

iHOMES and BUILDINGS

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Lowe's Launches Connected Home Retail Product

Kevin Meagher is Lowe's vice president and general manager, Smart Home. In this interview, he describes Iris, Lowe's connected home solution.

Building Automation Prepares for the Building Internet of Things (BIoT)

CABA Launches Several New Market Research Studies

Apples and Oranges in Building Automation

When Building Automation Fails to Deliver



KEN WACKS' PERSPECTIVES

Apples and Oranges in Building Automation

By Ken Wacks

Building control systems have been evolving slowly since the introduction of the thermostat in the 1880s. A diversity of applications has been developed independently for building services such as comfort control, energy management, lighting, public address, signage, security, elevators and escalators, and power management.

I worked with the Intelligent Buildings Institute to identify a communications protocol for interconnecting these diverse building automation systems (BAS). We chose three contenders from a list of 35 protocols based on 200 criteria. I reported on this in the CABA Home & Building Automation QUARTERLY, the predecessor to iHomes & Buildings, in the winter of 1993: "The Challenge of Specifying a Protocol for Building Automation". That was more than 20 years ago, and the industry is still seeking the solution for interoperability.

So why are attempts at interconnecting BAS systems like mixing "apples and oranges"? How will the BAS industry achieve interoperability? CABA addressed this topic during the CABA Intelligent Buildings & Digital Home Forum held April 2, 2014 in Washington, DC. I moderated a discussion on "Solutions for Interoperability between Competing Standards and Protocols" with panelists:

- Toby Considine, Principal, TC9 (Chair of oBIX)
- Robin Ford, VP, Business Development, Manager, Global Caché
- Tom Lohner, Vice President, exp US Services

Protocol choices

For the past 20 years there have been industry-wide attempts to agree on unified specifications for home and building networks. It didn't happen.

Application developers seeking to deploy products for building automation must adjust to this reality. Some in our industry and government talk about developing a single standard for home automation and a single standard for

building control. My response is, "Been-there / seen-that / not likely." Instead, the focus has shifted to making devices on a diversity of networks interoperate.

International approach to interoperability

I chair an international standards committee under ISO/IEC that has been developing standards for interoperability. Our scope includes home and building systems. About 90 countries can vote on our standards.

Our goal is to lower costs for product manufacturers and to create a worldwide market for home and building automation systems. Initially we sought a uniform command set and a single interface that was network-independent. Because of market pressures, we are now focusing on a gateway to interconnect dissimilar networks and on interoperability among applications designed for these networks.

Gateway

We have written standards for communication protocols and automatic network configuration through a discovery process. In 2012, we completed standards for the Gateway and Product Interoperability. These standards can apply to some commercial buildings to support building automation.

Gateway series of standards: ISO/IEC 15045

The Gateway standards specify the architecture for a premises network to interconnect with a public network, such as the Internet. This enables the delivery of services. For example, electricity price data and/or control signals may be sent via the gateway to appliances for energy management or to an Energy Management Agent, which is responsible for allocating energy among multiple appliances.

