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An introduction to **RFID**

RFID Basics and Glossary 2020

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What is RFID?

The term RFID refers to Radio Frequency Identification, a technology which uses radio waves to automatically identify items or people. Most commonly this involves the use of an RFID tag and a reader device.

How does an RFID system work?

In general terms, Radio Frequency Identification systems consist of an RFID tag (typically many tags) and an interrogator or reader. The interrogator emits a field of electromagnetic waves from an antenna, which are absorbed by the tag. The absorbed energy is used to power the tag's microchip and a signal that includes the tag identification number is sent back to the interrogator.

What are the benefits of RFID over traditional ID technologies such as bar-coding and human readable formats?

RFID technology can offer many benefits over more traditional approaches. Specific benefits are dependent on the type of RFID technology that is used and the application of the technology. Some benefits that may be recognized in utilizing RFID are:

- Faster read rates

- None line of sight reading

- Multiple tag reads

- Programmable and re-programmable tags

- Enhanced security functionality

What is the difference between low frequency, high frequency and ultra high frequency RFID solutions?

Unsurprisingly the key difference between these solutions is the frequency at which the interrogator emits a field and at which the tags are operational. Through a combination of physical limitations and development profiles these technologies provide different functionality and benefits. For example HF tags can typically only be integrated at a distance of up to 0.8m (2.6ft) whilst UHF tags can be read up to 30m (98ft) from a reader. This said, HF tags typically use larger silicon chips, which provide greater security functionality than current UHF solutions.

What is the difference between Passive and Active RFID solutions?

Again the clue is in the terminology, passive RFID tags work on the basis that they absorb the power from the reader and use this to empower the microchip to reflect a modulated signal. Active tags contain a battery, which powers the chip and transmits to the interrogator. As a consequence passive technology tends to be significantly lower cost but restrited to modest read distances, whereas active solutions are capable of reading over hundreds of meters.

What read distances can I expect from my RFID system?

Read distance is very much driven by the technology that is implemented (frequency of the RFID

system) and the specific components that are put into use. As a guideline:

- LF passive — 0–0.5m

- HF passive — 0–0.8m

- UHF passive — 0–30m

- Active — 50m+

I've heard that RFID tags can't be interrogated when placed on metals and liquids, is this true?

Yes, traditional LF and HF tags do not function on metals and traditional UHF tags do not function on metals or polar liquids (such as water). This is due to tag detuning as a result of coupling between the tag and object to which it is attached. The Omni-ID technology that alleviates this issue offers a fundamentally different approach to passive UHF tag design.

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Aa

Active Tag	An RFID tag that uses a transmitter to return information as opposed to reflecting a signal back from the reader as many passive tags do. Most active tags are battery powered, though they may gather energy from other sources. Active tags can be read from up to 300 feet.
Air Interface Protocol	Rules that govern how RFID tags and RFID readers communicate.
Antenna	The conductive element to send and receive tag data. Passive low- frequency tags (135 kHz) and high-frequency tags (13.56 MHz) use a coiled antenna that couples with the coiled antenna of the reader to form a magnetic field. Readers have antennas that are used to emit radio waves. The RF energy from the reader antenna is harvested by the tag antenna and used to power the tag microchip to reflect back its signal back to the reader.
Antenna Gain	The power ratio at the input of a loss-free reference antenna to that supplied to the input of the given antenna to produce, in a given direction, the same field strength at the same distance. Expressed in decibels. The higher the gain the more energy output. Higher gain antennas can read RFID tags from farther away.
Anti-Collision	A general term used to cover methods of preventing radio waves from one device from interfering with radio waves from another. Anti-collision algorithms are also used to read more than one tag in the same reader's field.
Applicator	A label-printing device to print and apply pressure-sensitive labels to RFID tags. Pressure sensitive labels consist of a substrate and an adhesive. Used for shipping, content, graphic images or complying with standards such as UPC or GS1.
Asset Tracking	The most common RFID tag application. RFID asset tagging increases asset utilization, identifies the last known asset user, reduces lost items and automates maintenance routines. Association for Automatic Identification and Mobility: Global trade association that provides products and services related to data collection, automatic identification, and information management systems.
Association for Automatic Identification and Mobility	Global trade association that provides products and services related to data collection, automatic identification, and information management systems.
Authentication	In RFID, identify verification or authentication is used in two ways. In non-contact smart cards or other payment systems the RFID reader must ensure the transponder is a valid device and is not being used with the intent to commit fraud.
Auto-ID Center and Labs	A non-profit collaboration between private enterprise and researchers for the development of a global tracking network using RFID tags carrying Electronic Product Codes (EPCs). The center closed in Sep. 2003. The center's research continues at Auto-ID Labs in universities around the world, and is headquartered at the Massachusetts Institute of Technology.
Automatic Identification	Methods to collect an enter data into computer systems without human involvement. Technologies normally considered part of auto-ID include barcodes, biometrics, RFID and voice recognition.

