

# RFID: Radio Frequency Identification and it's applications with its advantages in modern times

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**Abstract** - Nowadays distribution centers operate in a highly competitive environment, forcing them to constantly improve to tackling complexity and change. The task of managing people and resources in an efficient way is the key to achieving the required productivity demands. This paper gives an overview of the current state of radio frequency identification (RFID) technology. Also, major current and envisaged fields of application, well as advantages, and limitations of use are discussed. This research tends to show the development of new management methods with the applications, advantages and scope of RFID.

**Keywords** - RFID technology, applications, management, scope.

## I. INTRODUCTION

RFID or Radio Frequency Identification has been around for decades. Only recently, however, has the convergence of lower cost and increased capabilities made business take a hard look at what RFID can do for them. RFID is contactless identification technology working on the physical basis of alternating electromagnetic fields. RFID technology was used since 1920's, whereas the attention paid to RFID started to increase in the 1980's. RFID systems consist of three main components - an antenna, a transceiver and a transponder. The range of the reader is dependent upon it's operational frequency. Usually the readers have their own software running on their ROM and also, communicate with other software to manipulate these unique identified tags. The basic premise behind RFID systems is that it marks items with tags. These tags contain transponders that emit messages readable by specialized RFID readers.

A reader retrieves information about the ID number from a database, and, acts upon it accordingly. A tag consists of a plastic base strip, microchip, and an antenna. The microchip has different memory size and is used to store data. The tag is placed on the object, which should be identified by the tag identification number. There are basically two types of tags:

- 1) The active tag
- 2) The passive tag

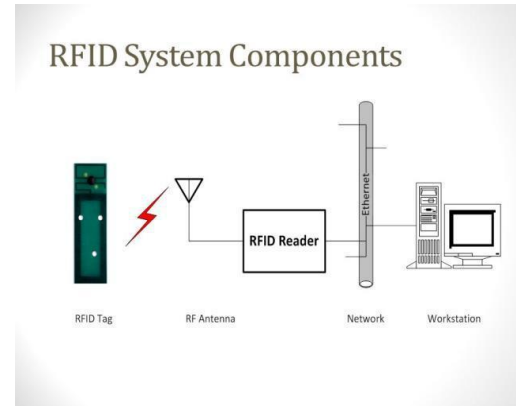


Fig.1: RFID System Components.

These tags are differentiated on the basis of the source of their electrical power. ACTIVE TAGS contain their own power source, which is usually an on-board battery. These tags have greater memory capacity and operating range. These are more expensive than the passive tags. PASSIVE TAGS obtain power from the signal of an external reader. In addition to their low cost, passive tags can also, be quite small. Current antenna technology limits the smallest useful passive tag to about the size of quarter. The larger the tag, the larger the read range. The enhancement of RFID technology has brought advantages that are related to resource optimization, increased efficiency within business processes, and enhanced customer care, overall improvements in business operations and healthcare.

Active tags	Passive tags
Transmit a stronger signal	Transmit a weaker signal
Have a longer "read" range, can exceed 100 meters, depending on antenna size	Read distance ranges of 10 cm. to a few meters
Operate at higher frequencies-commonly 455 MHz, 2.45 GHz, or 5.8 GHz	Typical operating frequencies- 128 KHz, 13.6 MHz, 915 MHz, or 2.45 GHz
Expire after battery power runs out	Operate until damaged or discarded
Size is typically slightly larger than a deck of playing cards	Can be as small as a grain of rice

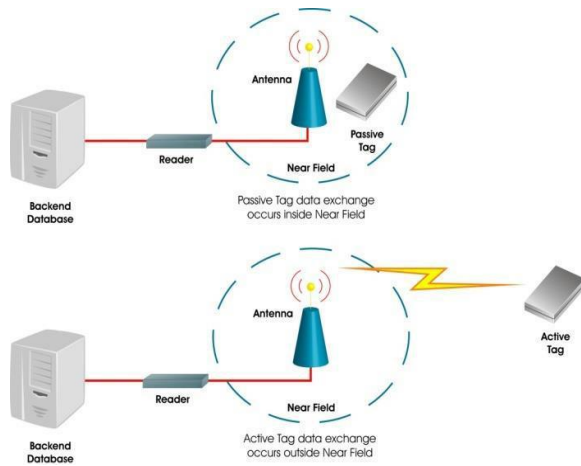


Fig.2 Active and Passive Tags.

