



Guide to Open Protocols

In Building Automation

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Overview

Building automation systems are a combination of many different devices and equipment, all communicating over a local or larger network.

These systems communicate with a wide variety of devices, from life-space positioned sensors and lights to technical-space located equipment such as chillers, boilers, air handlers and electrical panels. Regardless of the originating protocol from local controllers on different floors or zones, data may be forwarded to the cloud using another protocol via gateways. Monitoring dashboards in the local Facility Manager (FM) office or at corporate headquarters can see real-time visualizations of energy performance and issues.

To enable all this communication, many different protocols have been developed over the years. Protocols are the accepted rules and standards that allow communication and data-sharing between building automation equipment. Devices and systems that conform to a given protocol can communicate easily with each other, but not necessarily with other protocols.

Why does this matter? Because manufacturers that produce building automation equipment must choose which protocol(s) their product will conform to, which means that users of this equipment are choosing not just the product, but the protocol that goes with it.

This Guide is designed to help you navigate, at a high level, the choices in building automation open protocols. First we examine some of the key issues involved in selecting which protocol(s) to choose, then we review each major protocol—why it was developed, who uses it, pros and cons, and any relevant application-specific or regional-specific information.

Why open protocols?

Some protocols are proprietary, but most today are open. That means their characteristics are published and may be used by anyone freely or by license. Open protocols usually have the backing of some combination of corporations, user groups, professional societies, and governments. Some protocols are regional and others global, and each has its own set of specializations and capabilities that make it preferable in certain applications.

Unlike proprietary protocols, which are owned and protected by a company, open protocols are supported by the products and services of many different companies and organizations. This provides users with a much wider choice of devices or systems that can be employed to meet specific applications or needs.

Each protocol maintains standards and certifications through its own independent organization (such as bacnet.org and lonmark.org). Guidelines are updated as technology and needs evolve.

Advantages of open protocols include:

- > Supported by multiple manufacturers, software vendors, and install/service organizations
- > Widely available third-party software for user interface, trend reports, alarming, and other applications (much like apps for 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

“...companies that use open protocols tend to have a different overall business relationship with their users, a less “possessive” attitude; they earn future business by meeting customer needs, not by trapping customers with proprietary products.”

*www.calstate.edu/cpdc/ae/gsf/documents/controls_procurement_guidelines.pdf

Some protocols are more open than others. While all open protocols can be utilized by multiple manufacturers, the technology may be fully controlled by a single vendor or restricted group of vendors. The use of the technology may require a license fee to be paid. A standard which is openly developed and may be implemented without licensing controls is considered to be fully open.

Wired vs Wireless

One essential choice is whether you will use wired or wireless communications, or a combination of both. The most common wireless options utilize a wireless-specific protocol (see pages 17-18). Most control devices—such as room controllers, occupancy sensors, ventilation fan controls, and door sensors—are available with either wired or wireless communications.

Note that we are referring here to communications. Device power is handled independently from device communications. Devices will require electrical wiring to connect to the building's power system (although some products with low energy requirements now use batteries or energy-harvesting technology for power generation).

Advantages of wireless communications include:

- > Ease and low cost of installation (especially for existing buildings)
- > Scalability through easy addition of devices
- > Compatibility usually available via gateway with wired protocols such as BACnet®, LonWorks®, and Modbus®
- > Large facilities and campuses where it's not practical to run wiring between buildings and zones

Advantages of wired communications include:

- > New construction where running wires is not a significant extra expense
- > Where high-energy equipment could interfere with wireless
- > Where performance and reliability is critical

Not an either-or decision

While there are many protocols in the building automation market, these approaches often co-exist within a single facility. Open protocols can usually communicate with each other, because gateways and APIs have been developed by the various user groups and vendors. Such integration is not as simple as using products within the same protocol, but the benefits may be worth considering.

Each protocol has its own advantages and adherents, and mixing protocols may be the most effective way to optimize a building system to particular needs and budgets. Your facilities experts or consulting partners can help you understand what approaches will work best for your requirements, goals and budgets.



A note about terminology

In network communications, the term “protocols” includes many specifications that cover both the applications (functions and data content), and the transport of information (how data is moved from one device to another).

