What is RFID?

TAG

ANTENNA

CHIP

RFID

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What is RFID?

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RFID is a technology that allows for automatic and unique identification using electromagnetic waves that travel through the air. These waves make it possible to recognize living beings and objects from a distance, whether they're moving or stationary. The acronym "RFID" stands for **Radio Frequency Identification**.

In simple terms, it's used to identify any product by giving it a unique electronic identity. This way, RFID works as a bridge between the physical and digital worlds, giving a unique identity to any object or living being and enabling connections between objects, people, and various services — basically, it's one of the key technologies behind the **Internet of Things (IoT)**.

What is a TAG? RFID labels

An **RFID tag** is a simple automatic identification label equipped with a microchip and an antenna. This label (called a **TAG**) stores and transmits data **without the need for physical contact**.
It also allows each individual product to be tracked uniquely, since every RFID TAG is **unique and cannot be duplicated**.

The basic components of an RFID tag are:

TAG
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CHIP

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Microchip: This component contains the specific data of the tag.
It can store information such as unique codes, product movement, production data, and storage location.

Antenna: The antenna wirelessly transmits the data stored in the microchip.
It allows two-way communication when activated by a radio frequency signal sent by an RFID reader.

Support: This is usually a label made of adhesive paper or plastic.

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Types of TAG

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PASSIVE TAG	SEMI-PASSIVE TAG	ACTIVE TAG
They do not have their own power source Short reading distance Cannot integrate auxiliary sensors	They are "woken up" with the help of their own power source Long reading distance Can integrate auxiliary sensors	Have their own power source Long reading distance Can integrate auxiliary sensors
LOW COST	**MEDIUM COST**	**HIGH COST**

RFID is equal to NFC?
The answer is NO!

RFID = N = NO
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Specifications	RFID Tag	NFC Tag
Reading distance	The reading distance ranges from 20 cm to over 10 meters.	Reading distance max 10cm
Device support	An RFID reader is needed to read an RFID tag.	It can be read by smartphones and other NFC-enabled devices.
Communication	It sends information in one direction only.	Two-way communication: it can send and share information.
Speed	It is possible to read multiple tags simultaneously.	It is possible to read only one tag at a time.
Data storage	It carries only ID information.	It can store and transmit multiple types of data.
Cost	More expensive due to its longer reading range.	Less expensive due to the shorter reading range.

Here are the fundamental differences between RFID tags and Barcodes. (1/2)

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Specifications	RFID	Barcodes
Effectiveness	Multiple RFID tags can be read simultaneously (up to 200/sec) and no line of sight is required for reading.	One code is read at a time and a line of sight between the code and the scanner is required for reading.
Durability	Tags can be very durable. They are not susceptible to agents that prevent reading	Labels get damaged easily. Dirt and other agents can prevent reading
Capacity	They have internal memory and can be associated with a large amount of data.	They can be assigned a very limited amount of data
Flexibility	Data on the tags can be both read and written. Tags are reusable and allow dynamic access to information.	The information is static. Not modifiable

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Here are the fundamental differences between RFID tags and Barcodes. **(2/2)**

By LeghornGroup

Specifications	RFID	Barcodes
Other advantages of RFID compared to barcodes Compared to barcodes and other identification technologies, radio frequency technology offers numerous advantages: Reading does not require direct contact. Reading does not require optical line of sight, so there is no need for orientation towards the scanner. Tags can: - Be read simultaneously. - Work in dirty or contaminated environments and resist even very harsh conditions (environmental agents, thermal, chemical, mechanical stresses). Therefore, they are more durable. RFID tags contain more data than barcodes and can be rewritten and updated with new information. RFID tags also operate when immersed in a fluid, inside the object to be identified, or inside a container. The RFID tag contains a unique and unrepeatable serial number that identifies each individual product manufactured worldwide, while the barcode identifies only the batch of a product, not the single item. RFID tags are more expensive than barcodes, but the cost/benefit ratio is generally advantageous.		

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How does passive RFID work?

Identification takes place using an antenna to read, a chip (called tag or transponder) that has been applied to the object (or person or vehicle) to be identified.

The tag contains a certain amount of information related to the object to which it is applied (such as the code, production date, manufacturer), which can be static or may change over time.

The tag does not need a power source (electricity) to operate: when it is "illuminated" by the magnetic field of the antenna it is exposed to, the tag can accumulate the small amount of energy it needs to transmit, at a short distance, the information it contains. This type of tag is called "passive."

