ✓ Determine who is responsible for providing equipment, IP addresses, and maintenance

- ✓ Expectations for non-BAS vendor supplied devices

SUBMITTAL PHASE – NETWORK ARCHITECTURE



- ✓ Single-line diagram of networked systems

- Include communication protocols
- Include firewalls and managed switches
- Include non-BAS vendor provided systems

- ✓ Network responsibility matrix

- BAS contractor vs. IT
- 3rd-party gateways

CONSTRUCTION PHASE – COORDINATION IS KEY



- ✓ IT personnel should be included in construction meetings
- ✓ Make sure information is available to those who need it, when they need it
- ✓ IT equipment needs clean, conditioned space
- ✓ Delays in IT will lead to delays in commissioning

FUNCTIONAL TESTING PHASE– VERIFY NETWORK PERFORMANCE



- ✓ Graphics should load quickly
- ✓ Point values should be displayed quickly
- ✓ Equipment should respond to commands almost immediately
- ✓ Overrides should take effect within a few seconds
- ✓ Verify access through VPN, web, etc.
- ✓ Network discovery tools

COMMISSIONING GRAPHICS



✓ Submittal Phase – Graphics Submittals

- Review against specification
- If possible, get buy-in from building engineer
- Are the graphics clear? Are the point values where you would expect them? Is all the necessary information shown?
- If applicable, are graphics similar to other portfolio buildings?

CONCLUSION



- ✓ Including the BAS/graphics in the commissioning process is necessary as building systems become more complex
- ✓ Include the BAS in the OPR/BOD and specifications
- ✓ BAS network architecture needs planning and design
- ✓ Review BAS submittals before implementation
- ✓ Incorporate graphics and trend analysis into functional testing
- ✓ Advanced analytics should be the future of commissioning

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THANK YOU

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