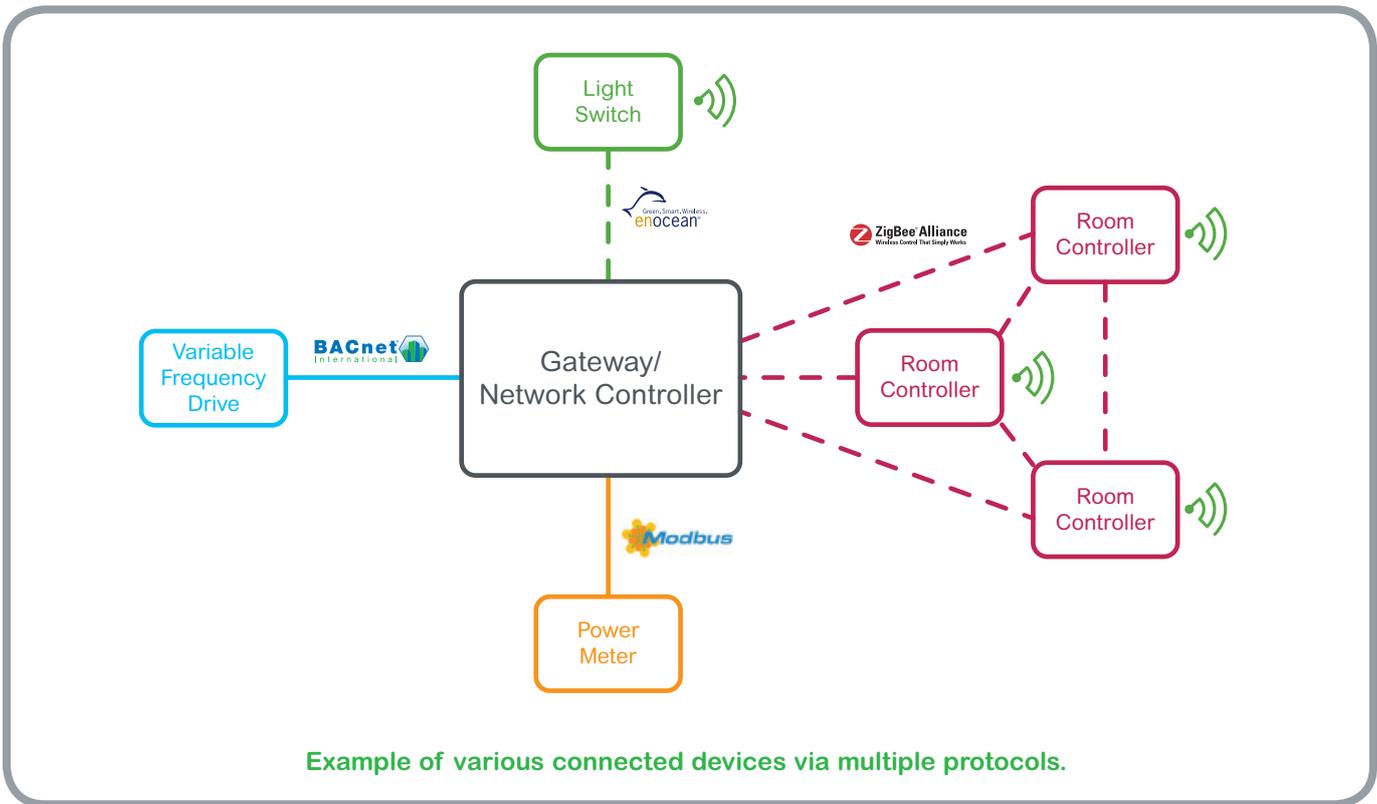
Each building automation protocol includes both application and transport standards, and they can often be mixed. For example, the BACnet application protocol can transport data using its own standard, but it can also transport data via other transport standards including ZigBee® and LonWorks.

Unless otherwise noted, this guide focuses on the application side of the protocols.

Considerations

Here are some guidelines to help decision makers find and implement a building automation solution that is right for them:

- > **Define needs and goals.** As always with technology, evaluate choices in the context of clearly stated business goals and budgets.
- > **Look for choices.** It helps to work with providers that offer a wide range of product and technology choices. This will improve the chances of finding an optimal solution for each facility.
- > **Choose distributed intelligence.** If possible, choose products that have built-in intelligence. Distributed intelligence improves network performance and reliability, and eliminates bottlenecks that can result from a single point of control.
- > **Adapt to the region.** Be prepared to deal with different standards and requirements, depending on the region. Regional considerations are included for each protocol in this guide.



