

# The Auto-ID Center

An open initiative supported by Sun Microsystems.



## Key feature highlights

Enables a wide array of benefits, including:

- Increased labor efficiencies
- Improved order reconciliation
- Increased product availability
- Reduced inventories
- Improved demand forecasting
- Reduced product shrinkage
- Improved asset visibility and tracking
- Improved customer service and convenience

Designed around existing and emerging industry standards, such as:

- Electronic Product Code (EPC)
- Savant System Interface
- Object Name Service (ONS)
- Physical Markup Language (PML)

Provides increased functionality and capabilities for a variety of application in virtually every industry, including key industries such as:

- Retail
- Consumer Goods
- Manufacturing
- Transportation and Logistics
- Healthcare
- Life Sciences
- Government

## Auto-ID: Identify Any Object, Anywhere, Automatically

Automatic Identification — or Auto-ID — refers broadly to technologies that can help computers identify everyday objects. Enabling computers to automatically recognize and identify everyday objects will in turn enable those computers to track and trace the objects, trigger events, and even perform actions on the objects themselves.

The application of Auto-ID technology will provide enterprises with an unprecedented real-time view of their assets and inventories throughout the supply chain, thereby enabling significant gains in their operational efficiencies. Although ideally suited for supply chain management-type applications, Auto-ID technology has applications in any industry that can benefit from better asset tracking, tracing, and management.

## The Auto-ID Center and Sun

The standards for Auto-ID technology are presently being defined and driven through the Auto-ID center, a unique partnership between more than 98 global companies and six of the world's leading research universities. Founded in 1999, the Auto-ID Center is an independent, not-for-profit global research organization headquartered at the Massachusetts Institute of Technology. The Center has sister labs at the University of Cambridge in England, Adelaide University in Australia, Keio University in Japan, Fudan University in China, and St. Gallen University in Switzerland. The Auto-ID Center's vision is of a world where computers will be able to identify any object, anywhere, instantly.

Sun Microsystems became an early sponsor of the Auto-ID Center in June 2000, and presently chairs the center's Technology Board as well the Software Action Group. In this role, Sun, with its long history of successful involvement and expertise in driving industry standards, is actively leading the efforts to drive Auto-ID technology standards in general and help define the Auto-ID software standards in particular.

For the past 25 years, the Universal Product Code (UPC) — popularly known as the bar code — has been the primary means of identifying products. Designed 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. To this end, the bar code has served its purpose well. However, it has several shortcomings.

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The bar code is a line-of-sight technology that can only read products one at a time, that is, a scanner has to “see” the bar code to read it, which means people usually have to orient the bar code towards a scanner for it to be read. Additionally, the bar code can only track product categories. This means, for example, that the bar code cannot distinguish between a can of soda and another of the same brand and make.

The Auto-ID Center would like to address these shortcomings and more through the development and promotion of a newer set of standards and technologies. These standards and technologies will enable the creation of an open, global network for identifying goods, with the potential to make companies vastly more efficient and profitable. The new Auto-ID technology will be built around a new standard — the Electronic Product Code (EPC) — that is capable of uniquely identifying and distinguishing between similar objects. Just as the UPC code is encoded onto bar codes, the EPC will be encoded onto low-cost Radio Frequency Identification (RFID) tags that can be used to tag everyday objects with a unique ID that can then be scanned “wirelessly.”

The mission of the Auto-ID Center is to define the standards that will help in the development and deployment of infrastructure to create a universal, open network for identifying individual products and tracking them as they flow through the global supply chain. This will help transform the way products are made, marketed, distributed, purchased, consumed, replenished, and recycled.

### The Benefits of Auto-ID Technology

Auto-ID technology can offer substantial benefits to corporations and consumers alike, including:

- **Greater Efficiencies** — By combining produce-to-demand capability and inventory reduction, while reducing manual stock keeping, the supply chain could save billions of dollars.
- **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.
- **Product Authenticity** — Distributors and retailers may be able to confirm, with pin-point accuracy, whether or not the goods on their shelves are authentic.
- **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.
- **Enhanced Recycling** — Coding packages as cardboard, aluminum, or plastic could help simplify waste management and recycling efforts.

