



SIEMENS

Communication in building automation

Answers for infrastructure and cities.

Introduction

The communication protocol BACnet was specially developed for the requirements of buildings. It is suited for both the automation and the management level. The emphasis is placed on building automation and control with a view to HVAC plants, fire control panels, intrusion detection and access control systems. BACnet is continually being extended for additional building-specific systems such as escalators and elevators. By integrating new IT technologies such as IPv6 and Web services, the BACnet standard is further developing into a modern, IT-friendly and multidisciplinary building protocol. At the same time, standardized ASHRAE or AMEV device profiles ensure a high level of quality and planning reliability with a strict testing and certification procedure.

Highlights

- Highest investment protection thanks to the use of the open, worldwide ISO 16484-5 standard
- Continued incremental development by ASHRAE, always focusing on the requirements in and around buildings
- Vendor-independent
- No license fees
- Guaranteed reliability thanks to independent test houses and certification bodies for BACnet devices
- Different transmission media, such as BACnet IP, BACnet LonTalk, or BACnet MS/TP can be combined and support the most flexible topologies
- Integration of the most diverse types of plants and vendors without having to use special hardware
- Siemens is involved in the BACnet organizations worldwide in order to promote the development of the standard

Siemens products featuring BACnet communication

- Desigo CC™ and Desigo Insight management stations
- Desigo PX automation stations
- Operator units PXM20
- Climatix™ lines
- Sinteso™ fire control panels
- Danger management station MM8000



Introduction

KNX is an open, worldwide standard used for more than 20 years, conforming to EN 50090 and ISO/IEC 14543, that is supported by more than 300 vendors. With KNX technology, advanced multiple disciplines as well as simple solutions can be implemented to satisfy individual requirements in room and building automation in a flexible way. KNX products for the control of lighting systems, shading and room climate plus energy management and security functions excel in ease of installation and commissioning. A vendor-independent tool (ETS) is available for commissioning. KNX can use twisted pair cables, radio frequency (RF) or data transmission networks in connection with the Internet Protocol for communication between the devices. Coordinated room and building management often demands the integration of other technologies and systems. Hence, KNX links and interfaces for connection to Ethernet/IP, RF, lighting control with DALI and building automation and control systems are provided.

Highlights

- Investment protection and interoperability thanks to the standardized, worldwide KNX standard
- Highest level of comfort and security while ensuring low energy consumption
- Matching products and systems for comprehensive room and building automation
- Straightforward connection to higher level building automation systems
- Vendor- and product-independent commissioning software provides standardized commissioning procedures (ETS)
- Choice of transmission media: KNX TP, KNX RF and KNX IP
- Corresponds to the former European Installation Bus (EIB) and is backward-compatible
- Siemens is member of the KNX Association and actively takes part in the evolution of the KNX standard

Siemens products featuring KNX communication

- Gamma building control
- Synco™ 700 heating, ventilation, air conditioning controllers
- Room thermostats RDG/RDF
- Room controllers RXB
- Gamma IP gateway KNX/BACnet N 143
- Synco living home automation system



Introduction

KNX PL-Link fully complies with the KNX standard. Communication between the room automation stations PXC3 of Desigo Total Room Automation (TRA) and peripheral devices with KNX PL-Link has been optimized within the framework of the KNX standard to the extent that plug-and-play functionality is available with automatic device recognition. KNX PL-Link devices are configured using the Desigo tools. The KNX commissioning software (ETS) is not needed.

Highlights

- Automatic recognition of devices with KNX PL-Link
- Simplest configuration of devices with KNX PL-Link using the Desigo tools
- Comprehensive portfolio of devices with KNX PL-Link for all technical disciplines in the room
- Integrated monitoring of devices with KNX PL-Link using room automation stations PXC3
- Replacement of a device with KNX PL-Link without any tools
- 2-wire standard cable for up to 64 peripheral devices in line or star topologies with a maximum line length of 1,000 m
- Feeding of up to 64 peripheral devices directly via the bus line
- Fast event-oriented communication for lighting and shading applications
- Room automation stations PXC3 allow for simultaneous integration of devices with KNX PL-Link and KNX S-Mode on a single bus line. Devices with KNX S-Mode are commissioned using ETS

Siemens products providing the KNX PL-Link function

- Room automation stations PXC3
- Room operator units QMX3
- VAV compact controllers GDB/GLB181
- Various Gamma products (sensors, presence detectors, sensor interface, etc.)
- I/O blocks RXM21/39 for ventilator convectors
- Communicative flush-mounted room sensors AQR25..



