

RADIO FREQUENCY
IDENTIFICATION
TECHNOLOGY

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AGENDA

- Overview
- Introduction
- Working
- Applications
- How is RFID used inside a living body?
- Comparison with Barcode

Overview

- What is it?

Radio Frequency IDentification

Means to identify an object using RF transmission

- Why RFID?

Replacement to Barcode

- Basis for idea

EM Spectrum → Radio Frequency

Introduction

RFID stands for Radio-Frequency IDentification.

Radio-Frequency IDentification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. RFID is a technology to record the presence of an object using radio signals.

The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less.

How does RFID work ?

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention.

RFID methods utilize radio waves to accomplish this.

A Radio-Frequency IDentification system has three parts:

- A scanning antenna
- A transceiver with a decoder to interpret the data
- A transponder - the RFID tag - that has been programmed with information.

❖ Scanning Antenna :-

RFID enables wireless communication between the tag and the reader via their antennas where the reader antenna transmits electromagnetic energy to the tag to energize the tag and also reflect back that energy to reader which is further connected to a computer system where the stored information is kept.

RFID applications do not need much bandwidth, the antenna rejects the signals that are out of band.

❖ Transceiver

An RFID reader, also known as an interrogator or transceiver , is a device that provides the connection between the tag data and the enterprise system software that needs the information. The reader communicates with tags that are within its field of operation, performing any number of tasks including simple continuous inventorying, filtering (searching for tags that meet certain criteria), writing (or encoding) to selected tags, etc.

The reader uses an attached antenna to capture data from tags. It then passes the data to a computer for processing. Just like RFID tags, there are many different sizes and types of RFID readers. Readers can be affixed in a stationary position in a store or factory, or integrated into a mobile device such as a portable, handheld scanner. Readers can also be embedded in electronic equipment or devices, and in vehicles.

❖ Transponder :-

A transponder or an RFID tag consists of an integrated circuit attached to an antenna. The tag is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the application. For example, employee ID badges containing RFID tags are typically made from durable plastic, and the tag is embedded between the layers of plastic. RFID tags come in a variety of shapes and sizes and are either PASSIVE OR ACTIVE.

Passive tags are the most widely used, as they are smaller and less expensive to implement. Passive tags must be "powered up" by the RFID reader before they can transmit data.

Active RFID tags have an on-board power supply (e.g., a battery), thereby enabling them to transmit data at all times.

Applications

- General transport (*logistics*), tracking a package, parcel
- Tracking vehicles for *road toll*
- Many countries have started using RFID chips in passports
- Tags in clothing, e.g. in Jeans
- Sealing for containers (for the shipping industry).
- Identifying animals; used for tracking pets, but also for research, for example on turtles.
- Keys for vehicles. The vehicle key has an RFID tag inside; only the key with the right RFID tag can start the vehicle (this makes copying vehicle keys harder). Also used for locking/unlocking vehicles from a distance.
- Contactless *identity cards*, for example to regulate entry into certain areas; also used for ticketing, or public transport.

How is RFID used inside a living body?

- RFID devices that are intended to be implanted inside a living body (like an animal or human being) have special requirements. They need to be encased in a special kind of casing that will not irritate or react with the living tissues that they are inserted into. The casing must also be transparent to the scanning radio-frequency beam that activates the chip. Some RFID vendors have created biocompatible glass for use in these application.
- Because the radio-frequency waves that activate the microchip containing the identification number are only useful within a few feet (or less), the RFID chip is typically inserted very close to the surface of the skin.

- The placement of the device is usually done with a hyperdermic-type needle. This method of insertion also dictates the shape and size of the device; implantable RFID devices are typically the size and diameter of a grain of rice. For dogs, the device is usually implanted between the shoulder blades.
- RFID tags have been placed inside cow. Dog owners have used RFID tags to identify their pets.