THE AUTO-ID CENTER

AN OPEN INITIATIVE SUPPORTED BY SUN MICROSYSTEMS

KEY HIGHLIGHTS

Technologies:

- Electronic Product Code (EPC)—Unique numbering scheme for every object in the world
- Object Name Service (ONS)—Network directory to link EPC codes to databases
- Physical Mark-up Language (PML)—Organizes information about physical objects

Applications:

- Supply chain—Inventory reduction, improved availability, enhanced quality and freshness
- Security—Counterfeit protection, theft prediction
- Consumer—Smart washing machines, refrigerators, ovens
- Environment—Recycling

Sun Microsystems has joined other global companies in supporting the Auto-ID Center, a not-for-profit research organization based at the Massachusetts Institute of Technology (MIT) in Boston, with a sister lab at the University of Cambridge in England and further expansion on the drawing board. Led by a diverse team of scientists and researchers, the Auto-ID Center is developing the next generation of the ubiquitous bar code and the Universal Product Code (UPC). Created 25 years ago for the Uniform Code Council by MIT and major corporations including Gillette and Procter & Gamble to provide an open standard for product labeling, the bar code has helped businesses reduce costs, increase efficiency, and drive innovation for the benefit of consumers, manufacturers, and retailers. However, the code has reached its limits. The new technology will be built on the Electronic Product Code (EPC), which is embedded in an extremely low-cost memory chip.

The mission of the Auto-ID Center is to merge the physical world with the information world by setting standards for smart objects. By bringing bits and atoms together, the project can help create an environment where connectivity is not limited to computers, but also includes everyday objects, linked together and communicating in real time, all of the time. This will help transform the way products are made, distributed, marketed, purchased, consumed, replenished, and recycled. When the new EPC standard is introduced, it will enable products ranging from airplane engines to bottles of shampoo to be linked to the Internet.

The Benefits of Auto-ID Technology

This new technology can offer great benefits to corporations and consumers alike, including:

- **Product authenticity**—Distributors and retailers may be able to confirm, with pinpoint accuracy, whether or not the goods on their shelves are authentic.
- **Product availability**—Every manufacturer can have true “produce-to-demand” capability, enabling them to eliminate excess inventory by drawing on the latest intelligence about purchasing trends.
- **Greater efficiencies**—By combining produce-to-demand capability and inventory reduction, while reducing manual stock keeping, the supply chain could save billions of dollars.
- **Enhanced recycling**—Coding packages as cardboard, aluminum, or plastic could help simplify waste management and recycling efforts.
- **Improved customer service**—Businesses can efficiently produce customized products on demand, manage special requests, and reduce the time and cost of delivering goods to market.
- **Innovative product features**—Companies can automatically download cooking instructions to an intelligent microwave, or life-saving dosage information to an intelligent medicine cabinet. This will enable the bundling of services and products.

How Auto-ID Technology Works

The EPC will provide even more detailed information than the UPC, because instead of a unique ID for a *group* of products, the EPC creates an ID for each *individual* product. This ID is embedded on a memory chip (smart tag) that utilizes Radio Frequency Identification (RFID) to connect the object to the Internet. Costing no more than a few cents, these tags will be applied to individual products during the manufacturing process. In turn, the tags will communicate their EPC codes to radio frequency reader devices located in plants, warehouses, stores, and homes. (See Figure 1.)

When a smart tag is scanned by a reader, it will wirelessly echo back a unique code. The reader will use this code to discover product-specific information provided by the product's manufacturer on a public Internet site. This information will be stored in the Product Markup Language (PML) standard format, allowing a human operator, the radio frequency reader, and devices linked to the reader to interact intelligently with the product. (See Figure 2.)

PML is a derivative of the well-known XML markup language for describing physical objects to the Internet, similar to the HyperText Markup Language (HTML). An Object Naming Service (ONS) tells computer systems where to find information about any object that carries an EPC code. ONS is based on the Internet's existing Domain Name System (DNS), which routes information to appropriate Web sites. However, the ONS has the capability to be many times larger than the DNS, because Auto-ID technology can identify millions of manufacturers, each with more than one million individual products. ONS will serve as a lightning-fast post office that locates data for trillions of objects carrying an EPC code. To encourage widespread adoption, both ONS and PML will be open standards, just like the UPC bar code.

