Opinion

Can't We All Just Get Along? Interoperability in a Connected World

By Lee Gruenfeld

Let me not leave you in suspense. The answer to the question posed in the title is "No."

Sorry. Wish I had better news. But there are some very good reasons why the ideal of everything in the Internet of Things blithely communicating with all the other things isn't going to happen, at least not in the next few years, and not smoothly if it ever does.

For one thing, there's nothing "ideal" about that situation. Bringing it about would involve a set of serious compromises that would kill innovation to the detriment of consumers. We may find the proliferation of protocols like ZigBee, Z-Wave, Insteon, Powerline and Bluetooth confusing, even maddening, but each of them is very different from the others. Urging device manufacturers to settle on one or the other sounds reasonable, but it's not. It's like urging airplane manufacturers to agree on a single design whether they're making F-15s or cargo planes.

A manufacturer selecting an IoT ecosystem protocol on which to base an automated home or office system has to take into account the number of devices to be supported, how far they'll be from the hub, whether they're plugged in or battery powered, will they be separated by air or concrete, how liable to interference are they, will they be coming on and off line frequently, and so forth.

An ecosystem of home devices might look simple, but it's actually an incredibly complex, full-bore network that, 10 years ago, would have taken a team of computer science PhDs a month to configure. Now we want that network to be self-forming, self-healing, and non-interfering with other gadgets like cordless phones and garage door openers. Unplugging a connected lamp and moving it to another room may seem like a no-brainer to us humans, but to a home network it's a technological catastrophe that has to be resolved automatically (which is what "self-healing" means).

To really understand the situation, we have to dive a little into the details because the issue of "protocols" is really about two different things that tend to get mixed up in polite conversation.

The first is about radio waves, which is how wireless (not to be confused with "Wi-Fi," which is just one type of wireless) devices send signals to each other. Wi-Fi, confusingly, is also a radio standard, which of course Wi-Fi itself uses, just as Bluetooth uses its own Bluetooth radio standard. There's also 802.15.4 (can't believe nobody's made a musical about that memorable name) which, unlike Wi-Fi, uses very little power and is favored by popular approaches like ZigBee and the much-anticipated 6LoWPAN.

The multitude of radio protocols is the easier of the two interoperability issues to solve, because you can use hubs and similar bridging devices as a central control point to sort out the physical communication. (In all fairness, we should mention that the Powerline protocol uses the wiring in your house instead of radio waves to communicate with other devices. And just to further roil the already muddy waters, Insteon uses both radio waves and Powerline. So there.)

The other issue is the "language" devices use to communicate with other devices once a communication connection has been established. ZigBee, as an example, has tailored itself around various verticals, which is powerful from a control standpoint but makes it virtually impossible for it to communicate with other protocols or sometimes even other versions of itself. Insteon's "language" is far simpler, and is compatible across all Insteon versions, but to every other protocol it's speaking gibberish. And so forth.

Now you know why consumers need to be very careful when selecting devices to add to an existing system, and are often frustrated when they're unaware of this situation and wonder why their security system can't make sure the porch light stays on at night when no one's

home, or why their new leak detector doesn't even show up in their app.

The most common suggestion I hear for getting out of this fix is, "Why don't we just make everything Wi-Fi? Wouldn't that solve all of these problems?" As it happens, a lot of people in the tech industry are asking the same question.

Wi-Fi for everything might solve some problems, but it would leave us with others. Wi-Fi has tremendous range, over 100 meters in open air, and impressive bandwidth capability. But it's power hungry, which makes it unsuitable for anything battery-powered that can't be recharged frequently. It also has a limit of 32 nodes, each of which takes about a megabyte of system resource and requires a moderately powerful processor to run. Ever notice how long it takes for your smart phone to make a new Wi-Fi connection? That's because it has to go through a complex configuration sequence every time something changes or the system is powered up, a lag which in some situations isn't acceptable.

