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A new air interface protocol that connects RFID sensors with the EPCglobal network will play a pivotal role in realizing the Internet of Things.

By Daeyoung Kim

May 3, 2010—As I wrote in this column in the Nov./Dec. 2008 print issue, researchers at the Auto-ID Lab Korea have been working since 2005 to develop the Internet of Things, often called the EPCglobal network (see An Internet of Senses). The network allows companies to use Electronic Product Code (EPC) standards to track goods in the supply chain with passive RFID tags and share related data over the Internet. But it's limited: It can't support RFID sensors, which identify and monitor the physical conditions of things or locations, capturing and processing information about temperature, humidity, pressure or vibration. Our current goal is to integrate RFID sensors with the EPCglobal network, so we have an Internet of Things that supports both RFID-tagged goods and RFID sensors.

It's a long-term project with many challenges, but we're making progress. In 2007, we launched a project called SNAIL (Sensor Networks for All-Ip worLd) to develop a new air interface protocol that would connect RFID sensors with the EPCglobal network. We worked with an open-standard Internet Protocol (IP) to develop an IP-WSN that enables RFID sensors to communicate seamlessly with the EPCglobal network. (WSN stands for wireless sensor networks, a term sometimes used to describe RFID sensors.) The architecture extends the Low Level Reader Protocol (LLRP), ratified by EPCglobal, which specifies how RFID readers interface with the EPCglobal network. The air interface protocol also addresses issues such as security, mobility and time synchronization.

The IP-WSN is compliant with Internet standards established by the Internet Engineering Task Force (IETF). EPCglobal just needs to adopt the protocol, but it must ratify the LLRP for IP-WSN as a standard. We verified its feasibility in tests in the Korea Advanced Research Network (KOREN), a research environment for the development of network technology. We also created a prototype of the expanded EPCglobal network at the RFID/USN Korea 2009 international exhibition in October, and demonstrated how the new air interface protocol supports integration of RFID sensors.

We are now working to expand the information processing architecture of the EPCglobal network. For example, the Application-Level Events (ALE) software standard, which directs how data from Gen 2 EPC tags is collected and filtered, also needs to be able to manage data from RFID sensors. And the EPC Information Services (EPCIS), which enables companies to securely exchange RFID and related product data in real time with their business partners, must be able to store sensor data.

There's still much work to be done to create the Internet of Things. The Cambridge Auto-ID Lab and other research organizations are contributing to its development. Integrating RFID sensors into the

EPCglobal network brings us one step closer to achieving our goal.

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