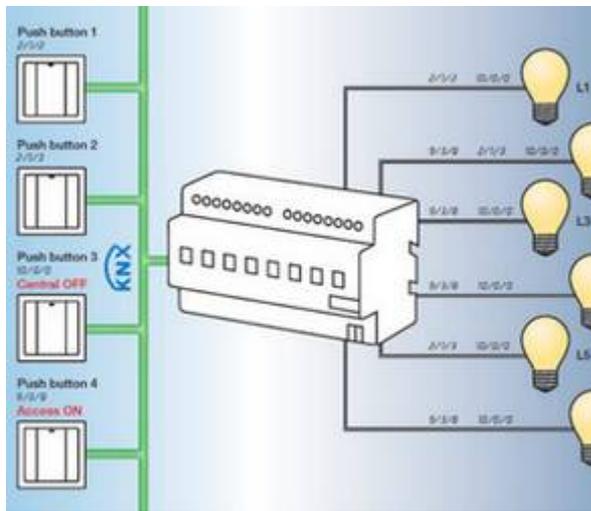


Warning to U.S. Home Automation Industry: Step Away from the KNX

Grayson Evans, who wrote the book on CEBus way back when, shares his five years of experience with the EU home automation and building control standard KNX, and considers prospects for the U.S. in advance of CEDIA Expo 2015.



KNX home automation and building control standard architecture: Control devices are daisy-chained via a two-wire bus to a main panel that connects to the powerline and the loads. (Image: [Smart Automation](#))

By Grayson Evans, September 16, 2015

The following article comes with a few caveats. I am not an expert on KNX. Everything I know about it comes from five years of personal hands-on experience with existing installations and a long history of designing and working with similar technology for building control and home automation. My experience is primarily limited to Turkey with limited exposure to systems in Germany and the U.K. - Grayson Evans, [Cinema@Home](#).

[There's a big push](#) to bring the popular European building automation standard [KNX](#) to the U.S. This year, the KNX Association is bringing a booth to [CEDIA Expo 2015](#) in October for the first time; a new company called [DMC Technology](#) recently established the country's first certified KNX training center, run by one of the world's preeminent KNX educators Marc-Antoine Micaelli; and Siemens, the only major KNX manufacturer in the U.S., wants some company.

Will the effort work? Doubtful.

To understand why, let's look at the fundamentals of KNX and the particulars of the EMEA (Europe, Middle East, Africa) home-control market, vis-à-vis the U.S.

The concept of home automation is quite different in EMEA compared to the U.S. In EMEA it is more “control” oriented (lighting, a little HVAC, blinds/curtains), whereas in the U.S. it is more entertainment oriented. This explains the popularity of KNX in Europe and the Middle East.

When I arrived in the “ME” part six years ago, everything that claimed to be “automated”, mostly commercial buildings, was using KNX as the basic technology. Since then, it has gained wide popularity in new residential construction. The odd thing is, in residential, it is seldom used for any type of automation.

There is a reason. More on that shortly.

Explaining KNX

Since it's a mixed evolution of EIB, European Home System Protocol (EHS), and BatiBus, I was familiar with the technology from my days of working on CEBus and LonWorks.

Devices that are KNX-enabled fall into two general categories: sensors (switches, light sensors, temp sensors) and actuators (relays, motors, dimmers). All devices are connected together with a two-wire differential signal bus (RS-485-like) at 9600 bits/s, plus two wires for low-voltage power.

The standard incorporates RF, powerline, IR, and other media, but I have never seen anything used other than twisted-pair.