So while Wi-Fi has a large number of use cases for which it's ideal, there are many for which it's not, which is why we have all the others, each with its own particular strengths, weaknesses and fitness for a particular use. And that's why life is even more difficult and confusing for consumers who are already finding the Internet of Things difficult and confusing.

Exacerbating the problem is that major players in the home automation industry have lined up forcefully behind their chosen protocols, even forming formal alliances to push their favorites. In response, other players, including Apple, Google, Amazon and Samsung, have created their own ways (HomeKit, Weave, Alexa and SmartThings, respectively) of getting devices to talk to each other using existing protocols. Some of these are actually compatible with each other (you can operate SmartThings things with your Amazon Echo) but these are typically siloed and exclusive, few of those companies showing much interest in standardizing with their competitors. Yet other companies have created coalitions like the AllSeen Alliance, which owns the AllJoyn protocol, and the Open Internet Consortium, which has Samsung as a member, and Samsung owns Smart Things, so go try to figure that one out.

In other words, the way the industry is choosing to deal with the problems of competing protocols is by creating competing ways to resolve it. (As one of my colleagues puts it, "The great thing about standards is that there are so many to choose from.")

There are several industry consortia working on the issue right now, and there are some powerful entities involved, like Microsoft and Qualcomm. But Apple, Google and Amazon aren't part of those efforts, which pretty much tells you all you need to know about the likelihood of any definitive solution presenting itself in the current millennium. The good news is that at least all of these fierce competitors will keep innovation flowing.

The bad news, as I warned right from the start, is that the Tower of Babel has already reached the ionosphere and is only getting higher.

Sorry.

The Future of Smart: Genius or Dumb and Dumber?
Now for the good news.

There is an answer, but not to the question we're asking. We have to ask a different one.

To illustrate: Years ago I puzzled over why there was a harsh desert in Southern California just to the east of the relatively lush and verdant Los Angeles basin. Couldn't figure it out until it dawned on me that I was asking the wrong question. The entire American southwest is one vast desert. The right question is, why is there a small strip of green real estate to the west of it? And then the answer came instantly: ocean, mountains, a fresh water supply, etc.

"How do we get all of these devices to talk to each other?" is the wrong question, because there's no particular reason why we need them to. I don't care about 30 billion devices interoperating; I care about my 30 devices interoperating. How to do that is the right question. That gives us a problem we can manage, and manage well.

It can best be described by analogy to a similar, more familiar situation, the advent of personal computing. It was invented by Apple, expanded by IBM and Microsoft into a ubiquitous but chaotically messy global juggernaut, and partially corralled by Apple again. The reason the Mac concept worked so well is twofold. First, Apple created and owned the closed Macintosh ecosystem and controlled everything, where the IBM/Microsoft/

Intel model tried to play nicely with everyone. Controlling everything meant that Apple wasn't plagued by the locusts attendant to thousands of independent bits of hardware and software trying to climb onto a single platform. The word "driver" appeared nowhere in Apple user documentation (and, not incidentally, Googling "Mac + virus" got you zero results.)

Second, Apple's approach was to supply solutions, where IBM's was to supply hardware and software. "The computer for the rest of us" and "It simply works" weren't just marketing slogans; they were the genetic code of a carefully planned system. Apple had no interest in getting their ecosystem to work with everything on the planet. There was no need for it. (At least initially; as it happens, the two models starting to look a lot like each other, and now you can even run Windows on Mac computers.)

So we ended up with two robust, completely incompatible systems that fought it out for world domination by constant innovation, to the benefit of all of us. (That IBM/Microsoft/Intel initially succeeded where Apple struggled was, like the Betacam vs. VHS; more about money and muscle than merit.)

A similar situation will prevail in the Internet of Things. Getting everything to talk to everything else is not only practically impossible, it's not necessary, and attempting it will impede progress and leave us in technological gridlock.

