RFID JOURNAL

An IoT Primer from a Father of the Internet

Vinton Cerf offers some words of caution and optimism.

By Mary Catherine O'Connor

Tags: Innovation, Consumer, Devices, Technology, Smart Home

May 27, 2015—I was running errands the other day and happened upon a radio broadcast of an interview with Vinton Cerf on my local public radio station. Cerf, who currently serves as Google's chief Internet evangelist, appeared on the City Arts & Lectures program to talk about the Internet of Things.

Cerf is regarded as one of the fathers of the Internet. While working at the Advanced Research Projects Agency Network (ARPANET), Cerf co-developed the Transmission Control Protocol and the Internet Protocol (TCP/IP) And in the 1980s, while working at MCI, he developed the first commercial applications of e-mail using the Internet. So it's unsurprising that Cerf, as someone who had a major role in helping to create new ways for people to communicate, has a lot to say about how the IoT is now creating ways for *things* to communicate.

"We used to joke that some day, toasters would be on the Internet," Cerf told the chuckling crowd. It was just a bit of a gag, he said, but at one trade show in the early '90s, some computer scientists did wire up a toaster and use a messaging system to remotely tell it how burnt they wanted the toast to be.

Now that the IoT has entered the smart-home lexicon and manufacturers have started adding Internet connectivity to everyday appliances, "smart" toasters have become the butt of many a smart-home joke. (And, I believe, rightly so—I've yet to find a valid reason for anyone to own a smart toaster.)

Cerf then went on to give the crowd a primer on IoT technology, explaining its roots in various industries and applications. It was an interesting interview and probably compelling even to people who do not, like me, spend a fair amount of time geeking out about sensor networks and radio protocols.

Below, I've summed up the highlights of the interview.

The origin story of the IoT in consumer appliances:
Smart toasters tend to be ridiculed, but the backstory of how manufacturers even went down that path is that it became cheaper, as the cost of computer components dropped, for manufactures to use microcontrollers in appliances instead of the complex mechanical components upon which they had long relied. But the benefits extend beyond price. "You can change software in an appliance more easily than changing an electromechanical controller," Cerf explained. "So first, you have computers in things. This sets the stage for the possibility for the appliances, already software-driven, to communicate with each other and the Internet."

The long view on data security:
There is much hand-wringing over how well or poorly various platforms and devices, from industrial applications all the way to fitness trackers for consumers, are handling data security. Cerf noted that there's a good reason for that concern: The Internet itself, at least the consumer-facing side of it, was built on a platform not designed for security.

"Personal computers were not meant to be interconnected," Cerf said. Plus, malware was born well before the Internet. Back then, he noted, malware was propagated when diskettes carrying infected code would be shared between one computer user and another. Much of this malware simply created silly results, like a special effect on a video game that made the screen look like it was melting.

It is impossible, of course, for designers of today's computing devices to consider every potential actuality or pitfall, or to safeguard against technologies that do not yet even exist. But the evolution of personal computing and early data infections holds cautionary tales for how important it is to think about, and then test, a system's vulnerabilities before—not after—deploying it.

Healthy Returns:

Cerf said he is especially bullish about the potential for the IoT to innovate how health care is administered, and he cited a few specific examples related to medical devices. "Having devices online lets you manage something on a continual basis," he explained. "For medical devices, this means you can establish a record of what is normal, to see what is not normal." When most of us go to see a doctor, we're sick. So the picture he or she sees of our health is not representative of our everyday health baseline. Using wearable devices to track your vitals, and then store this data in a place where your physicians can securely access it, could give the doctors a better understanding of the system that is your personal health, This would enable them to take a more big-picture approach to treating any given illness you might experience.

Another example of how continuous monitoring could be used in health care, Cerf said, is a current Google project in which the company is developing a contact lens with an integrated glucose monitor, to track the amount of glucose in a user's tears. "You can get the same information from tears as you'd get by taking a blood sample, but you'd get it continuously," he said, noting that this could greatly help diabetics micromanage their sugar levels—without needles.

On governance:
Cerf was asked about the role of government regulation and how we can grow the Internet of Things in a way that improves society—that is, how we can better daily lives or business processes without sacrificing basic rights to privacy and security. Cerf, who has lived in the Washington, D.C., area for most of his adult life, said the real problem is that "few members of Congress have any real technical background," and that, therefore, "some of us [technologists] are going to have to bite the bullet and run for Congress."

Cerf quickly added, however, that he's not starting a run for office.

It would probably be hard to give up that sweet gig at Google, after all.

Mary Catherine O'Connor is the editor of Internet of Things Journal and a former staff reporter for RFID Journal. She also writes about technology, as it relates to business and the environment, for a range of consumer magazines and newspapers.