Reinventing the Supply Chain

By creating an intelligent, automated supply chain (which may account for up to 75 percent of a product's cost), the EPC is capable of saving companies billions of dollars, while enabling them to quickly react to consumer needs. Because the EPC unites all elements of the supply chain, it creates an interactive, dynamic cycle—from raw material, distribution, purchase, recycling, and back into raw material or reusable components. Fewer products will be wasted, and manufacturers will be able to develop environmentally friendly products based on real-time feedback from each element of the cycle. Products wearing smart tags will interact with each other, consumers, and manufacturers, forming an optimally efficient supply and demand process.

For example, EPC tags embedded into products will allow stores to pinpoint, in real time, batches of ground turkey that need to be recalled, helping to reduce health risks to consumers. Monitoring smart recycling centers will help manufacturers determine how to make environmentally friendly products. Theft can be reduced because RFID readers can detect and report stolen or counterfeit products.

Benefits to consumers will be equally dramatic. Shoppers will be able to point scanner-equipped cell phones at a product and learn about its features from the manufacturer's Web site. Shopping may no longer involve long lines at the checkout counter, because items will be automatically scanned and billed to the customer's preselected personal account. And smart shelves will tell manufacturers when to restock items, so stores can reorder in time to prevent running out.

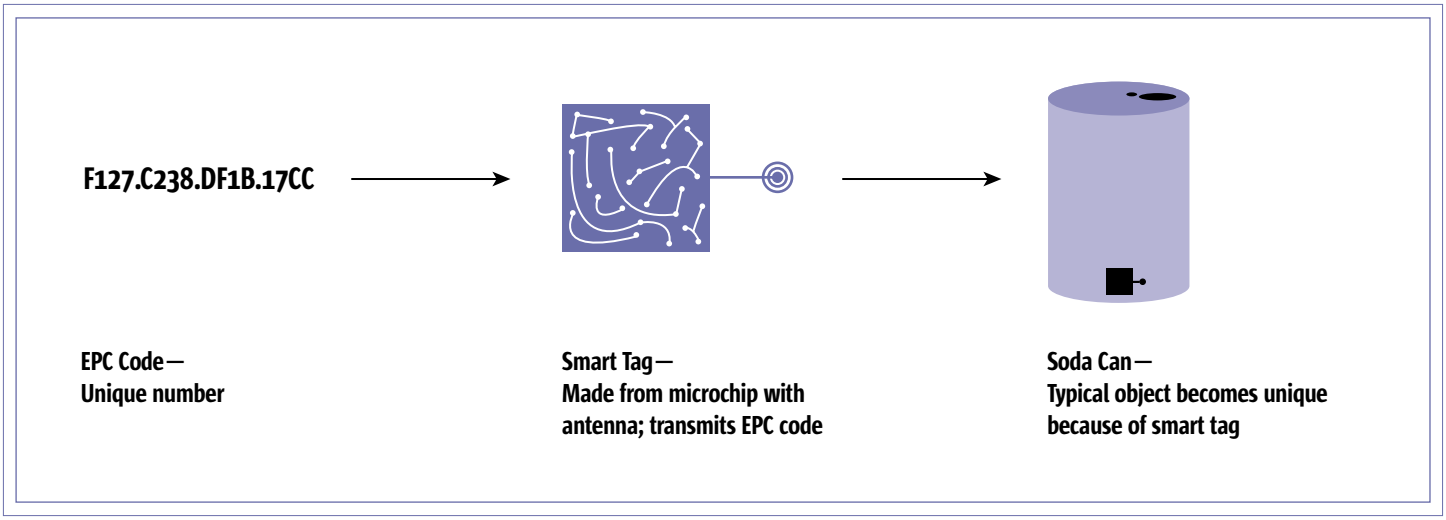

Figure 1. How Auto-ID Technology Works

A Unique, Collaborative Research Effort

