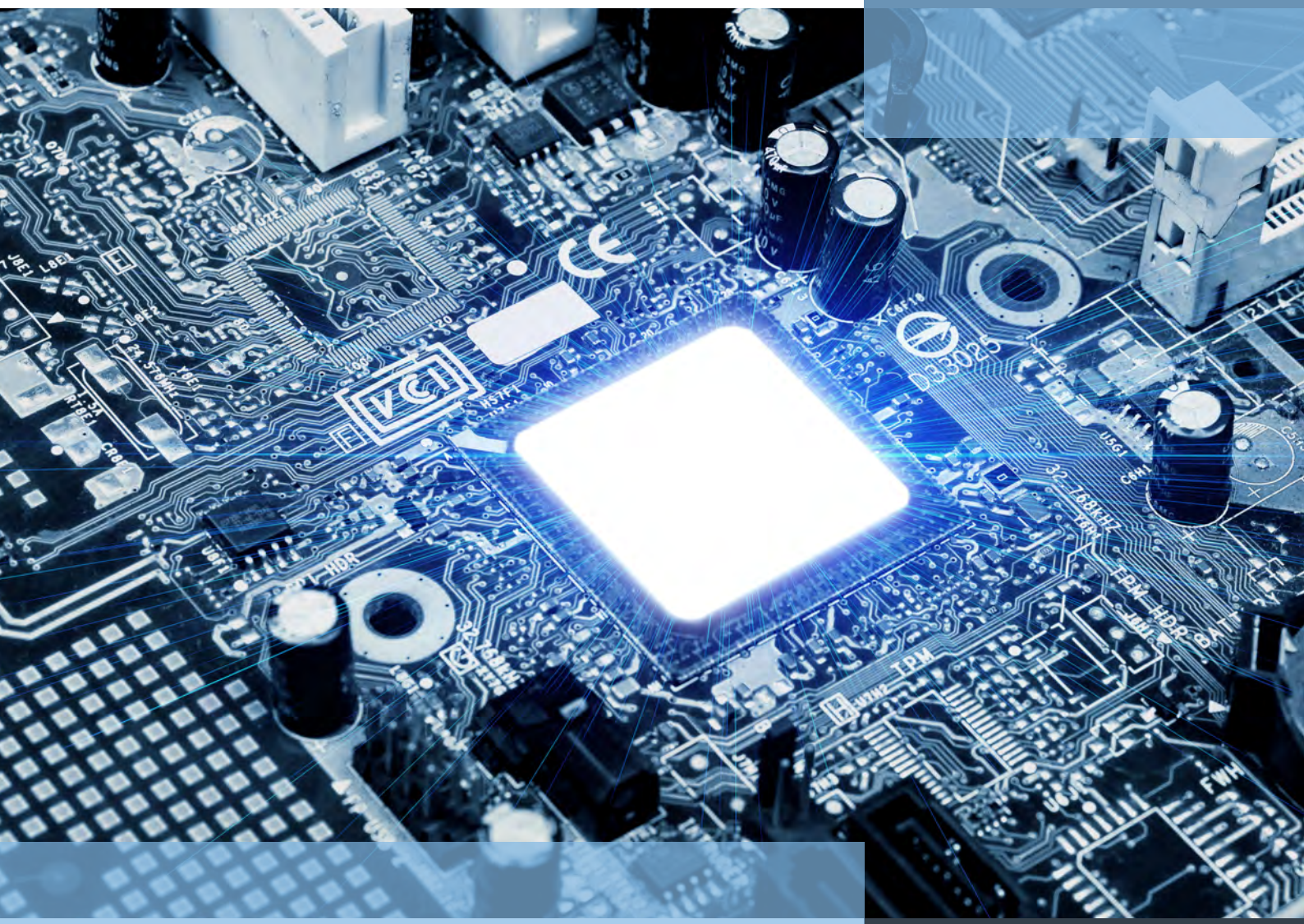
ALL ABOUT OPEN PROTOCOL IN BUILDING AUTOMATION



A Building Automation Systems (BAS) mainly focuses on automation of indoor conditions like HVAC, lighting, security, access and etc. At the same time, its motive is to provide cost and energy efficient solutions and thereby making the buildings intelligent In making the Intelligent Building(IB), most important thing becomes the communication between the different devices. It is very important to choose the right communication protocol for the communication between the devices. Each of the competing protocols claims to be the best. So how do facility manager select the one that is best suited for the facility?

