Building Automation and Controls (BAC) | Building Management System (BMS)

Overview

Building Automation and Controls (BAC) are a combination of hardware and software that control a building's power systems; lighting and illumination; electric power and control; security, observation and magnetic card access; heating, ventilation and air-conditioning systems (HVAC); outdoor controls; lift, elevator and escalator controls; entertainment and BMS (Building Management Systems).

BAC systems provide efficient control of internal comfort conditions, individual room control, increased staff productivity, effective use of energy, improved building reliability and life, quick and effective responses to HVAC problems, and save time and money. The systems also provide information on problems in the building, allow for computerized maintenance scheduling, are easy and effective for employees to use, and easily detect problems.

Building management systems are most commonly implemented in large projects with extensive mechanical, HVAC, electrical, and plumbing systems. Systems linked to a BMS typically represent 40% of a building's energy usage; if lighting is included, this number approaches to 70%. BMS systems are a critical component of managing energy demand. Improperly configured BMS systems are believed to account for 20% of building energy usage, or approximately 8% of total energy usage in the United States.

In addition to controlling the building's internal environment, BMS systems are sometimes linked to access control (turnstiles and access doors controlling who is allowed access and egress to the building) or other security systems such as closed-circuit television (CCTV) and motion detectors. Fire alarm systems and elevators are also sometimes linked to a BMS, for monitoring. In case a fire is

detected then only the fire alarm panel could shut off dampers in the ventilation system to stop smoke spreading and send all the elevators to the ground floor and park them to prevent people from using them.

Applicable Industries

- Furniture & Home Appliances
- Smart Grid
- Telecommunications

Applicable Functions

- Facility Maintenance
- Maintenance
- Product Development

Market Size

Estimate A

$29.8 billion (2013, Global, Building Automation & Controls), $55.5 billion (2020)

Source: Markets and Markets

Estimate B

$50 billion (2018, Global, Building Automation & Controls)

Source: David Russell Schilling

Estimate C

$86.0 billion (2023, Global, Building Automation Systems)

Source: Linc Services

User Viewpoint

Business Value

How does this use case impact an organization's performance?

BAC systems provide efficient control of internal comfort conditions, individual room control, increased staff productivity, effective use of energy, improved building reliability and life, quick and effective responses to HVAC problems, and save time and money. The systems also provide information on problems in the building, allow for computerized maintenance scheduling, are easy and effective for employees to use, and easily detect problems.

The expected benefits of BAC include: -

1) Good control of internal comfort conditions

2) Possibility of individual room control

3) Increased staff productivity

4) Effective monitoring and targeting of energy consumption

5) Improved plant reliability and life

6) Effective response to HVAC-related complaints

7) Save time and money during the maintenance.

Key Performance Indicators

How is the success of the system measured for users and for the business?

Productivity, maintenance time and cost.

System Capabilities & Requirements

What are the typical capabilities in this use case?

The system capabilities are:

1) Control of internal comfort conditions

2) Individual room control

3) Increased staff productivity,

4) Effective use of energy

5) Improved building reliability and life and quick and effective responses to HVAC problems saving time and money.

Performance requirements are a correct setup and constant monitoring of related parameters.

Deployment Environment

Where is the 'edge' of the solution deployed?

Most commonly implemented in factories and office buildings.

Technology Viewpoint

Sensors

What sensors are typically used to provide data into the IoT system, and which factors define their deployment?

Environment condition tracking devices, including sensors for temperature, energy consumption, humidity, etc.

Analytics

What types of analysis are typically used to transform data into actionable information?

Real-time remote monitoring of an building's condition. Deviations from average historical data indicate developing problems enabling predictive measures.

Cybersecurity

What factors define the trustworthiness of the solution?

Potentially dangerous environments included which require high levels of security from misuse.

Cloud & Edge Platforms

What factors define the cloud and edge platforms used to integrate the solution?

Building automation systems use a cloud based service model. Instead of networked controllers connecting locally to an onsite DDC server, companies are developing controllers that essentially network together locally and connect up to an online server service via the internet. This cloud-based service acts identically to a DDC server installed on the premises of the building, but takes advantage of a lot of the same economies of scale.

Connectivity

What factors define the connectivity solutions used to provide both device-to-device and device-to-cloud communication?

Integrated communication capabilities through devices inside the building.

User Interface

What factors define the interfaces available to the system users?

UI must be comprehensive while enabling a user to monitor everything necessary within a lot of data collected.

Data Viewpoint

Data Sources

How is data obtained by the system?

Data is taken via the controller inside the BAS system which are the brains of the systems. Controllers take data from the collectors and decide how the system will respond. A digital controller can receive input data, apply logic (an algorithm) to that information, then send out a command based on what information was processed.

Data Types

What data points are typically collected by the system?

Input data in which an algorithm is applied and sent as a command to the system.

Data Volume

What volume of data is expected from each deployment, and from the system as a whole?

Depends on the exact amount of usage. The more heat, ventilation is used, data volume increases.

Data Requirements

What other requirements define data behavior?

Real-time data collection is required in order for the various devices to operate effectively inside the building.

Implementation Viewpoint

Business & Organizational Challenges

What business challenges could impact deployment?

Currently, one of the biggest challenges the industry is facing is the fact that there are no cost-effective solutions. The system integration requires a high amount of investment and a complete overhaul of the network systems inside a building. Another challenge has to do with cybersecurity. As buildings get more connected, the threat of outside attacks increases and people are not willing to take that risk.

Organizations might be unwilling to invest in the fees associated with this new

system and the fact that the industry is currently at its infancy might be an issue with adoption of the technology.

Integration Challenges

What integration challenges could impact deployment?

The BAS needs to be integrated inside a building's network. Thus, old buildings and buildings with a less sophisticated network are not easily integrated with the BAS.

Installation Challenges

What installation challenges could impact deployment?

Installation of the system requires an existing network protocol. Furthermore, the installation fees can be quite high and requires independent contractors.

IoT ONE Use Case

Accelerating the Industrial Internet of Things

IoT ONE is widely recognized as a leading Industrial IoT research firm, opinion influencer, and go-to-market channel.

1. Create a **free account** to view and download hundreds of IoT case studies and supplier profiles.

2. Already have an account? **Feature** your case studies, and your hardware and software solutions.

3. You can connect with us via email at **team@iotone.com**.

www.iotone.com