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Automatic identification and data capture	A broad term that covers methods of identifying objects, capturing information about them and entering it directly into computer systems without human involvement. Technologies normally considered part of auto-ID include bar codes, biometrics, RFID and voice recognition.

Bb

Backscatter	RFID tags using backscatter technology reflect radio waves at the same carrier frequency back to the tag reader, using modulation to transmit the data.
Base station	An RFID tag reader that is connected to a host system.
Battery-Assisted Tag	These RFID tags incorporate batteries and use the battery power to run the tag circuitry and sometimes an onboard sensor. They communicate with the tag reader using the same backscatter technique as passive tags though they have a longer read range because all of the energy gathered from the reader is reflected back to it. Also known as semi-passive RFID tags.
Beacon	Active or semi-active RFID tags programmed to broadcast a signal at set intervals.
Biometrics	Techniques designed to recognize and authenticate the identity of people based upon one or more intrinsic physical or behavioral traits (e.g., fingerprints and retinal patterns). Because biometric traits cannot be lost or forgotten like passwords and are impossible to copy or distribute, they make very effective identifiers if they can be read accurately.
Bistatic	A bistatic RFID interrogator or reader uses a one antenna to transmit energy to the RFID tag and a different antenna to receive reflected energy back from the tag.

Cc

Card Operating System	Software in a smart card that manages the basic functions of the card, such as terminal communication, security management and data management.
Checksum	Code added to a data block on an RFID chip that is checked before and after data transmission from tag to reader to evaluate whether data has been corrupted or lost.
Circular-Polarized Antenna	A UHF reader antenna that produces radio waves in a circular pattern. As the waves move in a circular pattern, they have a better chance of being received, though circular polarized antennas have a shorter read range than linear-polarized antennas. Used in situations where the orientation of the tag to the reader cannot be controlled.
Closed-Loop Systems	RFID tracking systems where the tracked item never leaves the companyís control and the system does not have to use open standards.
Commissioning	The process of writing a serial number to a tag and associating that number with the tagged product in a database.

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Compatibility	RFID systems are compatible if they employ the same protocols, frequencies and voltage levels and are able to operate together within the same overall application.
Compliance Label	A label that indicates conformance to industry standards for data content and format. Compliance labeling standards ensure a similar labeling approach that clearly defines the label format, usage, and the information to include on the label. There are no RFID compliance labeling standards yet but some consider bar-code labels with embedded UHF EPC tags as compliance labels.
Conducted Power:	The RF power supplied by an RFID system to the antenna. It is measured at the cable to antenna connection. In the U.S., Federal Communication Commission regulations limit maximum conducted power to 1 watt.
Contactless Smart Card	A credit card or other card incorporating an RFID chip to transmit information to a reader without having to be swiped.

