

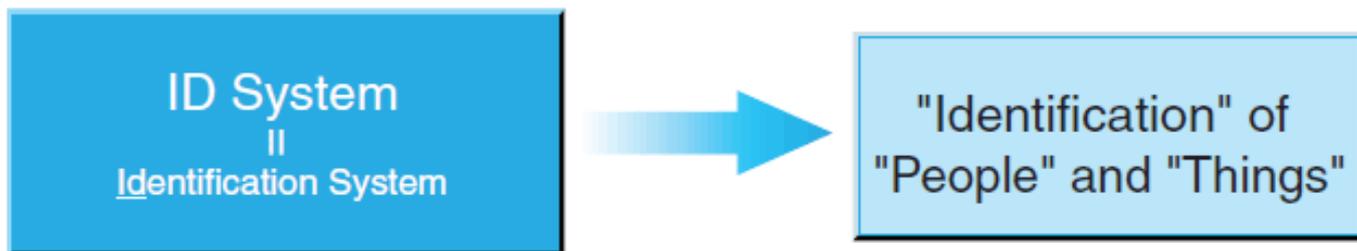
# RFID Systems

RFID Systems enable non-contact reading and writing of data. Also called electronic tags, IC tags, ubiquitous ID systems, and RF tags, RFID Systems enable non-contact reading and writing of data.

## What is an ID System?

ID system stands for the Identification System. It is a system to read and identify information on people and things, including AIDC (Automatic Identification & Data Capture).

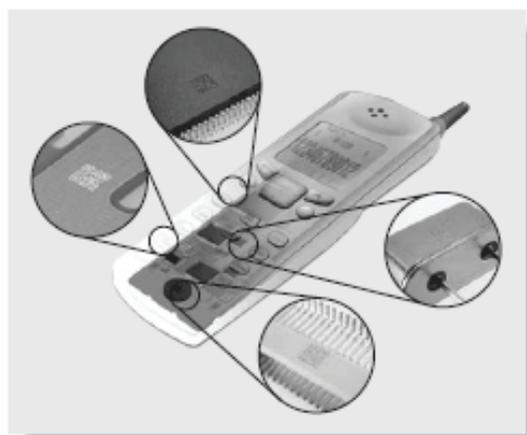
AIDC uses devices that combine hardware and software and does not require human intervention to identify information obtained from media such as barcodes, 2 dimensional codes, RFID systems, iris, fingerprints, voice etc.



## Barcode/2 Dimensional Code Applications

Barcodes are also known as linear symbols, and 2 dimensional codes are also known as 2 dimensional symbols. Barcodes are attached to food and commodity in a variety of industries such as retailers, distributors, logistics company where the automation has been introduced.

Meanwhile, 2 dimensional codes have become common to catch up with the expansion of information control as well as to save space.



## RFID System Applications

RFID System is an abbreviation of Radio Frequency Identification System. It is an "Identification system using wireless communication" that enables transferring data between "RF Tags (or Data Carriers)" that are held by men or attached to objects and "Antenna (or Reader/Writers)". It is a kind of radio communication system.



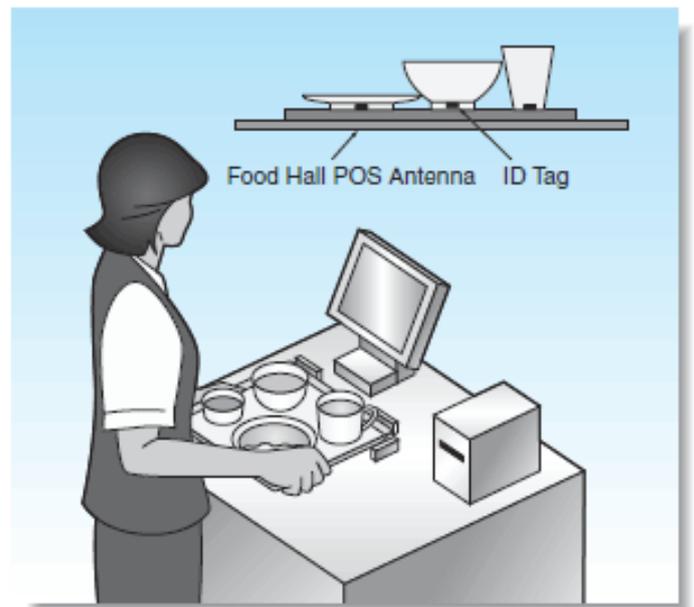
Examples of such a system that may be familiar include the "electronic ticketing system at train stations" and "touchless gate system on ski lifts".

