(Not) In Control of your Home

Bits Versus Electrons

(Not) in Control of Your Home

By Bob Frankston

I needed light on a staircase in my house. It was simple enough to install – I had my electrician simply connect a light fixture to the nearest power source and that was that. Nothing unusual until you notice I never mentioned a light switch. I simply defined a relationship between the switch and the bulb to send a message to tell the bulb to turn on and off using standard protocols on the common Internet transport.

At least that's the way it should be. But today's home control is a product of its history or, more to the point, histories with separate communities forming around control lights or home theater or particular protocol silos or families of devices. Today's home control market falls far short

of its potential because of the lack of the kind of shared infrastructure we see in the rest of the Internet.

The Internet is about simplicity and what could be simpler than a "switch"? But intelligent light switches are a far cry from the future we saw in *The Jetsons*, with robots doing our bidding. Light switches have long been at the center of home control because they are well-suited to DIY projects.

X10[i] was developed in the 1970's by British Sound Recording (BSR) in Scotland as a way to remotely control their record players[ii].

The reason X10 lasted so long is that it just turned things on and off – perhaps the most generic function. If it were smarter and built in specific functions like "next record" it would have found a limited market. The idea of remote control was not really new. The Zenith Space Command was available in 1956 to control televisions but was designed specifically for that purpose.

X10 is still used to control sprinklers, feed pets or whatever creative applications people could think of as projects. It has outlasted many "better" alternatives such as "CEBus" because it was an enabling technology (or platform) rather than a solution to a specific problem.

A Shared Platform

This is a testament to the power of having a generic platform rather than siloed solutions. For the most part customers want to buy solutions. Those of us designing systems have a responsibility to understand that we get vital synergy by building those solutions on a shared platform rather than making each one stand alone.

There are many people who will pay for an installer to create a system to control all the lights in a house or to setup a home theater in the style of a movie theater so they can sit back and enjoy the move with the whole experience carefully engineered. This is called the trophy home market where an installer carefully engineers the entire system in the same way an HVAC (Heating, Ventilation and Air Conditioning) installer designs a system. If you want a change you may have to call an installer.

While I'm wary of the experience of a friend who could no longer change the rules for the lights in house because he misplaced the setup disc it makes sense to have a specialist deal with the complexities of installing a home theater because it involves pulling wires and mounting all the components. But I draw the line at turning my door lock into a

service with a monthly fee and depending on some system in a faraway cloud if I want to change the settings.

This is why I prefer the term "home control" rather than "home automation". My home (and my life) isn't something that can operate on autopilot. What I want are components I can use to fashion my own solution.

Entertainment or, more to the point, the home theater has been another driver. In the 1950's we assembled high end Hi-Fi systems out of simple components all linked together with simple wires using standard "RCA phone jacks" – the kind we still use for analog TV signals today though, increasingly, we are using a single HDMI cable for all the signals.

What we're missing is the glue that replaces the pile of remote controls we currently need to control each of the devices separately. If I want to watch a particular program on cable TV I need to manually look up the channel and then point the set-top box controller at the right place (the STB can no sit longer on top of a TV!) and then set the TV to choose the right input.

There is lots of "glue" in the protocols used to connect devices but they tend to be proprietary or otherwise difficult to use beyond their original purpose.

IEEE-1394 was developed by the entertainment industry as a general purpose technology but was too aware of application requirements including the need for microsecond respond times thus limiting the network to 6 meters. It's a reminder of the dangers of putting intelligence into the network.

Other protocols are proprietary so as to maintain control or, sometimes, merely to fund the standards process. Verizon has a network protocol for their STB but only makes it available under a license agreement.

Insteon[iii] (which I use for 100% of the light switches in my house) is a major improvement over X10 but it shows little learning from the software and networking world. This is frustrating, but at least the protocols details have been available so I've been able to get around some of the limitations.

Like X10, Insteon is a peer protocol with devices communicating directly rather than depending on a central controller. I was able to do my own software to add functionality and do my own gatewaying but I don't depend on anything fancy. Simple is good. Simple is what makes things work.

Simple is not the same as simplistic. Simple comes from an architecture that makes everything falls in place. To put it another way, we have to find the right way to factor the problem, hence the title of my January 2013 article *Refactoring CE*.

It's easy to understand why companies invest in solving saleable solutions and benefit from tying customers to their solutions and clouds. It is better (for the provider) when the solution can be packaged as a service to provide recurring revenue. This is also true in academia where researchers are attempting to solve specific problems rather than building technologies that enable others to build their own solutions.

Commons Power

Today's internet protocol (IP) provides us a commons for exchanging bits. In theory any IP device can exchange bits directly with any other IP device without being confined to silos. This is the "Internet of Things". In practice we have a lot of work ahead of us.

The consumer electronics industry professionals as well as academics and DIYers need to understand the power of having a commons for exchanging raw bits without regard to the particular application.

Perhaps we'll see some more interest in new application protocols as IP (typically Wi-Fi) based products start to appear. Belkin's WeMo[iv] product line is interesting and in using it I immediately ran into the challenge of connecting the product to my network. Although Belkin does a better job than most at working around the misguided idea of implementing security in the network, in this case Wi-Fi authentication means a device can't "just work" and mobility is severely limited.

Another problem is that the IP address doesn't give us a stable relationship between two end points. We don't want to have to go outside the house to look up a name in the DNS just to turn on the light. We can learn from various P2P protocols and from protocols like Insteon which assigns stable identifiers to each device.

We also need a way to specify who has permission to turn on and off a light at 8PM. When I gave my printer an IPv6 address I discovered everyone in the world had access. Perimeter security (Firewalls and Wi-Fi) doesn't give us the kind of control we need and, as we saw in Belkin WeMo example, it makes everything unnecessarily difficult and brittle.

These are reasons to embrace today's IP as a starting point for innovation. It gives us a common transport we can use now and a focus for innovation. As with the web we can come up with our own variations that share a vast com-

mons. More to the point, our home networking can be the source of innovation that represents the future of the Internet as basic infrastructure for our physical world as well as our virtual world.

It's amazing how much insight one can get by doing something simple like just trying to turn on a light. Unlike amorphous problems like "home entertainment" the simple task of connecting one source (a "switch") to a provider (a bulb) forces us to think clearly.

Callouts in the article

- ➢ The Internet is about simplicity, and what could be simpler than a switch?
- ➢ X10 is still used to control sprinklers, feed pets, or whatever creative applications people can think of as projects. It has outlasted many "better" alternatives such as CEBus because it is an enabling technology (or platform) rather than a solution to a specific problem.
- ➢ My home (and my life) is not something that can operate on autopilot. What I want are components that I can use to fashion my own solution.
- ➢ Our home networking can be the source of innovation that represents the future of the Internet as the basic infrastructure for our physical world as well as our virtual world.
- ➢ Consumer electronics industry professionals as well as academics and DIYers need to understand the power of having a commons for exchanging raw bits without regard to the particular application.

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[i] http://en.wikipedia.org/wiki/X10_(industry_standard)

[ii] Do I need to explain to today's readers what a phonograph was (OK, is)?

[iii] http://insteon.net

[iv] http://www.belkin.com/us/wemo