Dd

Data Carrier	A medium for storing machine-readable data, such as bar codes and RFID tags. May also refer to the carrier frequency for data transmission.
Data Field	RFID chip memory assigned to a particular data type. Data fields may be protected or written over. For example, a data field might contain information about where an item should be sent, and when the destination changes the new information is written to the field. A protected data field could be used to store an Electronic Product Code, which doesnít change during the life of the product it's associated with.
Data Retention	RFID tags can retain data for over 50 years depending on temperature, humidity and other factors.
Data Transfer Rate	Number of characters that can be transferred from an RFID tag to a reader over a specified time. Baud rate defines how quickly readers can read information on an RFID tag, and is different from read rate, which refers to how many tags can be read over a specified time.
De-Tune	When a UHF antenna is placed close to metal or metallic material, the antenna can be detuned to better receive RFID waves of a certain length from a reader so that the RFID tag can be read, but results in poor performance. OMNI-ID tags do not need to be de-tuned.
Dead Tag	An RFID tag that cannot be read by a reader.
Dipole	Antenna consisting of two straight electrical conductors or "poles". The antenna is typically 1/2 wavelength from end to end. In an RFID transponder the antenna is connected to a microchip.
Dual Dipole	An antenna that contains has two dipoles. The goal of the dual dipole design is to reduce the tag's orientation sensitivity.
Dual Interface Smart Card	A card containing a microchip that can be read either when in contact with a reader or read remotely using radio waves.

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Dumb Reader	A tag reader with limited computing power that converts radio waves from a tag into a binary number, passing it to a host computer with little or no filtering.
Duty Cycle	Length of time a tag reader is set to emit energy. European Union regulations permit tag readers to be on no more than 10 percent of the time.

Ee

Effective Isotropic Radiated Power (EIRP)	A measurement of RFID tag reader antenna output which is used in the United States and elsewhere, usually expressed in watts.
Effective Radiated Power (ERP)	A measurement of the output of RFID tag reader antennas used in Europe, usually expressed in watts.
Electrically Erasable Programmable Read-Only Memory (EEPROM)	A method of storing data on microchips where bytes can be individually erased and reprogrammed. More expensive than factory programmed RFID tags where the number is written into the chip silicon during manufacture, but offers more flexibility because the end user can write an ID number to the tag at the time the tag is going to be used.
Electromagnetic Interference (EMI)	This occurs when the radio waves of one device alter the waves of another device. Cells phones and wireless computers may produce radio waves that interfere with RFID tags.
Electronic Product Code	A serial number created by the Auto-ID Center that will complement barcodes. The EPC identifies the manufacturer, product category and individual item.
Electronic Seal	A method of sealing a digital document in a manner similar to that used for electronic signatures. Electronic seals enable computers to authenticate that documents or electronic messages have not been altered, providing a level of security in digital communications.
Electroplating	The process of using electrical current to coat an electrically conductive object with a thin layer of metal. The primary application of electroplating deposits a layer of a metal with a desired property onto a surface lacking such a trait. Electroplating can also be used to build up the thickness of undersized parts.
Encryption	Altering data so that it cannot be read by those for whom it is not intended. In RFID systems encryption is used to protect stored information or to prevent the interception of communications between RFID tag and reader.
EPC Discovery Service	An EPCglobal Network service that allows companies to search for every reader that has read a particular EPC tag.
EPC Generation 2	The standard ratified by EPCglobal for the air-interface protocol for the second generation of EPC technologies.
EPC Information Service	A network infrastructure that enables companies to store data associated with EPCs in secure online databases with different levels of access.

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EPCglobal	A non-profit organization set up by the Uniform Code Council and EAN International, the two organizations that maintain barcode standards, to commercialize EPC technology.
Erasable Programmable Read-Only Memory (EPROM)	Non-volatile memory in an RFID tag that can be erased by exposure to intense ultraviolet light and then reprogrammed.
Error Correcting Code	Code stored on an RFID tag to enable the reader to determine the value of lost or scrambled data.
Error Correcting Mode	A mode of data transmission between RFID tag and tag reader so that errors or missing data is automatically corrected.
Error Correcting Protocol	A set of rules used by tag readers to interpret data from the RFID tag correctly.
European Telecommunications Standards Institute (ETSI)	An independent, non-profit organization that defines telecommunications standards for Europe. Responsible for standardization of broadcasting and related areas, such as intelligent transportation, medical electronics and RFID.
Event data	Information related to a significant business transaction or event, such as products leaving a manufacturing facility or equipment leaving a construction site.
Excite	Tag readers ìexciteî a passive tag when the reader transmits RF energy to activate the tag and cause it to transmit data back to the reader.