Introduction

The LONWORKS-based communication protocol is one of the most widely deployed technologies worldwide. Using the protocol, complete networks made up of interoperable products can be created. This is proven by the fact that more than 700 LONMARK®-certified products from more than 400 companies in the fields of building automation and control, traffic and energy supply are used. Owing to its worldwide use and being a global standard, LONWORKS is also of great importance to Siemens, focusing on HVAC functions in room automation and at the field level. The protocol conforms to ISO/IEC 14908 (worldwide), EN 14908 (Europe), ANSI/CEA-709/852 (U.S.) and is also standardized in China.

Highlights

- LONWORKS is suited for use with different types of transmission media, such as twisted pair cables, power line, RF, fiber optics or IP (both TCP/IP and UDP/IP), which makes it very flexible
- Straightforward installation with a choice of different cabling topologies (e.g. star or line)
- The connection of objects via bindings (e.g. standard network variables (SNVTs), standard configuration properties (SCPTs)) can be defined at the project engineering stage or can be adapted in the field. This simplifies the engineering process and helps prevent errors
- Siemens is involved in the organization LONMARK® International with the objective to protect and further develop the standard

Siemens products featuring LONWORKS communication

- Desigo RXC room controllers
- Room operator units QAX5x.x
- Climatix lines



Introduction

DALI (Digital Addressable Lighting Interface) is a standardized interface for lighting control. Electronic ballasts for fluorescent lamps, transformers and sensors of lighting systems communicate with the building automation and control system via DALI.

Highlights

- Extensive installation capacity and system flexibility thanks to the support of up to 64 electronic ballasts, 16 groups and 16 scenes
- Increased reliability owing to bidirectional communication with feedback of operating state (dim level, lamp failure, etc.)
- Polarity-free 2-wire link in line, star or mixed topology with a maximum cable length of 300 m
- Individually addressable operating units with free and flexible assignment of lamps with no need for making wiring changes
- Integration of emergency lighting in general lighting systems
- Siemens is a member of the work group DALI and participates therefore actively in the further development of the standard

Siemens products featuring DALI communication

- Desigo PXC3 modular room automation stations
- Gamma KNX/DALI gateway Twin plus N 141/21
- Gamma KNX/DALI gateway N 141/02
- Flexcon DALI controller-4, sensor, pushbutton coupler



Introduction

Worldwide leading companies operating in the field of building infrastructure have joined to form the EnOcean Alliance, aimed at implementing innovative RF solutions for sustainable building projects. Core technology is the self-powered RF technology developed by EnOcean for maintenance-free sensors, which can be installed wherever desired. The EnOcean Alliance stands for the incremental development of the interoperable standard and for a secure future of the innovative RF sensor technology.

Highlights

- EnOcean combines wireless communication with methods developed to produce energy, aimed at minimizing product maintenance and the number of batteries in use
- Standardized EnOcean communication affords access to a large number of easy-to-integrate field devices
- Siemens is an active member of the EnOcean Alliance

Siemens products based on EnOcean technology

- Room units QAX95.4, QAX96.4, QAX97.4 and QAX98.4
- EnOcean gateways for KNX and LON, RXZ97.1/KNX and RXZ95.1/LON
- EnOcean wall-mounted transmitters AP 221 and AP 222



Other communication standards

Modbus www.modbus.org

Modbus is an open and widely used de facto standard applied in a large number of application areas, such as the industrial sector, buildings, traffic and energy. The Modbus protocol is used to establish master-slave/client-server communication between intelligent devices. Using Modbus, a master (e.g. automation station) and several slaves (e.g. chillers) can be interconnected. Data transmission takes place through one of the three operating modes: Modbus ASCII, RTU, or TCP.

M-bus (meter bus) www.m-bus.com

M-bus is a European standard covering remote readout of meters and can be used with different types of consumption meters and various types of valves and actuators. Data (e.g. heat energy) can be read out electronically. In that case, transmission is serial via a 2-wire line with reversed polarity protection, from the connected slaves (meters) to a master. M-bus meters are available for the acquisition of heat, water, electricity and gas.

OPC www.opcfoundation.org

OPC is a standardized software interface facilitating the exchange of data between different types of devices, control systems and applications of different vendors. This interface is frequently used to collect the process values of third-party devices for further handling by a building automation and control system.