Wired Protocols



BACnet

The ASHRAE BACnet® (building automation and control networks) protocol is focused exclusively on building automation. It was created in 1987 at Cornell University, Ithaca, New York, and became an ANSI standard in 1995 under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

BACnet is a worldwide standard used by more than 800 vendors across hundreds of devices. Products that meet ANSI/ASHRAE Standard 135 can communicate with each other over a network. BACnet clients must be backward compatible to ensure interoperability with multiple generations of devices within an installation.

The protocol is supported and maintained by ASHRAE Standing Standard Project Committee 135. Products are certified for compliance and interoperability through BACnet International via the BACnet Testing Laboratories (BTL). BTL Certification is available from several testing facilities, including all WSPLabs, MNB in Germany, and SoftDEL Systems headquartered in Pune, India.

Applications

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

Highlights

- > Millions of installed devices
- > Developed specifically for building automation
- > Supported by more than 800 manufacturers
- > Available in a wide range of products
- > Flexible standard allows vendors to offer unique and custom applications
- > Supported and updated by ASHRAE
- > 5 interoperable areas – data sharing, alarms and events, scheduling, trending and device management

Networking

- > Topology: Daisy chain, star, or mixed topology, depending on transport utilized
- > Media: Twisted pair (<1,500m/5,000ft recommended), fiber optics, wireless mesh
- > Transport protocols: IP, Ethernet, LonTalk, Zigbee, ARCnet, MS/TP

License

No fees

Regional relevance

BACnet complies with the ISO 16484-5 global standard, and is used in the United States, Europe, and more than 30 other countries.

Web

www.bacnet.org/

www.bacnetinternational.org/



LonWorks

LonWorks® (**l**ocal **o**perating **n**etwork) is a widely used standard for many types of control applications, including building automation. It was created by the manufacturer Echelon in 1988, and in 1999 it was accepted as a standard by ANSI for control networking (ANSI/CEA-709.1-B).

The protocol's largest application area is in building automation and is an international standard, with millions of installed devices around the world.

LonWorks is supported by LonMark® International, an independent consortium of manufacturers that promote efficient and effective integration of open, multi-vendor control systems. The organization develops standards and provides device certification.

Applications

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.

Highlights

- > Millions of installed devices
- > Developed specifically for building automation
- > Standardized applications assure consistency regardless of vendor
- > Supported by hundreds of manufacturers
- > Simple installation
- > Flexible connectivity via range of media

Networking

- > Topology: Daisy-chain, star or mixed topology
- > Media: Twisted pair (daisy chain maximum distance of approximately 2,700m/8,800ft), power lines, fiber optics, wireless
- > Transport protocols: Connects to IP-aware applications or remote network-management tools using (IP) tunneling standard ISO/IEC 14908-4 (ANSI/CEA-852)

License

Fee required (paid by product manufacturer)

Regional relevance

ISO/IEC 14908 global standard, Europe EN 14908, U.S. ANSI/CEA-709/852 and China national controls standard GB/Z 20177.1-2006, and China building and intelligent community standard GB/T 20299.4-2006

Web

<http://www.lonmark.org/>



KNX

KNX is a worldwide communication standard for home and building control. It was created in 1999 by Konnex Association (now KNX Association), and is a combination of three previous standards: European Home Systems Protocol (EHS), BatiBUS, and European Installation Bus (EIB or Instabus).

The KNX Association administers the standard, providing vendor- and product-independent commissioning software for standardized commissioning procedures (ETS). KNX Association has 396 member companies in 38 countries, offering more than 7,000 certified products for building automation, which are handled by approximately 48,000 certified KNX-partners in 138 countries. KNX Association is a non-profit organization governed by Belgian Law.

Applications

KNX is used in residential and commercial building automation for HVAC, lighting, security, remote access, blind and shutter control, visualization, and energy management.