When it enters the range of a reader (from a few centimeters to several meters), the tag is "awakened" by the electromagnetic field generated by the reader and responds by "reflecting" the modulated signal.

The modulated response signal is then received by the reader, which decodes it.

This type of tag, called passive, is the most widespread on the market mainly due to its price, which makes it usable in many applications.

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How does active RFID work?

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Telepass is an example of an active RFID transponder application.

If it is necessary to transmit over long distances, greater power is required and the tag must be powered by a source of electricity, such as a battery. In this second case, the tag is called "active."

The sectors in which RFID technology can be applied are numerous. Tags are becoming widespread in the fields of industrial production, logistics, and clothing, but also in healthcare, public administration, access control, etc.

Which are the different RFID frequencies?

RFID systems use various frequencies, which can be classified as:
- Low frequencies (LF, between 125 and 134 kHz)
- High frequencies (HF, around 13 MHz)
- Ultra-high frequencies (UHF, between 860 and 960 MHz)
- Microwaves (above 2.45 GHz)
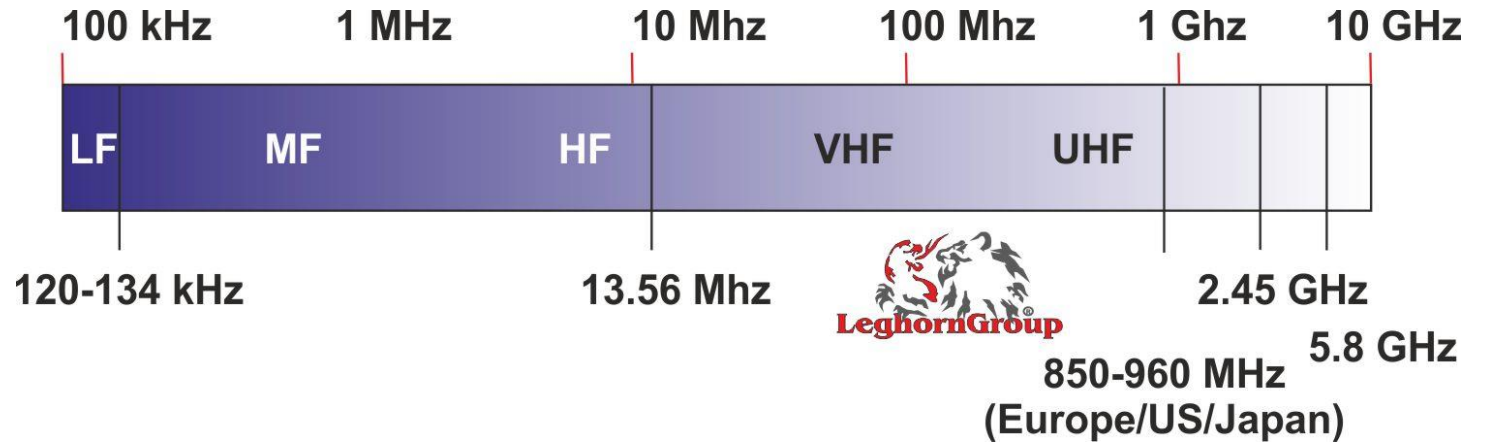
In general, as frequency increases, the reading distance and the amount of information transferable per unit time increase, while the resistance to operating conditions and the costs decrease.

Low-frequency (LF) tags use little power, can penetrate non-metallic materials and liquids, but the low reading signal does not exceed 30-40 centimeters.

High-frequency (HF) tags work better with metallic objects and can cover a distance of about one meter.

Ultra-high frequency (UHF) tags offer longer reading ranges and allow fast data transfer but do not easily penetrate materials.

Solutions with 2.45 GHz tags are used in Telepass and similar systems.

Field of action of LeghornGroup

Protection. We can protect your goods and assets with security seals and various products for tamper protection. The company can create bespoke, technical solutions to meet client's requirements.

Control. We ensure goods and people can be monitored using security products and integrated complete hardware and software solutions that allow the operator to monitor and intervene in real time, even remotely.

Identification. LeghornGroup's understanding of authentication along with their innovative technical products and solutions allow users to uniquely and securely identify, goods, vehicles, containers, animals and people.

Tracking. LeghornGroup's real time GPS tracking devices allow users to monitor location, status and movements of vehicles and people.

RFID Solutions. LeghornGroup also manufactures solutions for product authenticity; automatic identification systems using RFID to aid traceability of objects, animals and people, offering new and efficient operations to speed up the supply chain;

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