Ff

Factory Programming	Some read-only RFID tags must have their identification number written into the microchip at the time of manufacture. This is known as factory programming. That data cannot be overwritten or modified.
False Read	When a tag reader reports the presence of an RFID tag that does not exist. Also called a phantom transaction or false read.
Far-Field Communication	RFID tags farther then one full wavelength away from the tag reader are said to be "far field," while those within one full wavelength away are ìnear field.î Far field signals decay as the square of the distance from the antenna, while the near field signals decay as the cube of distance. Passive RFID tags that use far field communications (UHF and microwave systems) have a longer range than tags using near field communications (low- and high-frequency systems).
Field Programming	RFID tags with non-volatile EEPROM memory can be programmed after they are shipped from the factory so that users can write data to the tag once it is placed.
Fixed Reader	An RFID interrogator mounted to a permanent or non-mobile structure enabling users to read RFID tag numbers attached to movable items.
Folded dipole	A dipole antenna in which the two poles are connected to each other, as well as to the microchip.
Form factor	The transponder packaging type: thermal transfer labels, plastic cards, key fobs, etc. Forward Channel: Energy path from the tag reader to the RFID tag.

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Forward channel	Energy path from the tag reader to the RFID tag or the reverse link is from the tag back to the reader..
Free air	Reading an RFID tag that is not attached to anything.

Gg

Geographical Information System (GIS) Software	For recording, analyzing and managing geospatial data (data referenced to a fixed location). With GIS software users can run queries, analyze spatial information, and create maps.
Global Commerce Initiative	Founded by manufacturers, retailers and trade industry associations to improve international supply chains for consumer goods through collaborative development and EAN International/Uniform Code Council standards and best practices, including use of EPC.
Global Data Synchronization (GDS)	The process of matching a manufacturerís master files with retailerís product information. GDS is a prerequisite to deploying RFID in open supply chains to ensure that RFID serial numbers refer to the correct database product information.
Global Location Number (GLN)	A numbering system developed by EAN International and the Uniform Code Council as a way to identify legal entities, trading parties and locations to support electronic commerce. GLNs can identify functional entities (e.g., a purchasing department), physical entities (e.g., a particular warehouse) and legal entities or trading partners (e.g. buyers or sellers).
Global Trade Item Number (GTIN)	Standardized system of identifying products and services created by the Uniform Code Council and EAN International. Product identification numbers, such as EAN/UCC -14, are based on the GTIN.

Hh

Harvesting	The way passive RFID tags gather energy from RFID reader antennas. High-Frequency: This is generally considered to be from 3 MHz to 30 MHz. HF RFID tags typically operate at 13.56 MHz. They can be read from less than 3 feet away and transmit data faster than low frequency tags but consume more power.
High-frequency	This is generally considered to be from 3 MHz to 30 MHz. HF RFID tags typically operate at 13.56 MHz. Can be read from less than 3 feet away and transmit data faster than lowfrequency tags but consume more power.
Hybrid card	A smart card that has both a no-contact IC and a contact IC, so that a hybrid card acts as two separate cards.

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Ii-Kk

Induction Loop	A coil-wire transceiver used when doing RFID reads in the presence of metal. Inductive Coupling: The transfer of energy from one circuit to another through mutual inductance. In RFID systems using inductive coupling, the tag reader antenna and the RFID tag antenna each have a coil which together forms a magnetic field so that the tag draws energy from the field to change the electrical load on the tag antenna. The change is picked up by the tag reader and read as a unique serial number.
Inlay	"Unfinished" RFID labels, as they are a chip attached to an antenna and mounted on a substrate. Usually sold to label converters who turn them into smart labels. Also known as inlets.
Input/Output Port	Connections on an RFID reader for external devices. An output device could be a panel that opens when a tag is read. An input device could be a photoelectric eye to turn on the reader when an object breaks the beam.
Intelligent reader	A reader that can filter data, execute commands and perform functions similar to a personal computer.
Intentional Radiator	A device that produces an RF signal for the purpose of data communications. Examples are cordless phones and door openers.
Interoperability	The ability for RFID tags and readers from different vendors to communicate. Interoperability testing assesses the ability of different systems to exchange information and use the data that has been exchanged.
Interrogation zone	Area in which a tag reader can provide enough energy to power up a passive tag and receive back information. Also known as the read field or reader field. RFID tags located outside the interrogation zone do not receive enough energy from the reader to produce a signal strong enough to be recieved by the reader.
ISO 10536	International standard for proximity cards.
ISO 14443	International standards for proximity smart cards.
ISO 15693	International standard for vicinity smart cards.
ISO 18000	International standards for the air interface protocol used in RFID systems for tagging goods in a supply chain.
ISO 7816	International standards covering smart cards physical and electrical characteristics and communication protocols.
ISO/IEC 24730	Standard that defines two air interface protocols and a single application program interface (API) for real-time locating systems (RTLS) for asset management. It is intended to allow for compatibility and encourages interoperability of products for the growing RTLS market.

