RFID for Consumer Electronics

The consumer electronics industry has long considered RFID for tracking laptops, mobile phones and other devices, but several concerns have prevented widespread adoption. The business case called for item-level tagging, for example, but that presented challenges. Some RFID labels couldn’t be read on metallic surfaces, for instance, and others could be easily removed or duplicated.

Technology providers developed a solution coined “Interactive Gen 2”: a passive RFID integrated circuit (IC) embedded within the consumer electronic device’s printed circuit. The manufacturing process is cost-efficient, and the device’s serial numbers are secure because they are invisible from outside the unit. In addition, instead of the device’s metal surface interfering with the ability to read the RFID label, it can serve as an extension of the tag antenna, often improving performance.

But the solution’s most unique characteristic is the universal I2C (inter-integrated circuit) serial interface, which enables direct communication between the RFID IC and the device’s microprocessor. This “bridge” feature enables a myriad of new applications.

To understand the benefits of this bidirectional communication, let’s look at the Ucode I2C, an ultrahigh-frequency EPC Gen 2 chip from NXP Semiconductors. The RFID IC includes a conventional Tag Identifier (TID) and a unique TID (a permanent and unalterable serial number, useful for authentication and anticounterfeiting applications).
Now, here’s where the bridge feature comes into play. Say, for example, you manufacture laptops. After each laptop passes final inspection, you can instruct its microprocessor to disable the device, rendering it useless if stolen. To do this, you use an RFID reader to send instructions to the RFID IC, which passes the information via the I2C interface to the microprocessor. At final distribution or point of sale, you

upload an authentication key to the RFID IC, which sends it to the microprocessor; assuming it's the correct key, the microprocessor enables the device. Adoption of this scheme would, no doubt, deter theft.

Consumer electronics retailers benefit as well. To boost sales, a retailer could offer software-configurable upgrades, such as increased speed or enhanced graphics, and use a reader to make these changes while the laptop is still in its factory-sealed carton. Similarly, firmware patches could be uploaded to fix a software bug, and if a device is intended for a global market, a language preference could be set. For a special touch, the retailer could upload a personalized message on wallpaper.

The bidirectional communication bridge could also enhance return management, a benefit for manufacturers, retailers and consumers. If, for example, a laptop's hard drive fails, an error log is created and stored within the I2C. At the repair center, a technician could use a reader to collect the serial number and error log to determine the problem and verify warranty status.

Embedded Interactive Gen 2 solutions are designed to address the technology concerns voiced by consumer electronics manufacturers and retailers, enabling conventional track-and-trace applications—and much more.

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