Instead, what we need is a small handful of "uberprotocols" or consortia competing fiercely with each other. At first they'll be like IBM and Apple at the beginning, when they split their message between business/hobbyists on the one hand and education/ordinary mortals on the other but eventually were able to blur those distinctions. Each of us committed to one camp or the other, or went one way for business and the other for home. It will be the same for the IoT. I might commit to HomeKit or Weave for home, or even more simply just buy everything from Cox Homelife or Xfinity Home and leave it to the provider to figure out how everything in that constrained ecosystem works together. For business, I might go a different path, but both venues will be optimized instead of compromised.

The Apple/IBM geek vs. ordinary mortal tension will be there as well. Not to generalize too wildly, but right now IoT, at least in the home automation domain, is a hobbyist's adventure rather than a mainstream experience.

Walk into a retail establishment and chat up the home automation salesperson and you're going to hear all about protocols, configuration, pairing, hubs, and so forth.

The kinds of people most likely to be reading this article are probably thinking, "So what?" but I'll tell you so what: If we don't change the pitch, home automation is going to remain the realm of hobbyists. The competing pitch is going to be to never mention any of those things, but instead to talk about things like scenes ("When I leave home, make sure the lights are off, the alarm system is set, the heat is down, and the garage door is closed, and don't bother me with how you do it"), a completely different approach comprising different technology.

What we need is an uberprotocol focused on the experience, not the gadgets. We're overloaded with useless junk that's confusing the landscape and creating skeptics instead of adopters. We need to shift from what's possible to what matters, and create systems built around that concept.

The next big thing won't be a device; it'll be a brilliant way to get subsets of devices to talk to one another, and at the same time understand us, turning a stage full of independent dancers, all trying to one-up each other, into a tightly choreographed ballet. Earlier, I (somewhat depressingly) argued that efforts to turn the entire IoT into that ballet were futile, and I believe that. The only way to get this done is with ecosystems that start off closed, and only gradually expand following initial acceptance followed by wider adoption.

It's hard to imagine something as game-changing as an iPod, iPhone or Kindle coming onto the market (although nobody expected those, either). The Amazon Echo has already surpassed three million units in sales but it's a better incarnation of existing concepts, not a breakthrough. HomeKit, Weave, SmartThings and others are adding to the cacophony because they're new and haven't found their way yet, although they're on the right track. And, as a matter of fact, they're starting to talk to each other. The mix of "allowable" conversations is chaotic and expands almost daily, but it's happening.

If they do find their way, however, it won't be because they solved interoperability. That's a technical issue that should never even come to a consumer's attention. What they have to solve is how to get all of these devices and systems to provide real value to the people who buy them, without bothering them with arcane technical

issues along the way. If they can do that, consumers are going to cut them some serious slack in two major areas:

1. Lack of interoperability: By "cut them some slack" I mean that consumers are going to be perfectly happy buying everything from within one compatible system or from one provider.

2. Security and privacy: These are the obstacles up with which we wish we didn't have to put. It's become a mantra that a willingness to give up one or the other means you're deserving of neither, but that romantic sentiment is antiquated and, in a modern technological society, regressive. The fact is, consumers are willing, rightfully, to accept modest compromises if there's a return in the form of value.

In other words, make it worth my while and I'll buy all my stuff from within your ecosystem and let you have all the data you need to make it all work.

But we're not there yet. It's going to take some major advances in artificial intelligence (i.e., more neural network than algorithmic) to get machines to deal with the kind of all-too-human inconsistency and ambiguity to which we're all heir and have little difficulty understanding in other humans.

What we need is an "Alfred the Butler", who understands, suggests, on occasion insists, but ultimately obeys and learns.

Closed ecosystems, in which members inside each system compete against one another and the system competes as a whole against other systems, is what's going to make this all work and will answer the "right question." ●

Lee Gruenfeld is Vice President, Strategic Initiatives at Support.com.