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Isotropic	Isotropic antennas radiate energy equally in all directions.
Item-Level	The tagging of individual products, as opposed to case-level and pallet-level tagging.

Ll

Label Applicator	A device for applying labels. Some label applicators can print bar codes and encode RFID transponders in labels before application.
License Plate	A simple RFID tag that contains a serial number associated with database information as a way to simplify the tag and reduce cost.
Linear-Polarized Antenna	An antenna designed to transmit radio energy from the reader in one orientation or polarity, thereby increasing the read distance and providing increased penetration through dense materials. In order to be read accurately, RFID tags designed to be used with a linear polarized antenna must be aligned with the reader antenna.
LLRP Standard	A standard to foster RFID reader interoperability and create a foundation for technology providers to offer capabilities that meet industry-specific requirements.
Low-Frequency Tags	Low-frequency tags typically operate at 125 kHz or 134 kHz. Disadvantages of such tags are they have to be read from within three feet and data transfer rates are slow, though they are less subject to interference than UHF tags.

Mm

Manufacturing Execution System (MES)	A system that allows companies to control critical production activities and improve traceability, productivity and quality.
Micro-Electro-Mechanical Systems (MEMS)	Systems made up of components between 1 to 100 micrometers in size (0.001 to 0.1 mm). An RFID MEMS tag with micromechanical components is designed to withstand wide temperature ranges as well as gamma radiation and may be used on medical devices.
Middleware	RFID software that resides on a server between readers and enterprise applications and is used to filter data or manage readers across a network.
Mobile Reader	An RFID interrogator that is easily transported, allowing employees to read RFID tags attached to items in a warehouse or other settings along the supply chain.
Monostatic	An RFID reader that uses the same antenna to transmit RF energy to and receive RF energy from an RFID tag.
Multimode	RFID transponders that can be programmed to operate and comply with multiple standards.

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Multiple Access Schemes	Techniques to increase the amount of data that can be wirelessly transmitted within the same frequency spectrum. RFID readers may use Time Division Multiple Access (TDMA) so that they read tags at different times to avoid interference.
Multiplexer	An technique that allows a reader to have more than one antenna and reduces the number of readers needed to cover a given area while preventing the antennas from interfering with each other.

Nn

Near-Field Communication (NFC)	RFID tags closer then one full wavelength away from the tag reader are said to be ìnear field,î while those more than one full wavelength away are ìfar field.î Near field signals decay as the cube of the distance from the antenna, while far field signals decay as the square of distance. Passive RFID tags that use far field communications (UHF and microwave systems) have a longer range than tags using near field communications (low- and high-frequency systems).
Noise	Random or ambient electromagnetic energy found in the operating environment of RFID equipment. Other RF devices such as robots, electric motors and other machines may cause noise.
Nominal Range	The read range at which at which an RFID tag can reliably be read.
Null Spot	An area in the RFID tag reader field that does not receive radio waves. This is a common issue with UHF systems.

Oo

Object Name Service	A system for looking up unique Electronic Product Codes (EPCs) and information about the item associated with the code.
One-Time Programmable Tag	Also known as a field-programmable tag, it is RFID tag memory that can be programmed once and is then write-protected. After the memory is written to it is considered read-only memory.
Orientation	Position of a reader antenna in reference to a tag antenna. In UHF systems reader antennas can be linear- or circular-polarized. When using a linear polarized antenna the tag and reader must be in alignment to achieve the maximal reading distance.

