

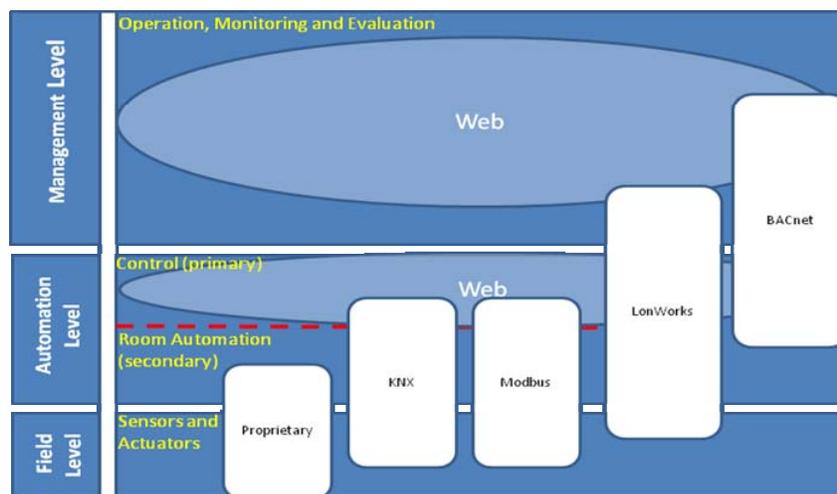
## Building Automation and Control

The understanding and application of Building Management Systems can be widely misunderstood, either too simplified or over complicated, with multiple terms being applied i.e. BMS, BMES, BAC and BAS etc, however, the fundamental of remote or centralised monitoring and control remains. The terminology *building automation and control* refers to the central management, monitoring, and optimisation of building technology using a computer-based building automation and control system. Building automation and control systems are installed in a multitude of applications including large office buildings, shopping centers, hospitals, etc., where complex electrical and mechanical equipment interact in such a way that there is ample opportunity to optimise both building performance and energy consumption.

Modern building automation and control systems also influence the measuring and control technology of these plants. The integration of building services components into a higher level building automation system today is a key factor in building design and meeting energy efficiency requirements. Optimal HVAC equipment performance can only be achieved by implementing sophisticated open and closed loop control functions with freely programmable DDC (Direct Digital Control) technology. The use of Open Protocols also offers a technical advantage, increasing flexibility for the specifier, purchaser and end users, helping form part of overall Building Management Strategy.

Open communication between building systems facilitates the simple and secure integration of third-party systems at all levels. Standardised, independent communication protocols ensure consistent exchange of information between devices and systems, with minimum engineering effort, providing straight forward operation and the ability to satisfy individual customer needs.

The most common communication protocols being adopted in the UK HVAC market are BACnet, LONworks, Konnex (KNX) and Modbus, but many other communication standards are also available. Each standard has a different communication requirement and is often used within a different level of the building management hierarchy, which can be generally broken down into 3 levels. 1) **Field level** - consisting of sensors and actuators. 2) **Automation level** - for room control & primary control. 3) **Management level** - for overall operation, monitoring and evaluation. The following graphic is an example of this.



## What Communication Protocol?

A common question raised when selecting communicating equipment is “*which protocol do I chose?*” Unfortunately, there is no right answer to this. The correct answer will vary be each application and customer and must take into account several factors: the current building automation control, size / type of building, existing network media, the current level of integration across other sub-systems, the customer satisfaction with or quality of the system integration / controls contactor.

As a specifier, designer or end user you can help the movement for cost-effective integration of intelligent systems, services and equipment by insisting that the Building Automation System and equipment Manufacturers use open, standard protocols, providing the ability to deliver long term sustainable value for all parties involved.

Please see an introduction below for a summary of these standards.

**BACnet** – A data protocol for Building Automation and Control networks, based around objects that represent physical inputs, outputs and software processes, each characterised by a set of properties that describe its behaviour and govern its operation.

The BACnet protocol defines a number of data link / physical layers, including [Ethernet](#), BACnet/IP (Internet Protocol), MSTP (Master-Slave/Token-Passing) over [RS-485](#), and [LonTalk](#), the most common being over IP or MSTP, each having their own communication requirements. At the management level BACnet/IP is by far the choice for BACnet communication, the use of BACnet/IP decouples the logical network from the physical network and provides maximum flexibility of physical network preference now and in the future.

**Modbus** - is an application-layer messaging protocol, providing client/server communication between devices connected on different types of buses or networks. An open and widely used network protocol in the industrial manufacturing environment, implemented on simple interfaces like RS485 or RS323 but also via a universal network standard TCP/IP.

**Konnex(KNX)** – a worldwide standard for applications in building control, ranging from lighting and shutter control to various security systems, heating, ventilation, air conditioning, monitoring, alarming, and lots more.

Functions can be controlled, monitored and signalled via a uniform system without the need for extra control centers. The KNX medium to which all bus devices are connected (twisted pair, radio frequency, power line or IP/Ethernet), enables the exchange of information across the KNX network.

## How can Open Protocols help with the Building Management System?

The objectives intended from Building Management Systems include improved energy efficiency from automated, coordinated equipment operation, and integration of various building systems providing centralised monitoring, evaluation and management.

Open protocols can further enhance the Building Management strategy by providing both economic and operational benefits, from design, construction and finance costs through to training and maintenance.

**Ease of Integration:**

Integration by a variety of 3<sup>rd</sup> party devices on Open protocol networks, ensures that owners and specifiers need only to select suppliers that provide a suitable Communication Interface to integrate on to the required network, forming part of the overall, complex Building Strategy.

**Knowledge:**

Embracing standard protocols may cause less confusion in the marketplace and make the task for designers, specifiers and end-users easier to implement. Open protocols are more readily changeable and therefore can adapt to new technologies swiftly, hence the ability to meet future demands of the building and industry for Communication needs today and tomorrow.

**Cost Control:**

Building operations may create labour savings with central control, as a fewer number of trained personnel are needed to oversee integrated system operation, this is not only represented by the reduction in skilled level but also a by product of an effective autonomous management system – easily monitoring, operating and managing the system from a centralised location, potentially reducing maintenance costs can by up to 10% over a 25 year period.

**Existing Infrastructure:**

The ability to use existing networks also reduces installation costs, specifically when retrofitting, adding extra functionality to the existing building system.

**Utilities:**

Facilities managers benefit from total control over their building utilities, providing intelligent and proactive management from a central location.

**The right integration at the right level!**

Open communication protocols allow buildings to fully maximise economic and environmental opportunities through automated management strategies. However the benefits can be undervalued or even lost if the right integration is not provided, through ineffective operation, poor information for monitoring and often a costly, lengthy and difficult commissioning process.

At VES, we recognise that each Building Management System should be tailored to the needs of the building and therefore raises the requirement for a variety of integration options. VES have experience in many protocols and real life implementation of, BACnet over IP and MSTP, Modbus and KNX, including some proprietary protocols such as the TREND protocol.

We provide a number of communication solutions at field, automation and the management level, and we understand the immense benefits to simpler integration of devices into the Building Management Strategy. Our air handling equipment can provide a number of communication interfaces for integration into any specified level of the network. Because we have designed our systems around communication and the overall building strategy we ensure that during the design stage the information provided aids with integration right from the start.

The importance of an embedded open communication protocol within HVAC equipment provides facilities to realise the benefits of a Building Management System, but for further peace of mind VES provide trained staff to help at all stages of the project, from selecting the correct equipment and communication protocol through to onsite commissioning assistance, ensuring the Building gets the best from our equipment.

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