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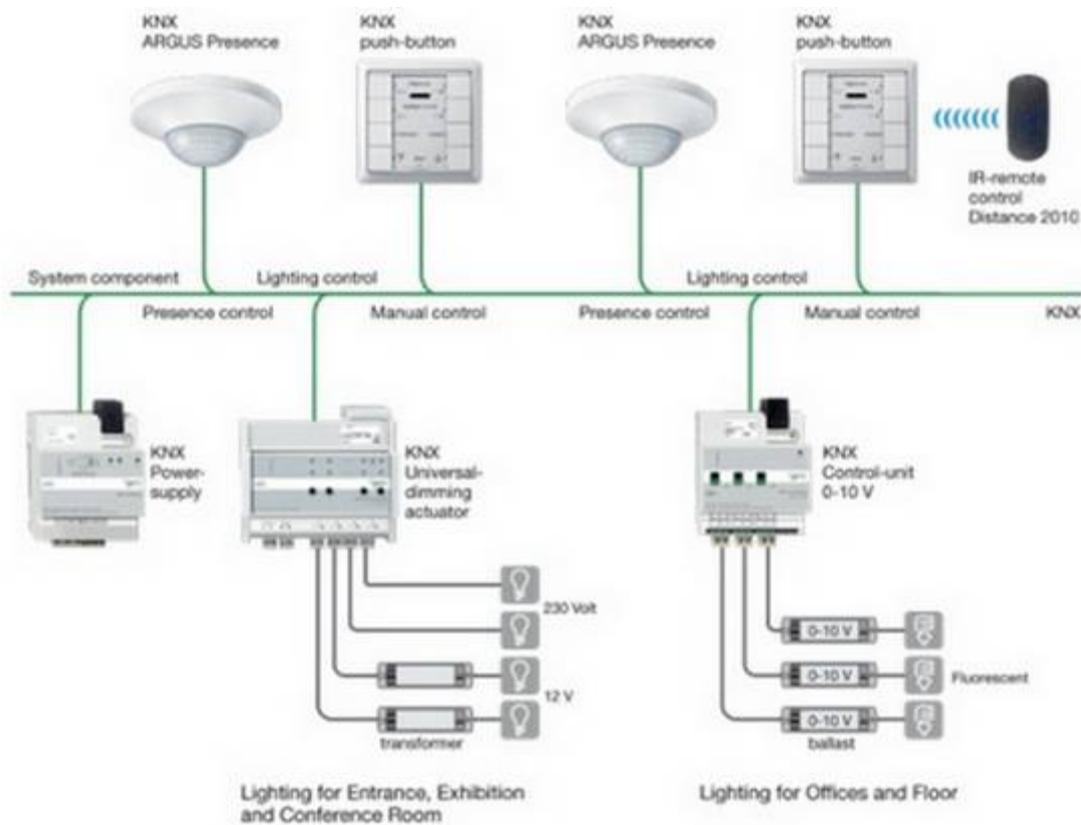
Every device on the bus has a field configured address and one or more group addresses (of which it is a member). When a device changes state, such as a light switch going from off to on, it transmits its new state to another device address or a group address. Transmitted data can be binary (0/1) or an 8-bit analog value. On the plus side, it is simple and doesn't need any type of controller.

A typical residential KNX installation looks similar to some “panelized” lighting systems in the U.S.

KNX switches are wired together, daisy-chain fashion, on a 4-wire bus back to the home's load center. There, the companion KNX lighting load modules (on/off or dimmers) are also wired to the 4-wire bus and connected with conventional 220V electrical wire to the light fixture.

During installation, a specific software application called ETS is used to give each KNX device an address and to “bind” it to another KNX device or devices. In this case, the switches send their state to a load control KNX module. Once set up, it operates no differently than conventional electrical wiring. Of course, a switch could be programmed to control a group of

loads. Switches can also receive data to their address to turn on a status LED for example. KNX-compliant devices are manufactured by every major European electrical equipment manufacturer (ABB, Siemens, Schneider, etc.)



KNX architecture (image: Schneider Electric)

KNX installations fall into two categories: standalone (no controller), or with a controller, as a subsystem of a proprietary automation system. A controller is *allowed* in a KNX ecosystem, but is not part of the standard, per se.

In either case, I have never seen KNX used to automate entertainment or more complex systems. It is always used to control lighting and sometimes curtains or blinds. There is not much HVAC control because HVAC equipment over here is a nightmare (hope that never comes to the U.S.!).

Every installation where we go into an existing home with KNX, we use an Ethernet or RS-232 bridge device to communicate with the KNX bus as a subsystem of a more complete automation project using Control4 or Crestron. These days, most of the major U.S.-based home control manufacturers offer KNX bridges.

Every European home automation system that I have encountered uses KNX as its core technology. There's no escaping it.

Old-School Software, Misplaced 'Popularity'

KNX installations are set up and programmed (Europeans always use the word “commissioned”) using ETS, a software application that runs on Windows only. It is expensive and only available from the KNX Association.

ETS and ETS training are a major source of operating income for the KNX Association. You pretty much need to have their training since the software is counterintuitive (old-school Windows app) and there is little in the way of alternative or competitive training available. I taught myself how to use it mostly from trial and error.

You might get the idea from the popularity of KNX in this part of the world, that home and building automation is widely used. However, the popularity of KNX is not exactly what it seems.

I would estimate that 80% of all commercial and 99% of all residential KNX installations I have encountered – we are usually called in to get them working correctly—are not used to automate anything. KNX simply is taking the place of conventional electrical wiring.