### Technologies

In order to ensure operational ubiquity, Auto-ID technology will adhere to and employ new standards, including:

- **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 Markup Language (PML)** — Organizes information about physical objects
- **Savant** — A system based on a distributed architecture that will manage the flow of EPC information in a way that doesn’t overload existing corporate and public networks

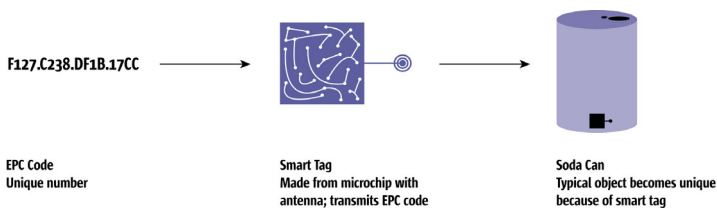
*Applications*

Auto-ID technology has applications in virtually every industry such as:

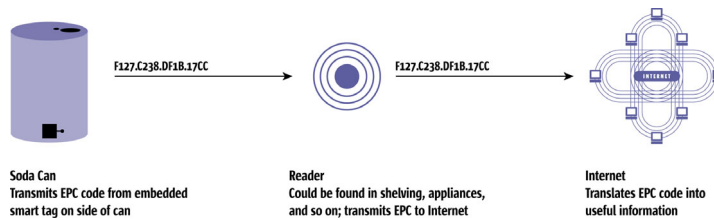
- **Retail** — Product availability, improved demand visibility, reduced product theft and shrinkage, reduced inventories, and customer convenience
- **Consumer Goods** — Improved quality control, lot tracking, counterfeit protection, product recalls, supplier management, and government regulations
- **Transportation and Logistics** — Automated data capture, asset utilization and tracking, volume planning automated sorting, shipment route tracing, contract pricing verification, and reduced claim costs
- **Healthcare** — Hospital asset management, tracking medication, and environmental monitoring of samples

**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 in a tag that utilizes Radio Frequency Identification (RFID) to connect the object to a network. These tags, which cost no more than a few cents, 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, and stores (see Figure 1.)



When a RFID tag is scanned by a reader, it will wirelessly echo back its unique code. The reader will use this code to discover product-specific information that will reside remotely in a data repository that is accessible only to those entities with the right privileges. This information will be stored in the Product Markup Language (PML) standard format, allowing applications, humans, and devices linked to the reader to interact intelligently with the product. (See Figure 2.)



PML is a derivative of the well-known XML 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, ONS has the capability to be many times larger than 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.

## The Auto-ID Center

### Reinventing the Supply Chain

In an increasingly competitive global market, the difference between a successful enterprise and one that is not will be the relative efficiency with which enterprises manage their respective supply chains. 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 also enabling enterprises 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, to distribution, to purchase, to 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 with RFID tags will enable more timely interactions between manufacturers, retailers, and consumers to create an optimally efficient supply chain.

For example, RFID-tagged products will allow stores to track the location and size of inventories in real time; better monitor demand for certain products and place orders to prevent an out-of-stock situation; and prevent batches of bad produce from being sold.

Benefits to consumers will be equally dramatic. In the future, shoppers may be able to point RFID scanner-equipped cell phones at a product to learn more about its features from the manufacturer's Web site. Shopping may no longer involve long lines at the checkout

counter because items could be automatically scanned for billing. And smart shelves could notify the store when a stocked item is running low, and even automatically reorder the product in time to prevent the store from running out of it.

### A Unique, Collaborative Research Effort

With a staff of 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 Carrefour, EAN International, Gillette, International Paper, Johnson & Johnson, Kraft, Pepsico, Pfizer, Philips, Procter & Gamble, SAP, Sun Microsystems, Target, 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.

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### About Sun

For years, customers have turned to Sun Microsystems to help them expand their business, lower their costs, and gain competitive advantage. Sun is a leading provider of industrial-strength hardware, software, services, and technologies that make the Net work.

For more information on Sun, please visit [sun.com](http://sun.com).

### For More Information

To learn more about the Auto-ID Center, visit [autoidcenter.org](http://autoidcenter.org).

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