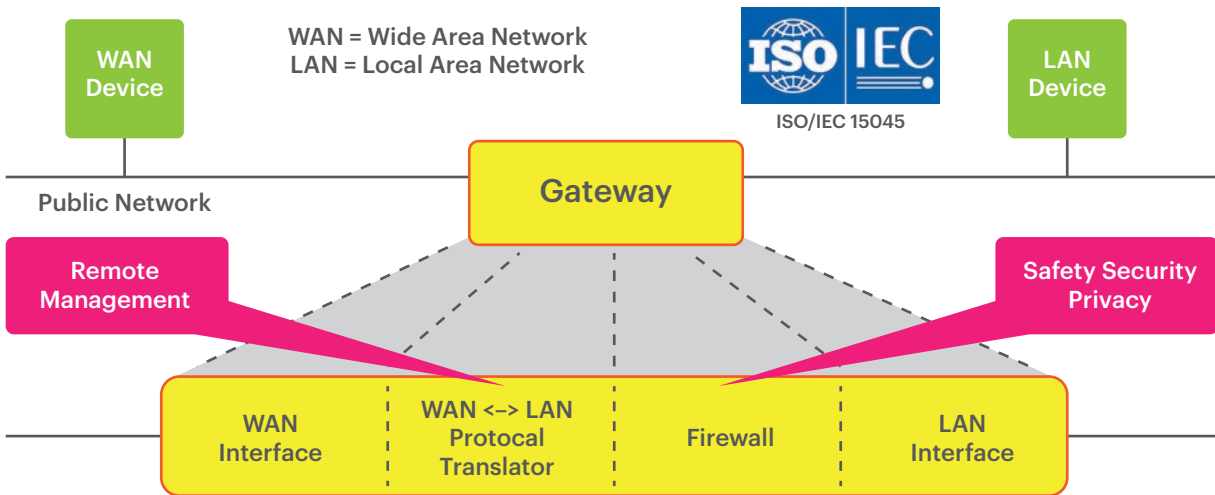


Figure 1 – International Gateway Standard

Product Interoperability series of standards: ISO/ IEC 18012

Product Interoperability standards make it possible for devices such as sensors, actuators, controllers, and user interfaces from different companies to work together for integrated applications.

As with all gateways, the primary function of the international standard gateway is to translate between Wide Area Network signaling outside the house and Local Area Network signaling inside the house. A distinguishing feature of the international standard gateway is the incorporation of a firewall in hardware and software. The firewall plays an important roll in providing security, privacy, and safety. A firewall can limit what types of messages can flow into and out of the house to ensure privacy.

This gateway standard also accommodates remote management so a service provider could configure the gateway for a specific application such as energy management. The elements of the standard gateway are shown in Figure 1.

A general-purpose gateway might include plug-in cards, as illustrated in Figure 2. This would permit adaptations for various Wide Area Networks. Options could include signaling via cable TV, digital telephone techniques (DSL), and wireless.

On the building side, cards are shown for a choice of popular networks. The Gateway Link contains the translation functions. To promote interoperability the gateway has an optional feature to interconnect dissimilar local area

networks for interoperability. The Service Module supports the firewall features of the gateway and facilitates applications.

Product interoperability options

Our international committee has decided to look at the top-level issue of product interoperability, independent of a particular protocol. We recognize that there will be multiple protocols for premises networks and products supplied