WHAT IS OPEN PROTOCOL

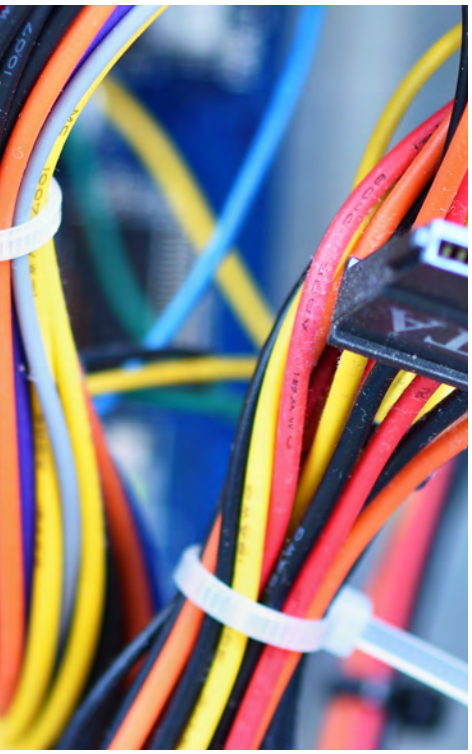
Building automation systems are one of the key ingredients to reducing the energy consumption in building and facilities, yet they are increasingly difficult to manage and program.

There are many challenges to maintaining these systems and there is growing pressure to integrate these systems with other building systems to create a “smart building.”

Building Automation Protocols are the rules and standards because of which communication is possible between different devices used for building automation.

An open communication protocol allows vendors' equipment to interoperate without the need for proprietary interfaces or gateways.

A system that uses open or standard protocols gives facility managers the flexibility to use products from different manufacturers and promises long term cost savings.



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ADVANTAGES OF OPEN PROTOCOL

Supported by multiple manufacturers, software vendors, and install/service organizations

Widely available third-party software for user interface, trend reports, alarming, and other applications (eg.smart phones)

Easier communication with subsystems such as lighting and chiller controllers

Active community groups for support, freeware, and leverage with vendors

Ability to stay current and add capabilities in the future

COMMON PROTOCOL IN BUILDING AUTOMATION

BACnet:
Building Automation Controls NETwork

BACnet is a network protocol specifically used for multiple devices to communicate across building automation systems by system users and building system manufacturers

BACnet supports most building operations, including HVAC, lighting, fire protection, and physical security (access control, intrusion) devices.

LonWorks
Local Operating NetWORK

LonWorks is a networking platform specifically created to address the needs of control applications. The platform is built on a protocol created by Echelon Corporation for networking devices over media such as twisted pair, powerlines, fiber optics, and RF.

The majority of LonWorks devices involve buildings projects, including HVAC and lighting. The protocol is also used in many other markets such as outdoor lighting, transportation, utility, process control, and home automation.

M-Bus (Meter-Bus) is a European standard (EN 13757-2 physical and link layer, EN 13757-3 application layer) for the remote reading of water, gas or electricity meters. M-Bus is also usable for other types of consumption meters. The M-Bus interface is made for communication on two wires, making it cost-effective.

M-Bus is used to report readings from water, gas, heat, and electric meters, as well as valves and actuators. It is also sometimes used for alarm systems and flexible illumination systems.

Modbus is a data communications protocol originally published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs). Modbus has become a de facto standard communication protocol and is now a commonly available means of connecting industrial electronic devices.