In these examples, tickets or lift passes are RF tags and the ticket gate or ski lift is an antenna.

Such systems are also used for the automatic payment in food halls. In this case, every food item has an RF tag attached to it, and an antenna is inside the table on which the food tray is placed when making payment.

This makes it possible to not only automatically calculate the price of the food, but also automatically display information such as total calories.

Recently, this kind of system has gained a lot of attention to realize a ubiquitous society.



## What is an RFID System?

An RFID system makes it possible to read and write data without contact, using electromagnetic or electric waves. Information can be read irrespective of the quality or surface condition of the item to be read. The large communication area helps to achieve high reliability in communication. The implementation of a RFID makes it possible to "unite items with their information", which allows for the creation of a highly flexible and highly reliable system.



Definition of "RFID" by Japan Automatic Identification Systems Association (JAISA)

1. Portable size
2. Information is recorded on an electronic circuit
3. Contactless transmission is performed

JIS Definition of "RFID"

A generic name for a device where data is read and written in a semiconductor memory with contactless transmission over short distances, using inductive electromagnetic field or waves.

## Major Features of an RFID System

### ***Able to Read and Write data without direct contact.***

RF tags can store data as much as max. 8000 bytes enough for the production control. All of the data required for each process (process history, inspection history etc) can be freely stored, without the need for direct contact. This makes it possible to develop paperless sites, where the causes of production stop are reduced.

### ***By "combining an item with its information", a highly pliable and reliable system configuration becomes possible.***

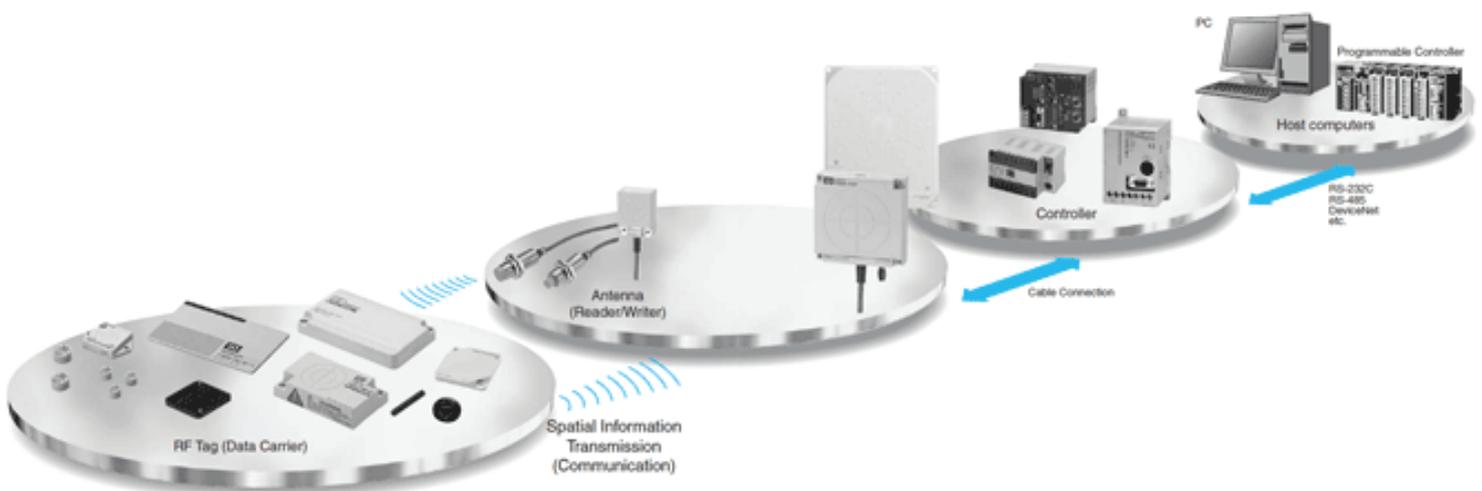
With the technology to decentralize information, the load on higher systems is reduced. This means that system development costs can also be reduced, systems can be implemented significantly faster, and the system is much more flexible when making changes. Also, "the unification of items with their information" for each process and site can make it possible to manage production/processes and product quality without errors. And, with the latest information contained in RF tags, work can continue offline in emergencies, significantly shortening the time required to restore processes.