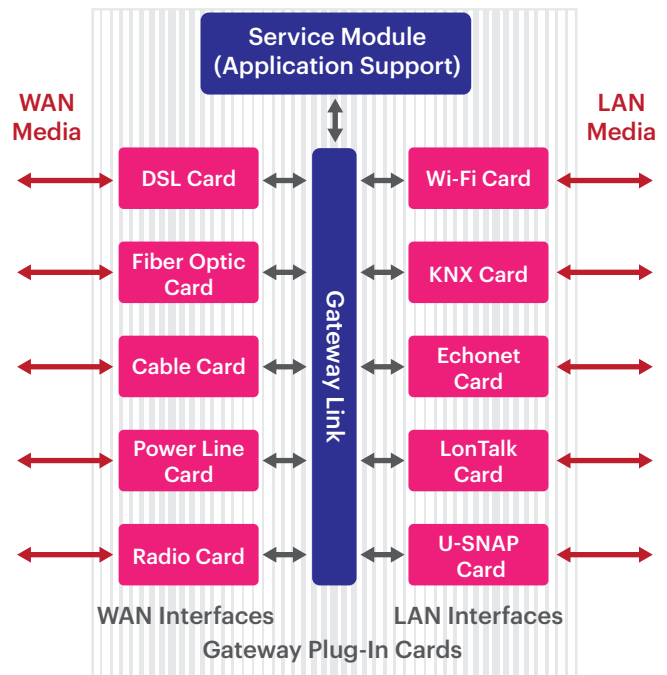


Figure 2 – A General Purpose Gateway

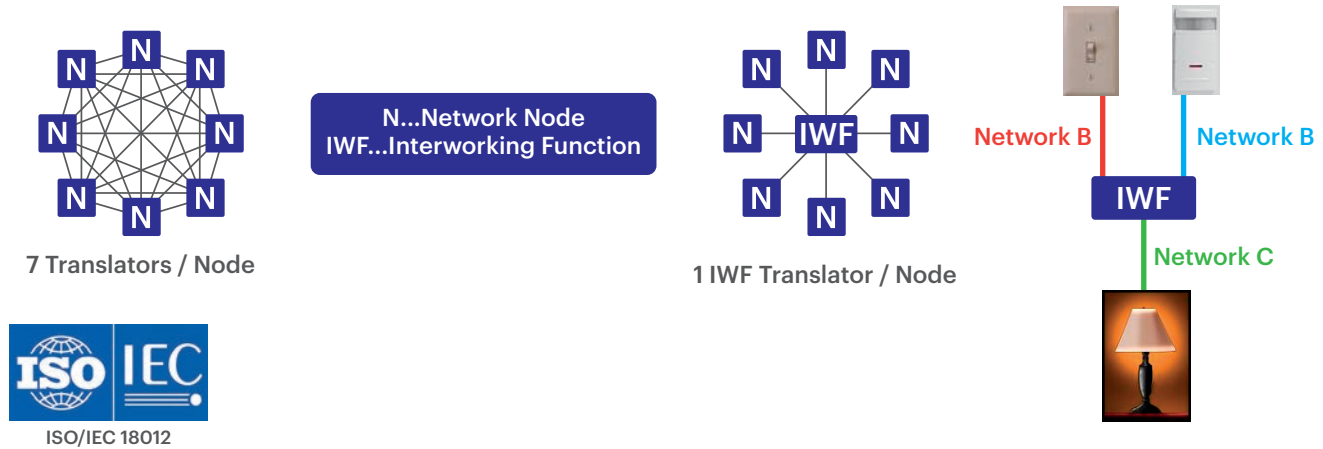


Figure 3 – Options for Product Interoperability

by a variety of manufacturers. The international standard gateway provides the mechanism for protocol translation to interconnect different networks. We identified the need for complementary standards to provide application interoperability.

The interoperability standards, based on a proposal from IBM, specify a common method to classify and to describe key functions using XML schemas. A base level schema defines primitives. Schemas specific to applications are being added.

Figure 3 highlights two fundamentally divergent methods for achieving interoperability among systems designed for different communication protocols with different message sets. In this drawing, each Node may be on a separate incompatible communications network. On the left, a message translation between every pair of nodes is required for interoperation. So each node needs to understand different message sets from seven other nodes.

On the right, each message is translated to a single common message set we call the Interworking Function for interoperation. A product maker could continue to program nodes with a proprietary message set, if they wish, and include the standard Interworking Function. At the bottom right of this figure is an illustration on how we might interconnect a switch, sensor, and lamp originally designed for three incompatible networks.

Interoperability challenges

Interoperability is a work in progress. Here are some questions yet to answered completely:

1. How will interoperability benefit customers?
 - Lower-cost equipment?
 - More equipment and service choices?
 - New service providers to manage interoperability?
 - New integrated services (e.g., lighting plus energy management)?
2. Will interoperability hurt vendor profits?
 - Will interoperability stimulate competition?
 - Will costs shift from service contracts to equipment?
3. Can all existing networks be made interoperable?
 - How can we interconnect with proprietary protocols?
 - Can all functions be mapped from one network to another?
4. When will interoperability be achieved? ●

Dr. Kenneth Wacks has been a pioneer in establishing the home systems industry. He advises manufacturers and utilities worldwide on business opportunities, network alternatives, and product development in home and building systems. In 2008, the United States Department of Energy appointed him to the GridWise Architecture Council. For further information, please contact Dr. Wacks at 781.662.6211; kenn@alum.mit.edu; www.kenwacks.com.