Modbus is used to communicate between intelligent devices and sensors and instruments, and to monitor field devices using PCs and human-machine interfaces.

Modbus is most widely used as an industrial protocol, but is also popular in building, infrastructure, transportation, and energy applications.

Web Services are often used to integrate building systems that have various protocols in use.

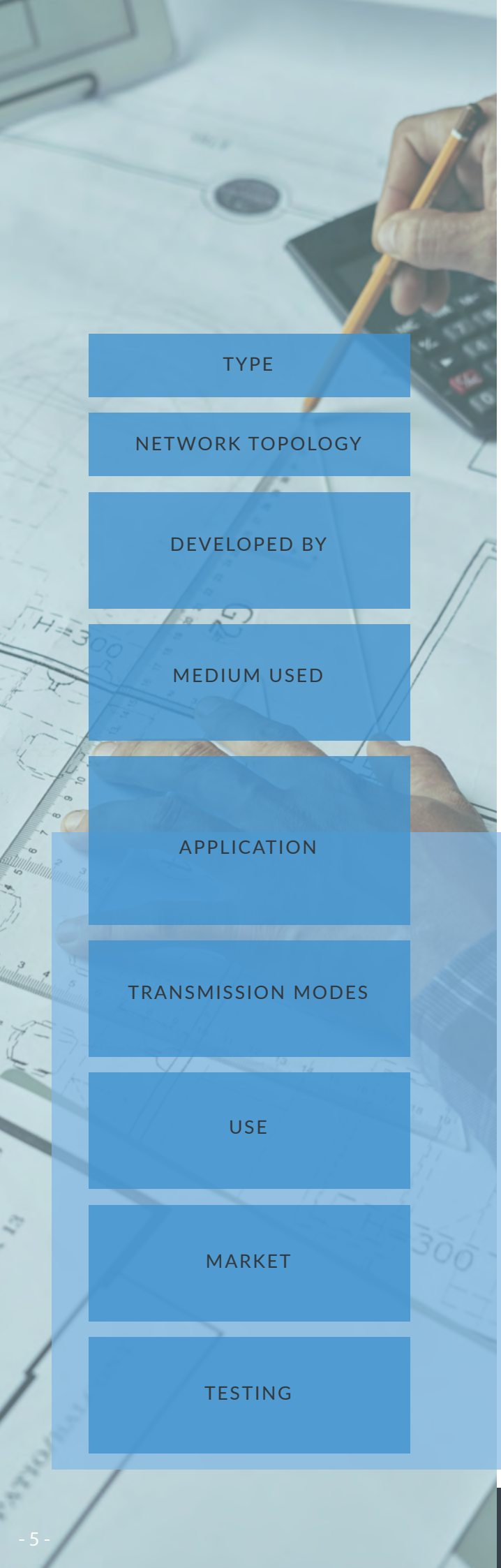
For example, an enterprise with a mixture of BACnet- and LonWorks-based facilities could use a Web Services application to integrate the information from both networks and provide unified reporting and analysis.

Web Services are used in building automation to integrate reporting across facilities, and provide a bridge between legacy and new systems. It can also be used locally within a single building, for example to link a Modbus sensor network with the facility manager's control portal.

Zigbee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios, such as for home automation, medical device data collection, and other low-power low-bandwidth needs, designed for small scale projects which need wireless connection. Hence, Zigbee is a low-power, low data rate, and close proximity (i.e., personal area) wireless ad hoc network.

Wireless standard for home and commercial use. Typically, ZigBee devices are used as room and HVAC controllers, as well as door/window contacts and occupancy sensors.