Highlights

- > Millions of installed devices
- > Developed specifically for building automation
- > Standardized applications assure consistency regardless of vendor
- > Supported by hundreds of manufacturers
- > Tree topology appropriate for large networks
- > Choice of transmission media
- > Backward compatible with former European Installation Bus (EIB)

Networking

- > Topology: Tree, line and star topologies (or any combination)
- > Media:
 - Twisted pair (KNX TP): KNX is transmitted across a separate bus cable (recommended maximum of approximately 1,000m/3,280ft), hierarchically structure in lines and areas
 - Power Line (KNX PL): KNX is transmitted on the existing mains network
 - Radio frequency (KNX RF): KNX is transmitted via radio signals. Devices can be uni- or bidirectional
 - IP/Ethernet (KNXnet/IP): This widespread communication medium can be used in conjunction with the KNXnet/IP specifications, which allow the tunnelling or routing of KNX frames encapsulated in IP frames
- > Transport protocols: KNX communicates with other protocols via gateways

License

Fee required (paid by product manufacturer)

Regional relevance

Complies with International standard (ISO/IEC 14543-3), U.S. standard ANSI/ASHRAE 135, Canadian standard CSA-ISO/IEC 14543-3, European standards CENELEC EN 50090 and CEN EN 13321-1, and China standard GB/T 20965.

Web

www.knx.org/



DALI

DALI (**d**igital **a**ddressable lighting **i**nterface) is the leading protocol for the control of lighting in building automation. Developed by a group of manufacturers led by Phillips, the protocol was first drafted as an open standard in 2000 as an alternative to Digital Signal Interface (DSI). DALI 2 replaced the original DALI protocol in 2014 and is backward compatible with it.

DALI provides exceptionally fine-grained control over lighting, with each device being separately addressable. 256 levels of brightness are possible. Features that are or will be available under DALI 2 include remote control, integration with fire and emergency lighting systems, balancing of light output as LEDs age, and the ability to adjust lighting load based on electricity demand.

The protocol is administered by the DALI working party (AG DALI), ensuring that DALI compliant products will have the highest levels of interoperability with other DALI products. Testing can be done either by an approved test house or by DALI members themselves using DALI software.

Applications

DALI is used exclusively for lighting and related controls. DALI devices include fluorescent HF ballasts, low voltage transformers, PE cells, motion detectors, wall switches and gateways to other protocols.

Highlights

- > High signal-to-noise ratio for reliable communications
- > Fine-grained control of lighting intensity
- > Bidirectional communication enables feedback of operating state (dim level, lamp failure, etc.)
- > Free and flexible assignment of lamps for easy changes
- > Emergency lighting can be integrated in lighting systems
- > Up to 64 devices can be on a single DALI network; multiple DALI networks can be linked via gateways

Networking

- > Topology: Line or star topologies, or a combination
- > Media: A single pair of wires forms the bus for a DALI network (approximately 300m/1,000ft max); wireless extension is available
- > Transport protocols: Communicates with other protocols via gateways

License

Free to members of AG DALI; non-members can apply for a fee bearing license

Regional relevance

DALI is a worldwide standard, specified by the International Electrotechnical Commission (IEC 62386).

Web

www.dali-ag.org/



Clipsal C-Bus

C-Bus is a communications protocol based on a seven-layer OSI model for home and building automation. It was created by Clipsal Australia (now part of Schneider Electric) for the Clipsal brand of home automation and building lighting control. C-Bus became an open protocol in 2008.

C-Bus provides a great deal of flexibility in switching and control – functions can be changed, added, removed, moved, or reprogrammed at any position on the network without cumbersome hard-wiring. It uses a dedicated low-voltage cable up to 1,000m/3,000ft to carry command and control signals, making it suitable for large commercial applications.

The protocol is administered by the C-Bus Enabled Program which provides certification as well as information and support to third-party developers for the design and development of commercial products.

Applications

Usually used for lighting control, but can also control pumps, motors, and virtually any other type of electrical load.

Highlights

- > Highly robust and reliable control system
- > Interfaces to both PC-based and embedded systems
- > Devices controlled via a single cable (maximum recommendation is 100 devices per cable)
- > Simple to install and commission
- > Can control any type of load, digital and analog

Networking

- > Topology: Free topology architecture
- > Media types: Unshielded twisted pair (up to 1,000m/3,000ft)
- > Transport protocols: Proprietary (however, C-Bus allows for integration with DALI, OPC, Web Services and ZigBee)
- > Data can be transported over RS232 and TCP/IP

License

No fee required; paid license available with increased support for partners

Regional relevance

C-Bus is used in Australia, New Zealand, Asia, the Middle East, Russia, USA, South Africa, the UK and other parts of Europe including Greece and Romania.