Pp

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Passive Tag	RFID tags lacking a power source and transmitter are powered by radio waves from the reader that are converted by the tag antenna into current.
Patch Antenna	A square reader antenna made from metal or foil.
Phantom Read	When a reader reports the presence of a tag that doesnít exist. Also called a false read or phantom transaction.
Portal	An RFID interrogator gateway where tagged items are moved through a portal reader to collect RFID tag data.
Power level	The amount of RF energy emitted from an RFID tag reader. The higher the power output the longer the read range. Many countries regulate power levels to avoid interference with other devices. Printer: An RFID printer, or printer/encoder, prints a label with an embedded RFID transponder and encodes item information in the chip within the transponder.
Programming a Tag	The act of writing data to an RFID tag. When a serial number is first written to a tag it is called "commissioning".

Qq

Quiet Tag	RFID tags that are only readable with reader output at full power, or which can be read only at very close range.

Rr

Radio Frequency Identification (RFID)	A technique for identifying unique items using radio waves. Typically a tag reader communicates with an RFID tag, which contains digital information. There are also "chipless" forms of RFID tags that use material to reflect back radio waves beamed at them.
Read	The process of retrieving RFID tag data by broadcasting radio waves at the tag and converting the waves the tag returns to the tag reader into data.
Read range	The distance from which tag readers can accurately and reliably communicate with RFID tags. Active tags have longer read ranges than passive tags because they have their own power source for signal transmission. In passive tags the read range is controlled by frequency, reader output power, antenna design, and the method used to power up the tag. Low-frequency tags use inductive coupling which requires the tag to be close to the reader.
Read rate	A specification describing how many tags can be read within a given period or the number of times a single tag can be read within a given period. Alternatively, the maximum rate that data can be read from a tag expressed in bits or bytes per second.

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Read-Only	RFID tag memory that cannot be altered unless the microchip is reprogrammed.
Read-Write	RFID tags that can store new data, often used on reusable containers and other storage assets. When the contents of the container are changed, new information is written to the tag. Reader: A device used to communicate with RFID tags, it has one or more antennas that emit radio waves and receive a signal back from the tag. Tag readers are also sometimes called interrogators.
Reader Field	The area a tag reader can cover. Tags outside the field do not receive radio waves emitted by the tag reader and cannot be read.
Reader Module	Reader electronics (digital signal processor and circuit board) can be placed in a dedicated device or an RFID label printer, for example.
Reader Talks First	A passive UHF reader initially communicates with RFID tags in its read field by sending energy to the tags. The tags do not transmit until the reader requests them to do so. The reader finds tags with specific serial numbers by asking all tags with a serial number that starts with either 1 or 0 to respond. If more than one responds, the reader might ask for all tags with a serial number that starts with 01 to respond, and then 010. Also known as "walking" a binary tree, "tree walking", or "singulation".
Real-Time Locating System	A technique for finding the position of assets using active RFID tags. Three reader antennas are positioned to receive signals from tags in their common read field. Triangulation is used to calculate the asset location.
Reverse Link:	The path energy travels from the RFID tag to the interrogator, or reader. It is also sometimes called the back channel.
RFID	See Radio Frequency Identification.
RFID Tag	A microchip attached to an antenna and packaged so that it can be attached to an object. Programmed with a unique serial number, an RFID tag receives signals from a tag reader and sends signals back to the reader. RFID tags can be active, passive or semi-passive.

Ss

Scanner	An electronic device, such as an RFID tag reader, that sends and receives radio waves. When combined with a digital signal processor that turns the waves into data, the scanner is called a reader or interrogator.
Semi-Passive Tag	RFID tags where the battery operates the microchip's circuitry but is not used to send a signal to the tag reader. By "sleeping" until they receive a signal from the reader, semi-passive tags conserve battery life. More commonly know as a Bap Tag; Battery Assisted Passive Tag.
Shielding	The use of a Faraday cage, Mylar sheet or metal barrier to prevent radio frequency noise from interfering with tag readers or to prevent readers from interfering with other devices.