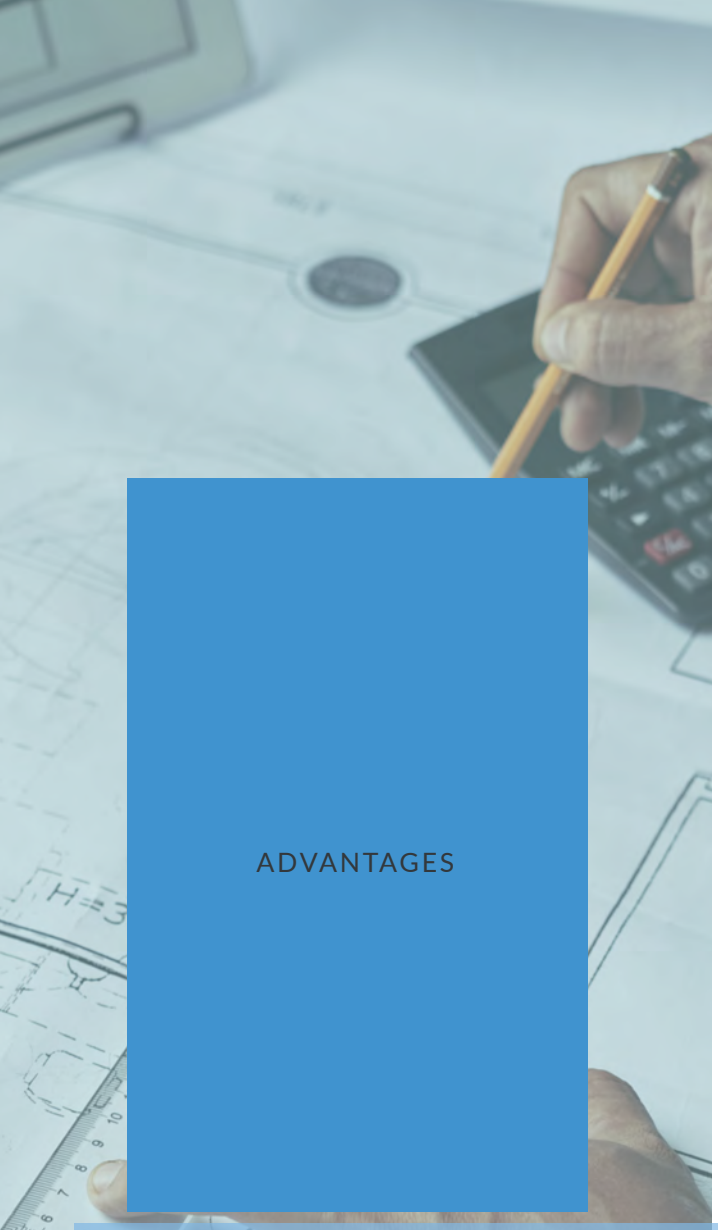
BACNET
LONWORKS
MODBUS
M-BUS
WEB SERVICES
ZIGBEE



	BACnet	LonWorks
TYPE	Wired/Wireless	Wired/Wireless
NETWORK TOPOLOGY	Star/ Mixed Topology	Star/ Mixed Topology
DEVELOPED BY	ASHRAE	Echelon Corporation/ Motorola
MEDIUM USED	Twisted Pair, Wireless Mesh Fibre Optics	Twister Pair, Power Lines, FibreOptics, Wireless
APPLICATION	Support most building opertaions, eg. HVAC, Lighting, Physical Security & Fire Protection	Used for HVAC, ligtning, process control, and home automation
TRANSMISSION MODES	IP, Ethernet, LonTalk, ARCnet Zigbee, MS/TP	Predictive persistent CSMA, MS/TP, network, SNVT
USE	Communication across devices	Networking devices through power lines, fiber optics & other media
MARKET	Industrial, Transportation, Energy Management, Building Automation, Regulatory & health safety	Home automation, industrial, transportation, and public utility control networks.
TESTING	BACnet Testing Labs	LonWorks protocol