Web (IT standard technology)

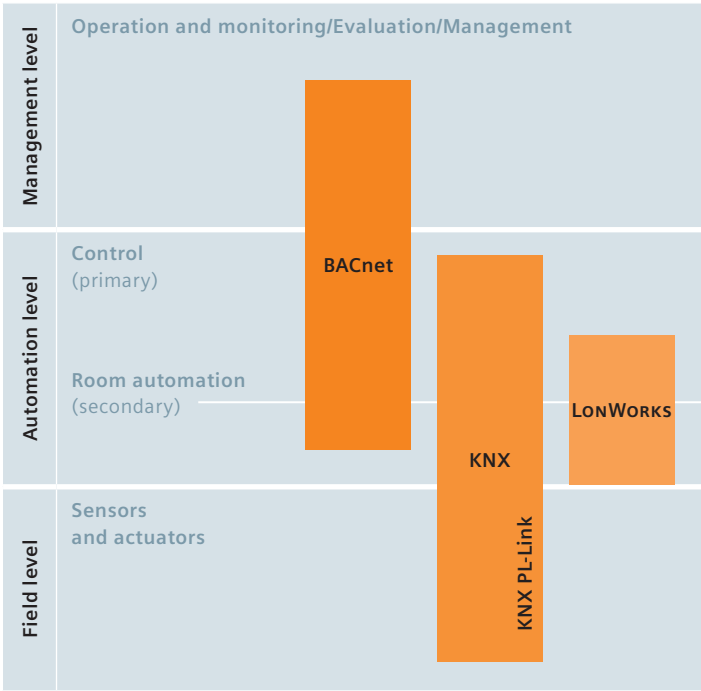
This is a generic term for a number of standardized communication protocols used in the IT world, be it within a local plant or via the Internet. Included are protocols which users work with when communicating with plants and products, such as graphic user interfaces that can be operated via Web browsers and/or touch panels, e-mail messages to service personnel, or implementation of firmware changes. In addition, this comprises an increasing number of protocols for direct communication between machines, such as the exchange of device management information, or so-called Web services for the connection of plants, even beyond the boundaries of building automation (e.g. to external building or energy management systems).

Siemens products

- Desigo management station (Web)
- Desigo SX Open, software-based integration platform (OPC)
- Desigo Touch and Web, touch panel and Web solution (Web)
- Desigo TRA, touch room operator unit QMX7 (Web)
- Desigo PX Web, Web operation (Web)
- Desigo PX Open, integration platform (Modbus, M-bus)
- Desigo TX Open, integration solutions (Modbus, M-bus)
- Gamma IP Control Center N 152, Web visualization (Web)
- Gamma *instabus* IP Router N 146/02 (Web)
- Gamma *instabus* IP Interface N 148/22 (Web)
- Webserver Synco OZW772 and LPB/BSB OZW672 (Web)

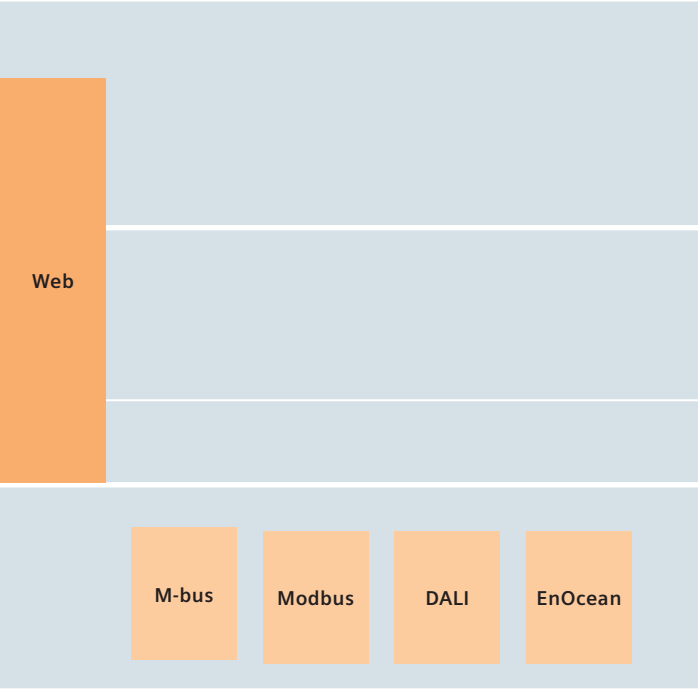
Standardized communication protocols for more economical operation

Open communication in building technology is important and facilitates the straightforward and secure integration of third-party systems at all levels. In the field of building automation, Siemens supports all communication protocols listed above, with no restriction to standards. These are communication standards that were developed for the successful creation and maintenance of projects. These make communication more secure, support efficient engineering and simplify maintenance and interoperability, thereby improving the investment protection.