### ***With the adoption of space transmission technology and protocols, highly reliable communication is made possible.***

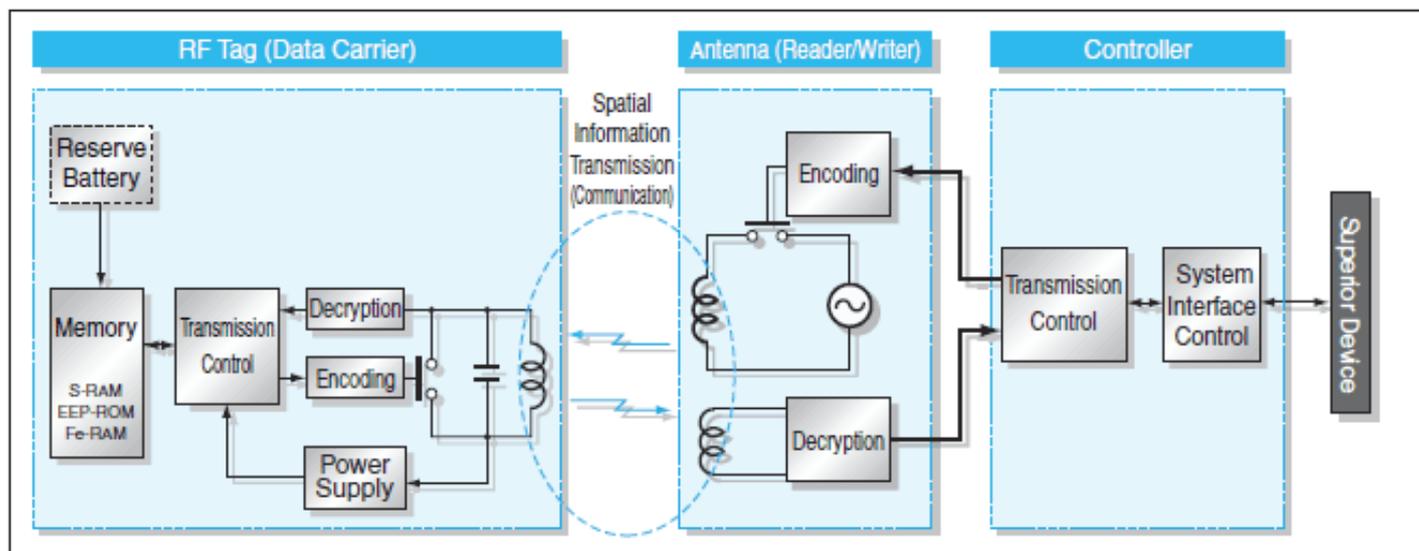
As opposed to barcodes which simply look for 1 or 0, advanced space transmission technologies and specialized protocols are employed for transmission through the air. 16 bits CRC is added to the information as it is transmitted. More than 18 bits Burst errors can be detected at a ratio of 00.9985%, providing a very high reliability in the transfer. Also, since there are no mechanical devices involved such as with the Raster Scan method for barcodes, the likelihood of malfunction and other problems is greatly reduced.

### ***Reading and writing is possible without line of sight, using electric and electromagnetic wave transmission.***

Unlike barcodes, since communication occurs by means of electric and electromagnetic waves, erroneous readings due to dirt, moisture, oil etc are cancelled out. Even if there is dust, moisture etc., or anything other than metal between the antenna and the RF tag,. it will not affect transmission. And since the communication range is wide, there is no need for extreme positioning which can greatly reduce the time and cost of design.



## RFID System Function Block Diagram



## Type of Spatial Transmission