Web

www.cbus-enabled.com/



Modbus

Modbus® is a serial communications protocol developed by Modicon (now Schneider Electric) in 1979. Originally created for use with Modicon's programmable logic controllers (PLCs), it was released as an open protocol in 2004 and has become a de facto standard for connecting a wide range of industrial electronic devices.

The Modbus protocol uses a client/server architecture to manage communication between a host and intelligent devices, especially sensors in data acquisition systems. In building automation, it is used to control equipment such as chillers, boilers, and fans. Noted for its flexible and open communications, Modbus is one of the most widely used protocols in the world.

The protocol is administered by the Modbus Organization, a group of independent users and suppliers of automation devices. The organization promotes the use of Modbus, supports users and suppliers, and certifies compliant devices.

Applications

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.

Highlights

- > Developed for industrial applications, now widely used in buildings
- > Millions of Modbus nodes in use worldwide
- > Easy to deploy and maintain
- > Offers vendors low-cost development

Networking

- > Topology: Line topology
- > Media: Two-wire, four-wire, wireless mesh
- > Transport protocols: IP, Ethernet
- > Data can be transported via ASCII, RTU)

License

No fees

Regional relevance

International de facto standard.

Web

www.Modbus.org/



M-Bus

M-Bus (meter-bus) is a European standard for the remote readout of consumption meters (heat, gas, etc.) in homes and buildings. It was developed in the 1990s at the University of Paderborn, in conjunction with Texas Instruments Deutschland GmbH and Techem GmbH, and is now widely used in many European countries for smart metering.

M-Bus makes it possible to read meters remotely from a host computer or handheld device. In building automation, M-Bus can be linked to the building system to provide integration with other systems such as HVAC and lighting. The protocol is based on the ISO-OSI Reference Model to provide openness and easy integration with other protocols.

M-Bus is administered by the M-Bus User Group, which conducts occasional seminars and user group meetings.

Applications

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.

Highlights

- > A single cable can link all meters in a building
- > Wireless version available for maximum flexibility
- > Meters are individually addressable
- > Allows meters to be installed in hard-to-access places
- > Provides integration of energy monitoring for building optimization

Networking

- > Topology: Line topology (technically M-Bus is not a network)
- > Media types: Twisted pair; wireless version available (868MHz, 433MHz, and 169MHz)
- > Transport protocols: Not defined in standard; gateways are available for IP

License

No fees

Regional relevance

M-Bus (Meter-Bus) is a European standard (EN 13757-2 physical/link layer, EN 13757-3 application layer, EN 13757-4 wireless).

Web

www.m-bus.com



OPC

OPC is a global software interface that enables the exchange of data among devices, control systems and applications from different vendors. It was originally developed in 1996 for machine-to-machine communication in industrial settings, and was limited to Windows® platforms. In 2008 a newer and more open standard of the protocol, OPC Unified Architecture (OPC UA), was introduced and has been adopted in other applications including building automation.

OPC UA is notable for its cross-platform service-oriented architecture, enabling interoperability across many types of equipment, systems, and databases. It can be thought of as a universal translator for linking disparate systems. It works with virtually every control system on the market, and can communicate with major building automation protocols such as Modbus, BACnet, and LonWorks. OPC specifications include transmission of real-time events and alarms, and interfacing of real-time data to various types of devices.

The protocol is administered by the OPC Foundation, an independent group of more than 450 manufacturers, suppliers, and integrators. The OPC Foundation oversees compliance and offers developer tools and test kits for members.

Applications

OPC UA is used in building automation to provide connectivity between different protocols. It enables different systems such as security, lighting, elevator, and HVAC to be networked using a single connectivity standard.

Highlights

- > Thousands of OPC-compliant products available
- > Allows interoperability across platforms
- > Avoids being 'locked into' a specific vendor or protocol
- > Increases options and flexibility for integrators and end users
- > Simplifies installation in heterogeneous environments

Networking

- > Topology: Server-client
- > Media and Transport: OPC client applications can communicate with OPC servers via any appropriate communication technology, such as TCP/IP, HTTP, HTTPS, or XML

License

Fee required (paid by product manufacturer)

Regional relevance

OPC is a de facto global standard used North and South America, Europe, Israel, China, Japan, Southeast Asia, and Australia.