With a staff of 48 scientists, engineers, and graduate students, the Auto-ID Center brings global business leaders together with the world's leading researchers. Major companies, including Sun Microsystems, support the Auto-ID effort because the potential business advantages of this new technology are so clear. The Center's sponsors include such global companies as CHEP, EAN International, Gillette, International Paper, Procter & Gamble, Pepsi, Pfizer, Philip Morris Group, Philips, SAP, Sun Microsystems, Tesco, UCC, Unilever, United Parcel Service, U.S. Postal Service, and Wal-Mart. To enable this open standard to meet the needs of global organizations, it is important that every company support the Auto-ID initiative.

About Sun Microsystems

Since the company's inception in 1982, a singular vision—The Network Is The Computer™—has propelled Sun Microsystems to its position as a leading provider of industrial-strength hardware, software, and services that power the Net, connecting anyone, anywhere, anytime, on any device. Sun's binary-compatible product line stretches from desktop workstations and ultra-thin, rack-mountable servers to enterprise-wide storage arrays and massive, high-integrity systems. The products and technologies of the Sun™ Open Net Environment (Sun ONE) provide the tools enterprise customers and service providers need to create, assemble, and deploy a new generation of Web-based services. Sun's support of the Auto I.D. Center is part of its long-standing effort to invest in the future every day.

For More Information

To find out more about the Auto-ID Center and the benefits of becoming a sponsor, please visit www.autoidcenter.org.

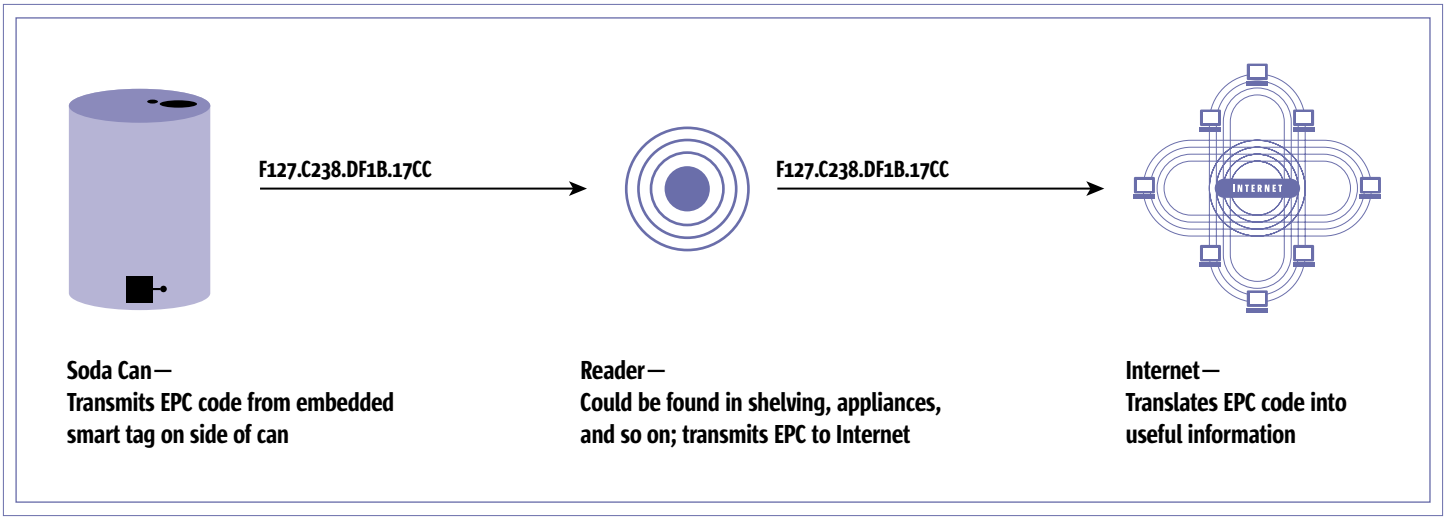

Figure 2. Transmitting EPC Codes

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