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There is a myth that KNX is somehow “high tech” and a home or office with KNX lighting makes the dwelling a “smart home” or “smart office”. Developers install it in high-end high-rise residential buildings to promote their projects as “smart” (gee, this never happens in the U.S.).

In reality, KNX devices are simply programmed to do the same things they would with conventional electrical wiring. There might be a few three-way switch set-ups and a switch by the entry door that turns off all the lights.

Admittedly, this is not the fault of the technology itself, but a poor understanding by builders, contractors and consumers of what the technology can do. Despite all the hype, home owners over here have no understanding of what home automation is about, and dealers have done a dismal job of explaining it.

Furthermore, due to the language barriers throughout the EMEA, training for these constituents is very limited.

Prospects for KNX in the U.S.

So can KNX adapt to a different automation model in the U.S.?

The question is really: Can it compete with other technologies in the U.S. that do the same thing and more?

If it can position itself as a standardized lighting control system, it may have a chance in that niche since there are so many competing, non-standardized lighting control technologies.

Look at the example of [Savant abandoning its LiteTouch](#) hardwired lighting-control system. Existing customers will have to update their entire system – from dimming panels to every last light switch – when any part of the system fails or falls out of favor.

In the case of KNX, they could get away with simply swapping out the central controller. That's a pretty big deal

However, KNX has many problems for custom installation companies like mine, and you should be aware of them. Admittedly, some of these are my personal opinions, but opinions formed from decades of experience with “standards”.

1. While it is a standard, KNX covers only a part of product implementation. Manufacturers are free to add proprietary functions and features to their products, and since KNX devices are quite commodity in nature, manufacturers rely heavily on variables that send/receive from only their products – much like many manufacturers do with their own “flavors” of ZigBee.

The manufacturers of KNX components are big old companies. Try to find out from Siemens what the heck some proprietary variable is in one of their products. Only Siemens authorized dealers have that info. Yes, the data sheets are on the Internet, but a lot was apparently lost in translation.

2. Seems like standards always come with trade associations to “milk” the technology, and KNX is no exception. It is simply called the KNX Association. It bills itself as “the creator and owner of the KNX technology”. Not sure what they mean by “owner” of the technology but they seem to keep pretty tight control over all things KNX.

I really don't appreciate another trade association that claims to promote a technology as “open” while at the same time claims to “own it” and keeps a lock down on the tools and training needed to promote it. Been there, hate it. If it is actually open then I should be able to purchase the software tools from several competing companies and get my training on YouTube if I feel like it.

3. Custom building wiring that locks the owner into one system is a bad idea. I can speak with some authority on this topic since I once created a company that required non-standard wiring for our home automation system. Been there, regret that.

Once a home or building is wired for KNX (daisy-chained switches on a 4-wire low-voltage bus with a single run back to the panel), the owner is pretty much stuck with it forever. A building wired for KNX can't change without a major remodel. True, this might be the case with other proprietary hardwired systems, as well.

In our work, we only use lighting or electrical device control technology that builds on conventional building wiring, such as Control4's ZigBee-based lighting or else PLC (powerline control) products. The system can always be converted back to conventional control.

4. My biggest headache with KNX is the project software. The configuration file for a project—device setup, addressing and binding—is not stored anywhere in the network. This is true of a lot of technologies. It resides on a laptop somewhere that was used to commission the system with ETS.

When I have to take over a home or office project that uses KNX, I got a big problem. ETS can print out a copy of the configuration and you MIGHT think the installation company would keep that on the site. You would be wrong of course (customer service in the “ME” is a luxury). I can use ETS to “sniff” the KNX data traffic and try to figure out what’s up when I flip a lighting switch, but this takes forever, and I still won’t know what parts of the network I’m missing.

This challenge, of course, is not unique to KNX. *Proprietary* control systems might lock up project data in a dealer-owned vault; however, KNX isn’t *supposed* to be proprietary.

5. There is also a myth over here (and I am not sure where this comes from) that KNX products are cheap. They are not, relative to similar technology. So far, few KNX products are made in China. The lighting control part of an automation project will actually cost about the same as using a Control4 wireless lighting control system (a lot due to cable and installation time). But since customers here have heard about KNX, it will usually win the project.

I was a big believer in standards. Goodness knows I spent enough years helping to develop them. But I lost my appetite for ‘em long ago. Somebody else’s idea of what you should do. The only standard I have really come to appreciate is Ethernet. It had a humble beginning and slowly grew by truly being OPEN. It works amazingly well and is now dirt cheap. Best of all, nobody owns it.

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