COMPARISON OF OPEN PROTOCOL

Modbus	M-Bus	W3C	ZigBee
Wired/Wireless	Wired/Wireless	Software system	Wired/Wireless
Line Topology	Line /Star / Tree topology	Mesh Network	Mesh / Star
Modicon Inc.	University of Paderborn, in conjunction with Texas Instruments Deutschland GmbH & Techem GmbH	World Wide Web Consortium	Zigbee Alliance
Two Wire, Four Wire, Wireless mesh	Twister Pair, Wireless Version available (868MHz, 433MHz and 169MHz)	Communicates via any valid Internet connection	Wireless
Used to communicate btw intelligent devices, sensors and instruments, & to monitor fields devices using PCs & human-machines interfaces. Eg.Chiller , boilers, fans	Used to read energy consumption data from power meters,heat meters, gas meters, water meters and various sensors and actuators from different manufacturers	Used in building automation to integrated reporting facilities & provide a bridge btw legacy & new system. Can be used locally within single building.	Can be used for HVAC controllers, room controllers and occupancy.
ASCII, RTU, TCP/IP, Eternet	Not defined in standard; gateways are available for IP	Asynchronous JavaScript And XML, REST	TCP or UDP
Connection between devices	Remote reading	Interoperable machine-to-machine interaction over a network.	Device-todevice communication in many-to-one, one-tomany, many-to-many
HVAC, Lighting, Life Safety, Access Controls, infrastructure, transportation & maintenance	Used in the area of building control systems	Used for exchanging data between applications or systems.	Used in low data rate applications that require long battery life and secure networking
Modbus TCP Conformance Testing Program	M-bus User Group	W3C Web Service Architecture Working Group	Zigbee Alliance Authorized Test Houses