Web

<https://opcfoundation.org/>



Web Services

Web Services are a standardized way of enabling different applications and IT systems to interact via the Internet. Web Services are actually a collection of protocols that work together to support activities such as opening files, accessing and exchanging data, and uploading and downloading information across platforms.

In building automation, 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.

The W3C Web Services Architecture Working Group defines and maintains the standard for Web Services Architecture. It should be noted that some protocols have issued their own Web Services standards. In October 2004, the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) released an addendum to standard 130-2004, called BACnet/WS to cover Web Services.

Applications

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.

Highlights

- > Extremely open web-based standard
- > Enables communication between virtually any device, system or application
- > Future-proof method of integrating and interoperating
- > Easy to implement in most applications

Networking

- > Communicates via any valid Internet connection

License

Depends on vendor

Regional relevance

Web Services are Internet-based and can be used globally.

Web

<http://www.w3.org/>

Wireless Protocols



enocean®

EnOcean

The EnOcean® standard for wireless networking was originally developed as a commercial venture of Siemens AG. It became an open protocol in 2008 when the EnOcean Alliance was formed by EnOcean, Texas Instruments, Omnicore, Sylvania, Masco, and MK Electric.

The standard specifies the use of energy-harvesting technology that does not require batteries or other power sources. EnOcean devices utilize kinetic and thermal energy-harvesting techniques such as solar cells, making them economical to use and environmentally friendly. The most typical applications in building automation are for lighting controls and sensors.

The protocol is administered by the non-profit EnOcean Alliance, comprised of some 350 member companies. The organization pursues standardization of communication profiles, ensuring that devices sharing the EnOcean protocol can communicate.

Applications

EnOcean products are commonly used in occupancy sensors, lighting controls, key card switches, and other room control applications.

Highlights

- > More than 800 certified products, most of them for building automation
- > Energy harvesting for greener operations
- > Wireless installation is low-cost and non-disruptive

Networking

- > Topology: Point-to-point communications
- > Media: Wireless
- > Generally, devices must be within 30m/100ft of each other

License

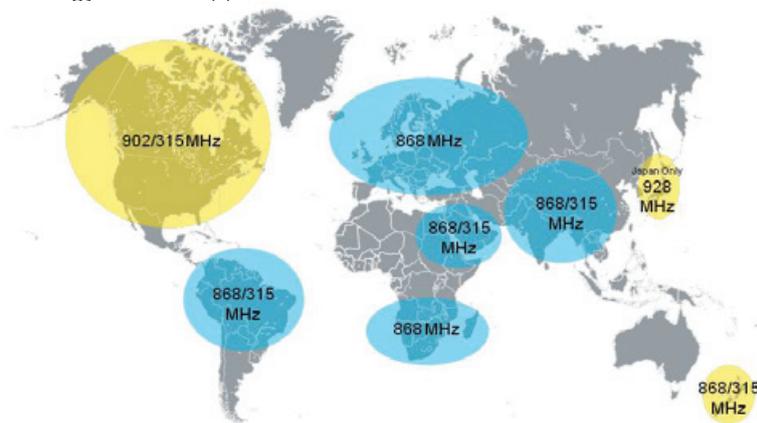
Fee required (paid by product manufacturer)

Regional relevance

EnOcean is a global standard based on International Electrotechnical Commission (IEC) standard ISO/IEC 14543-3-10 for low-energy wireless applications.

Web

www.enocean.com



EnOcean Frequency Coverage Map



ZigBee

ZigBee® is a wireless standard for home and commercial use developed by the ZigBee Alliance, established in 2002. ZigBee is based on an [IEEE 802.15.4 standard](#). The latest version of the standard is known as ZigBee Pro and was published in 2007.

A major feature of the ZigBee protocol is its mesh network topology that is self-healing and auto-routing. Mesh networks do not depend on any single connection; if one link is broken, devices search through the mesh to find another available route. This capability makes a ZigBee-based network very reliable and flexible.