The Building Technologies Division of Siemens supplies complete building automation and control systems and – in addition to heating, ventilation and air conditioning – integrates lighting, shading, fire safety and security, lifts, distribution of electrical energy and other forms of energy, etc.

Building automation and control systems from Siemens and solutions based on them make use of the standards listed above. The standardized and independent communication protocols are subject to incremental development and ensure a consistent exchange of information between devices and systems.



Highlights

- Straightforward and secure integration
- Straightforward data exchange between devices and systems
- Convenient and consistent operation
- Long-term investment protection thanks to incremental development of standards
- High level of flexibility owing to extensive support of various standards

Terms used in connection with BACnet

AMEV (Mechanical and Electrical Engineering Working Party of National, Regional and Local Authorities)	German advisory board submitting proposals for the construction industry. Mandatory for the public administration in Germany.
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, operating worldwide.
BACnet IP port	IP port number, UDP port number 47808 = 0xBAC0 is registered for BACnet.
BBMD	To interconnect several BACnet IP networks (partial networks), each of them requires a BBMD unit. Usually, the BBMD function is integrated in B-BC devices.
B-BC	BACnet building device profile, consisting of a number of BIBBs and giving a first overview of a BACnet device.
BIBBs (BACnet Interoperability Building Block)	A BIBB defines the services and procedures to be supported on the server and client side to satisfy a certain requirement of the system.
BTL	The BTL mark was developed by BACnet International (U.S.) for the BACnet Testing Laboratories (BTL).
Certification	Confirmation of conformity of a product by an independent certification body.
PICS (Protocol Implementation Conformance Statement)	The PICS document pertaining to a device lists all supported BIBBs, object types, character sets and options of communication.
UDP	In addition to TCP, the User Datagram Protocol is the most important transport protocol of the Internet family of protocols. Being a lean and connectionless network protocol, it is also used by the BACnet/IP standard where it forms the basis for efficient handling of the actual data traffic.

Terms used in connection with KNX

ETS	The Engineering Tool Software is a vendor-independent commissioning software for use with all devices with KNX S-Mode.
Group address (KNX)	Communication between KNX devices takes place via group addresses. They contain an unambiguous function or information.
KNX Association	Alliance of more than 300 companies from 34 countries that agreed on uniform telegram traffic between sensors and actuators in a bus system. Out of that, the European Installation Bus (EIB) developed. KNX is the successor organization to EIBA.
KNX IP	KNX bus communication via Internet Protocol.
KNX RF	KNX bus communication via radio frequency (RF).
KNX TP	KNX bus communication via 2-wire link (twisted pair).
Physical address (KNX)	The physical address assigns a device an unambiguous address, depending on the topology.

Terms used in connection with LONWORKS

LONMARK guidelines	Guidelines for creating interoperable LONWORKS products.
LON/LONWORKS	Local Operating Network is a decentral network. In addition, LONWORKS Network Services provide services for installation, administration, analysis and license control of LON networks.
LONWORKS	Collective term for LON technology as a whole.
LONWORKS protocol	Contains a complete description on the basis of the OSI 7 model of layers.

General terms

Conformity	Being in full compliance with the respective standard.
Interoperability	The capability of autonomous, heterogeneous systems to work together as seamlessly as possible to exchange information in an efficient and usable way, or to provide the information to the user with no need for special agreements between the systems.
IP	Internet Protocol
ISO	International Organization for Standardization.
Object	A specimen of a certain data type. Each object assumes a state, has a certain behavior and an identity. The state of the object is made up of its attributes and connections to other objects.
OSI	The OSI Model (Open Systems Interconnection Reference Model) is the layer model of the International Standards Organization (ISO). It was developed as a basis for creating communication protocols (ISO/IEC 7498-1).
Plug-and-play	Possibility to install new devices without additional configuration or user intervention.
Power Line (PL)	Connection via the AC 230 V mains network.
Protocol	Set of rules defining the format, contents, meaning and order of the messages transmitted between the various instances of the same layer.
RTU	Remote Terminal Unit
TCP	Transmission Control Protocol, part of the TCP/IP family of protocols. Being a connection-oriented protocol, TCP ensures data integrity and data flow control within TCP/IP and takes measures should data overrun occur.
Web browser	Computer programs for the presentation of Web pages or, generally, of documents and data (e.g. Internet Explorer).
Web service	Interface based on Web technologies for the exchange of data between computers on the Internet (machine to machine).

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