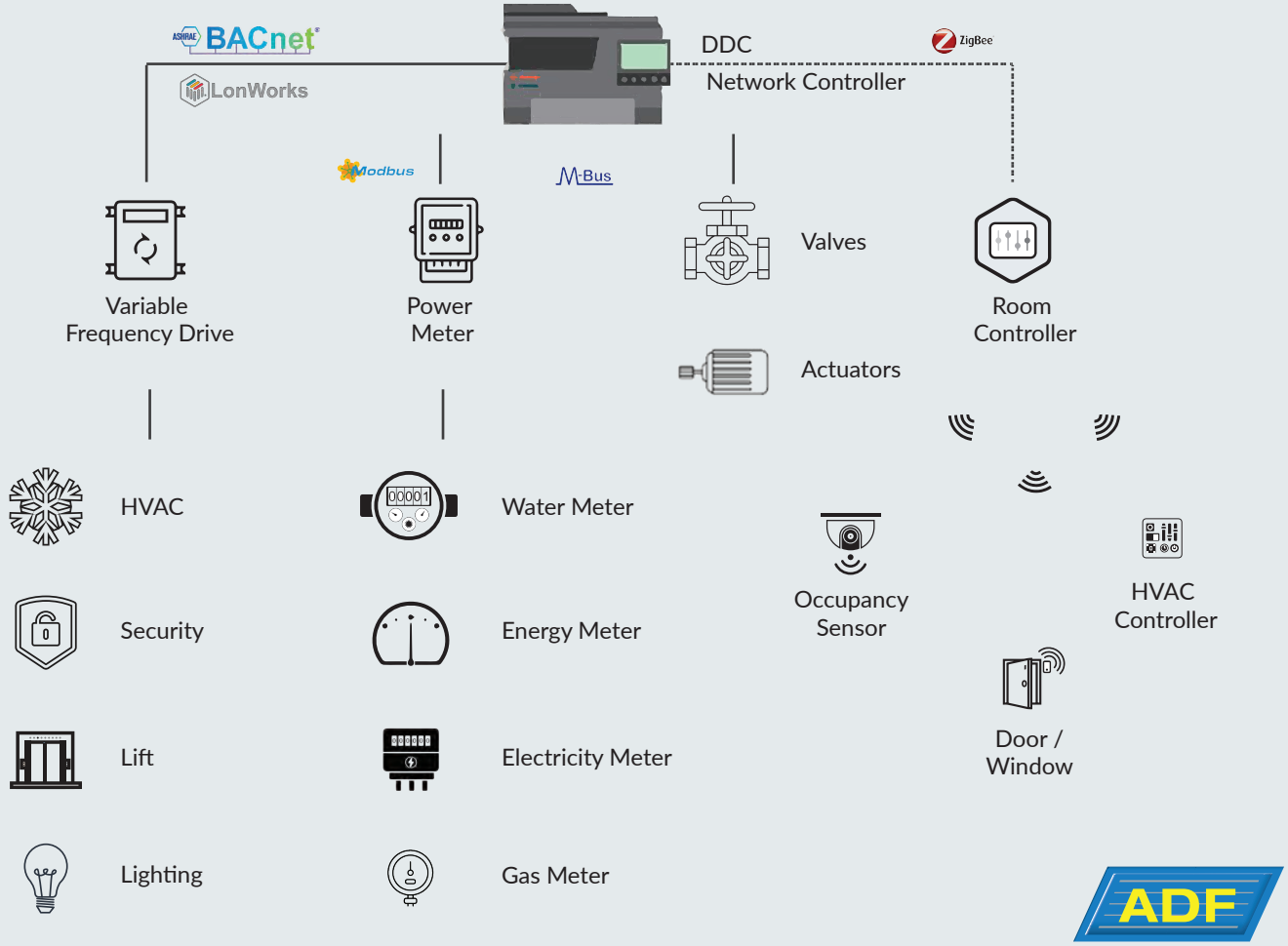


	BACnet	LonWorks
ADVANTAGES	*Scalability between cost, performance and system size *Endorsement and adoption by nearly every major vendor in North America and many other countries *Robust internetworking including multiple LAN types and dial-up *Unrestricted growth and the ability to add new innovations and new features anytime	*Web based tool; saves time and cost *Numerous developers of *Lonworks products in the market *Less Architecture at device level
DISADVANTAGES	*Limited the number of field devices that can connect to a master station except Ethernet TCP/IP *MT/TP-Wire Length *Ethernet-Infrastructure *New standard has security standard but not implemented in all devices	*Controlled devices & variables are connected to a separate control device. (Not recommended due to network interruptions producing system failures) *Extensions are allowed only through the LonMark Consortium. *Hardware specific, and requires the Neuron chip for network movement of the protocol. *Close to “plug & play” ability, yet still far from achieving interconnectivity using Microsoft Windows

COMPARISON OF OPEN PROTOCOL

Modbus	M-Bus	W3C	ZigBee
*Easy connection to Modicon *Suitable for small/ medium volumes of data (≤255 bytes) *Data transfer designed for industrial applications *Openly published and royalty-free *Easy to deploy and maintain *Moves raw bits or words without placing restrictions on vendors	*Simple principle – easy to install *Bi-directional communication for setup and updates *Robust data collection *Direct (no external gateways/level inverters) *Highly flexible by combining with other I/Os and I/O system interfaces *Use of multiple modules for larger data volumes	*Simple principle – easy to install *Bi-directional communication for setup and updates *Robust data collection * Direct (no external gateways/ level inverters) *Highly flexible by combining with other I/Os and I/O system interfaces *Use of multiple modules for larger data volumes	*Mesh network structure – even one product fails to work; others can continue to communicate without an issue *Low power consumption – it uses only 50 milli Joules (0.05 Watt-seconds) per data transmission *Supports a large network *Many devices to choose *Allows fast communication of data *Devices are controlled in a local network, so no internet required
*Limited the number of data types; Large binary objects are not supported. *No standard method for a node to find the description of a data object. *No security against unauthorized commands or interception of data *Transmissions must be contiguous which limits the types of remote communications devices to those that can buffer data to avoid gaps in the transmission. *Great amount of configuration and programming required *Protocol is not common in the SIMATIC family.	*Costly to change if not installed correctly from the design phase Sensitive on electro-magnetic interference *More difficult / costly in retrofit applications	*Over Matching Requirements. Any time one create a service to handle a variety of customers, need specialized machine requirements. *Availability. Every user or client who uses web services know that it is not available hundred percent all the time. *Security, available to public through http-based protocol which every one can access web services and use it. *Guaranteed Execution, HTTP which is hypertext transport protocol is not a reliable protocol that is it doesnt provide any guarantee of delivery of response.	*Protocol fragmentation - many versions available; each producer incorporates Zigbee in its devices in a slightly differently * Low data transmission rate compared to Z-wave, but it should not be an issue for the average homeowner *Not as secure as Wi-Fi (Zigbee 3.0 fixed that) *Might not be as great for outdoor wireless communication due to short range and limited coverage.