## II. RFID STANDARDS

Because the RFID solutions can be realized in different ways, some RFID standards were developed. These standards cover identification, data and system protocols, the air interface, application support, testing, compliance and health and safety.

The most important RFID standard is the world-wide used EPC standard (Electronic Product Code), which was developed by the organization EPC global. The EPC standard as a whole consists of several requirements for individual components of RFID solution.

The International Standards Organization (ISO) has three standards for RFID: ISO 14443, ISO 15693, and ISO 18000. In terms of the entire important air interface, ISO 18000 and EPC standard were incompatible.

## III. COMPONENTS OF AN RFID SYSTEM

The RFID system consists of different components which are put together in such a manner to allow the working efficiency to be high enough. RFID consists of following components:

1. Tag
2. Antenna
3. Reader
4. Communication infrastructure
5. Application software

The communication infrastructure and the application software are secondary units and the tag, antenna and reader being the major parts.

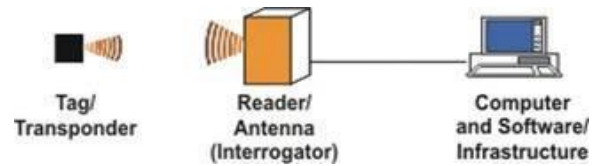


Fig.3: Components of an RFID System.

## IV. PROJECTS

### 1. INDUSTRIAL PROCESS MONITORING

The huge advantage of RFID technology is the possibility to use not only the tag identification number, but also the user memory of the tag, which can contain any products data. In the industrial process, the input material is marked by RFID tags and the information stored in tags is loaded to the database of the information system.

### 2. ASSETS INVENTORY

RFID technology can be efficiently used for objects identification, especially for assets inventory. Objects marked by RFID tags are registered quickly and efficiently and also their protection against stealing is taken care of.

### 3. LOGISTICS WAREHOUSE

RFID technology can be applied also in the branch of logistics in order to reach high level of automatization and supplier services. It helps in warehouse maintenance.

### 4. HEALTHCARE APPLICATIONS

RFID saves important resources that can further contribute to better care.

### 5. SECURITY AND CONTROL APPLICATIONS

RFID tags can be attached to equipment/user belongings such as ID cards and vehicles etc. It would help in proper management of a particular organization.

### 6. PATROLLING LOG APPLICATIONS

RFID is also used for auditing and controlling security persons themselves. It provides checkpoints for patrolling the security guards.

### 7. BAGGAGE APPLICATIONS

Airline industries, package and delivery service lose a lot of money on lost or late delivery of packages. Handling large amount of packages can be very complex. RFID helps in the proper tracking of the goods and helps the customer get proper information about their parcel.

## 8. TOLL ROAD APPLICATIONS

RFID applications make the toll collection better with improved traffic flow and efficient charging, as vehicles cannot pass without stopping for payment.

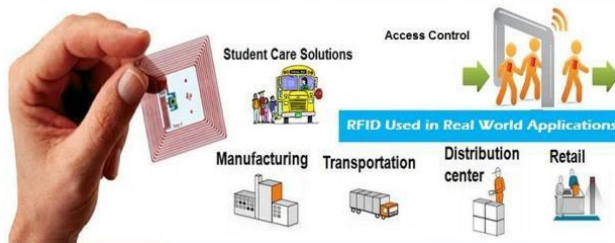


Fig.4: Projects of RFID.

## V. ADVANTAGES

- The greatest advantage of RFID over the barcode identification is that there is no need of any optical contact between the identifier and the reader.
- It provides clear, secure and fast identification.
- No direct intervisibility is needed.
- Multiple tags reading.
- Constant availability of data.
- Cost saving by error reduction.
- Tags can store more data than bar codes.
- Higher speed.
- Reduction of man power.
- Complex duplication.
- Unique item identification is easier.
- Tags have read and write memory capability.

As it is said, nothing is perfect and so is technology. RFID has enormous number of advantages but has some DRAWBACKS too. Some of them are:

- Interference
- High costing
- Signal problem
- Overloaded reading
- Standardization
- Faulty or deficient detection of tags.

## VI. CONCLUSION

RFID, a technology that exists for years now has potential uses in present as well as future in variety of applications. Though not without challenges and issues, it is a promising technology which has the potential in improving in coming years and promises a lot of advantages in management.

RFID's potential benefits are large, and we're sure to see many novel applications in future- some of which we can't begin to imagine.

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