The protocol is administered by the ZigBee Alliance, an open, non-profit association of approximately 400 members. The Alliance certifies products and promotes worldwide adoption of ZigBee as the wirelessly networked standard for sensing and control in consumer, commercial and industrial areas.

Applications

Typically, ZigBee devices are used as room and HVAC controllers, as well as door/window contacts and occupancy sensors.

Highlights

- > Long reach suitable for larger buildings and campuses
- > Wireless installation is low-cost and non-disruptive
- > Low power end devices can run on batteries for years
- > Secure networks using 128-bit encryption keys

Networking

- > Topology: Mesh network (self-healing)
- > Media: Wireless
- > Operates at 2.4 GHz for longer reach (up to 100m/300ft or more)

License

Fee required for commercial use. No fee for non-commercial use but membership in ZigBee Alliance required.

Regional relevance

ZigBee and ZigBee Pro are international standards based on IEEE 802.15.4.

Web

www.zigbee.org/

Schneider Electric EcoBuilding Open Protocol Matrix

		Wired Protocols											Wireless Protocols	
		BACnet		LonWorks		KNX	DALI	C-Bus	Modbus		M-Bus	OPC	Web Services	EnOcean
	Availability	/IP	MS/TP	/IP	FTT-10				RTU	TCP				
Building Management Systems	Availability													
SmartStruxure™ solution	Global	x	x	x	x				x	x			x	
SmartStruxure™ Lite solution	Global	x							x				x	x
Building Insights	North America	x							x				x	x
Building Insights Pro	North America	x							x				x	x
Light and Room Control Systems	Availability													
C-Bus Systems Offer (with controllers)	APAC						x	x				x	x	x
DALIcontrol Systems Offer	APAC						x					x	x	
KNX Systems Offer (homeLYnk and spaceLYnk)	EMEA, APAC					x								
SE7000 Series Room Controllers	Global		x		x									x
SE8000 Series Room Controllers	Global		x						x					x
Emergency Lighting Solutions	Availability													
Emergency Lighting	EMEA				x		x		Slave					
Residential Systems	Availability													
KNX Systems Offer (homeLYnk)	EMEA, APAC					x								
C-Bus Wisier™	APAC							x						x
Wisier™ Air	North America											x		x
Wisier™ Smart	Europe											x		x
Home Insight™ Cloud	EMEA, APAC	x				x	x		x	x		x		
Ulti ZigBee	APAC											x		x
Power Meters	Availability													
EM3500 Series Energy Meter	Global		x		x				x					
EM4200 Series Enercept Power & Energy Meter	Global		x						x					
BCPM	North America								x	x				
CM4000T	North America								x	x				
EM4000 Series	North America								x	x				
EM4300 Wireless Meters	Global													x
Enerlin'X Com'X (Com'X 200/210, Com'X 510)	Global								x			x		x
iEM3000 Series	EMEA		x		x				x	x	x			
E5600	North America								x					
ION6200	Global								x	x				
ION7300 Series	Global								x	x				
ION7550/7650 Series	Global								x	x				
ION7550 RTU	Global								x	x		x		
ION8650 Series	Americas								x	x				
ION8800 Series	Global								x	x				
PM3000 Series	Global								x	x				
PM5000 Series	Global								x	x				
PM700 Series	Global								x	x				
PM800 Series	Global								x	x				
PM8000 Series	Global								x	x				
Field Devices	Availability													
CWLP CO2 Sensor (Veris Industries)	Global		x						x					
HWLP Humidity Sensor (Veris Industries)	Global		x						x					
Services	Availability													
Building Analytics	Global	x	x	x	x				x	x		x	x	

The above list represents native support of each protocol. In many cases gateways can be added that enable the support of additional protocols.

For more information, contact your local Schneider Electric representative.

From the global specialist in energy management

Schneider Electric is the global specialist in energy management and automation. With revenues of €25 billion in FY2014, our 170,000 employees serve customers in over 100 countries, helping them to manage their energy and process in ways that are safe, reliable, efficient and sustainable. From the simplest of switches to complex operational systems, our technology, software and services improve the way our customers manage and automate their operations. Our connected technologies will reshape industries, transform cities and enrich lives.

At Schneider Electric, we call this **Life Is On**.



For more information, please visit www.schneider-electric.com

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