EXAMPLE HOW PROTOCOL CONNECTED



Discover of Open Protocol

A communication network protocol is a system of digital rules for message exchange within or between computers. However, each device must support the same protocol in the same version, and any differences might result in communication errors.

The open protocol definition is simple. These are the kind of protocols that can be included in a wide range of device types from any equipment vendor. What this means is that manufacturers that choose to adopt an open protocol want to achieve protocol interoperability when they design their equipment's functionality and capabilities.

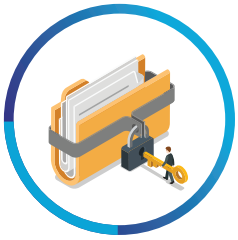
Benefits

01 *Can be used by anyone*
Open protocols are rather universal - they can be used by anyone rather than one entity or company.

02 *Avoid lock-in with any vendor*
Open protocols allow network manager to choose between a wider selection of manufacturers

03 *Higher flexibility*
Open protocol offer a higher degree of networking flexibility, with more integration options between existing and new gear

A “TRULY OPEN” SYSTEM



OPEN PROTOCOL

Simpler integration with other services (Eg. HVAC, fire, plumbing, lift, lighting) through a common understanding network.

OPEN SOFTWARE TOOLS

SQL Database, an open and common database, that is compatible with any IBMS, OBSI software and cloud integration

OPEN API

Gives the ability to create custom tools and applications based on data generated & ready for multi vendors

OPEN PROCUREMENT

Building owners and contractors are freely to choose to integrate be integrated the BAS with standard sensors, transducers or field devices available from any suppliers.

ADF

“ Automate building's energy use,
take control of energy costs,
and improve employee comfort
with building automation solutions ”

“ A new, open-platform system allows you to capitalize on the latest smart building technologies ”

WHY
ADF TECHNOLOGIES

TRULY OPEN SYSTEM
ADF System to ensure owner has absolute access to the system.

BTL CERTIFIED
ADF products are BTL certified products. BTL Mark is a mark of distinction.

FULL SUPPORT
ADF is a principal, manufacturer & integrator.

RESPONSIVE
ADF with experience and capable service & projects teams.

COST EFFECTIVE
ADF products are research and developed from Malaysia

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ADF

ADF Technologies Sdn. Bhd. is a privately-owned company, established in year 2006 and is accredited with MSC status. Headquartered in Penang, ADF has an operation office in Kuala Lumpur and has branches in Kota Kinabalu and Kuching.

Under the leadership of ADF's founders, their skills and experience in engineering and IT has successfully led ADF into becoming one of the leading solution and service provider in Building Automation System (BAS) and Energy Management System (EMS) in the building industry. With constant innovations and unceasing research and development from time to time, ADF has its own line of products that are used in all the awarded projects.

Adopting the Open System technology (BACnet® & LONWORKS®), we are able to implement an end-to-end solution that is open, interoperable and multi-vendor, through strategic partnerships with international partners.

Diversifying from what we have and do best, we also offer solutions and services for Audio Visual (AV), Extra Low Voltage (ELV) and Security Management System which are widely used in malls, offices, hotels, universities, hospitals and even guarded residences.

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