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Signal Attenuation	The drop in RF energy from an RFID tag or tag reader as a function of distance is proportional to the inverse square of the distance. Attenuation can be delibratly used to reduce the read range in a controled enviormnet to reduce the risk of stray reads).
Singulation	A passive UHF reader initially communicates with RFID tags in its read field by sending energy to the tags. The tags do not transmit until the reader requests them to do so. The reader finds tags with specific serial numbers by asking all tags with a serial number that starts with either 1 or 0 to respond. If more than one responds, the reader might ask for all tags with a serial number that starts with 01 to respond, and then 010. Also known as "walking" a binary tree, "tree walking", or "reader talks first".
Skimming	Reading an RFID tag covertly.
Slap and Ship	The act of putting an RFID label on a case or pallet just before it is shipped from a supplier to a retailer.
Slotted Antenna	An antenna designed as a slot cut into an electrical conductor connected to the transponder. Slotted antennas have the same orientation sensitivity as dipole antennas. Smart Card: Any payment card that contains an embedded microchip. A contactless smart card uses RFID technology to send and receive data.
Smart Label	A bar code label that contains an RFID transponder is considered ìsmartî because it can store information and communicate with a reader.
Smart Reader	A reader that can filter data, execute commands and perform functions similar to a personal computer.
Synchronization	Controlling the timing of tag readers that are close together so they don't interfere with one another during the read process.

Tt

Tag	A microchip attached to an antenna and packaged so that it can be attached to an object. Programmed with a unique serial number, an RFID tag receives signals from a tag reader and sends signals back to the reader. RFID tags can be active, passive or semi-passive.
Tag Talks First	How tag readers in a passive UHF system identify tags in their field. When RFID tags enter the readerís field they immediately announce their presence by reflecting back a signal, which is useful in an environment where items are moving quickly.
Tamper-Evident Tag	An RFID tag that signals a reader when a container has been opened without authorization.
Track and Trace	The process of gathering information about the movement and location of items.
Transceiver	A device that both transmits and receives radio waves.

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Transponder

RFID tags are sometimes referred to as transponders because they can be activated when they receive a predetermined signal. RFID transponders come in many forms, including smart labels, simple tags, and smart cards.

Uu

Ultra-High Frequency (UHF)

The frequency band from 300 to 3 GHz. RFID tags typically operate between 866 to 960 MHz so they can send information faster and farther than high- and low frequency tags.

Uniform Code Council 9UCC0

The nonprofit organization that oversees the Universal Product Code (UPC), the North American bar code standard.

Unique identifier

The unique serial number that identifies a transponder.

Universal Product Code (UPC)

The 12 digit data format encoded in UCC bar codes.

Ww

Warehouse Management System (WMS)

A methodology to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, putaway and picking. WMSs may use bar-code scanners, mobile computers, wireless LANs and RFID.

Work-in-Process Tracking

The use of RFID to track manufacturing changes reduces manual data collection and ensures that the right processes are preformed at the proper time on the correct product.

Write Once, Read Many (WORM)

An RFID tag that can be written to once and thereafter can only be read.

Write Range

The maximum distance over which data can be written to an RFID tag.

Write Rate

The rate at which information is written to a tag and then verified as being correct.

Xx-Zz

X12 EDI

The American National Standards Institute electronic data interchange standard developed for inter-industry electronic exchange of business transaction data.

ZigBee

Specification for high-level communication protocols using low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). Used in RF applications requiring low data rate, long battery life and secure networking.

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Omni-ID is the leading supplier of passive, low-profile UHF RFID solutions. Through our patented technology, Omni-ID "cracked the code" to overcome the problems traditionally associated with RFID, enabling a broad range of new applications that improve accuracy and efficiency in asset tracking, supply chain management and work-in-process.

Our family of versatile RFID tags works reliably in the harshest environments, including on, off, and near metal and liquids and excels in solving tracking and identification challenges with unprecedented accuracy.

With offices in the USA, UK, Asia and India backed up by a purpose-built manufacturing facility in China, our mission is to drive the widespread adoption of RFID and wider IoT technologies as the optimal tracking and identification devices.

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