

# RFID Concepts, Applications and Issues

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**Abstract** The functioning and use of Radio frequency Identification (RFID) is growing rapidly across many different industries. The technology is not only in traditional applications such as asset tracking, inventory tracking but also in security services such as electronic passports and RFID enabled credit cards. However RFID technology also raises number of concerns regarding privacy, security and law enforcement. In this paper the basic concepts of RFID technology are introduced, and also the associated security issues and threats in using This technology are discussed. The goal of writing this paper is to deliver a better understanding of basics of RFID and its applications and security issues.[1]

Keywords: RFID, Tag, middleware, antenna

## I Introduction

The source of RFID technology lies in the 19<sup>th</sup> century when luminaries of that era made great scientific advances in electromagnetism, Radio frequency Identification technology is automatic identification technology that uses radio signals to identify ,track variety of objects including people, vehicles goods and assets without the need for contact or line of sight contact. As this technology is best candidate in place of barcode. At the same time it is leaving many privacy and security issues lets discuss the in the next part of the paper.[2]

## II Working of RFID System

An integrated circuit for modulating and demodulating radio signals and performing other functions. An antenna for receiving and transmitting the signal. Systems that make use of RFID technology are composed of three basic elements: An RFID tag, or transponder, that carries object-identifying data. An RFID tag reader, or transceiver, that reads and writes tag data. A back-end database, that stores records associated with tag contents As shon in the figs 1 [a] Each tag contains a unique identity code. An RFID reader emits a low-level radio frequency magnetic field that energizes the tag. The tag responds to the reader's query and announces its presence via radio waves, transmitting its unique identification data. This data is decoded by the reader and passed to the local application system via middleware. The middleware acts as an interface between the reader and the RFID application system. The system will then search and match the identity code with the information stored in the host database or backend system.

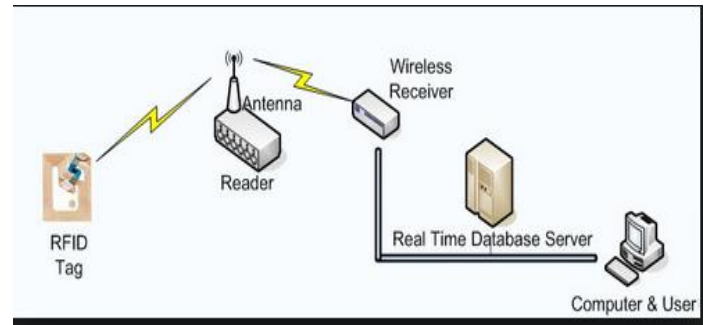


Fig 1[a]

## Communication

The communication process between the reader and tag is managed and controlled by one of several protocols, such as the ISO 15693 and ISO 18000-3 for HF or the ISO 18000-6, and EPC for UHF. Basically what happens is that when the reader is switched on, it starts emitting a signal at the selected frequency band (typically 860 - 915MHz for UHF or 13.56MHz for HF) . Any corresponding tag in the vicinity of the reader will detect the signal and use the energy from it to wake up and supply operating power to its internal circuits. Once the Tag has decoded the signal as valid, it replies to the reader, and indicates its presence by modulating (affecting) the reader field.[2]

## RFID Tags

An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification and tracking using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. Most tags carry a plain text inscription and a barcode as complements for direct reading and for cases of any failure of radio frequency electronics. The tags contain electronically stored information. .Tags can be attached to any item, goods, and objects to track or value the objects.[4]

## Tags are basically classified in two types

### Passive Tags

Do not require power. Draws from Interrogator field

- Lower storage capacities(few bits to 1 KB)
- Shorter read ranges(4 Inches to 15 feet)
- Usually Write once Read many /Read Only tags
- Cost around 25 cents to few dollars.

**Active Tags**

- Battery powered
- Higher Storage capacities(512 KB)
- Longer read range(300 feet)

**RFID Readers****Reader Functions**

- Remotely power tags
- Establish a bidirectional data link
- Inventory tags filter results
- Communicate with networked servers
- Can read 100-300 tags per second
- Readers can be at a fixed point such as entrance exit
- Readers can also be mobile/ hand held

**RFID Middleware**

The middleware refers broadly to software or devices that connect RFID readers and the data they collect, to enterprise information systems. RFID middleware helps making sense of RFID tag reads, applies filtering, formatting and logic to tag data captured by a reader, and provides this processed data to back-end applications (Burnell, 2008). RFID middleware serves in managing the flow of data between tag readers and enterprise applications, and is responsible for the quality, and therefore usability of the information. It provides readers connectivity, context-based filtering and routing, and enterprise / B2B integration [5]

**RFID middleware components**

A RFID middleware is the interface that sits between the RFID hardware and RFID applications. It provides the following advantages:

- It hides the RFID hardware details from the applications;
- It handles and processes the raw RFID data before passing it as aggregated events to the applications;
- It provides an application level interface for managing RFID readers and querying the RFID data.

**III RFID Applications****Manufacturing and Processing**

- Inventory and production process monitoring
- Warehouse order fulfillment

**Supply Chain Management**

- **Inventory tracking systems**
- **Logistics management**

**Retail**

- Inventory control and customer insight
- Auto checkout with reverse logistics

**Security**

- Access control
- Counterfeiting and Theft control/prevention

**Location Tracking**

- Traffic movement control and parking management
- Wildlife/Livestock monitoring and tracking

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**IV Privacy and Security issues**

Many concerns have been expressed over the security and privacy of RFID systems. Traditional applications, like large-

asset tracking, were typically closed systems where tags did not contain sensitive information. However, as more consumer applications are developed, security, and especially privacy, will become important issues. Much work has recently focused on issues of RFID security and privacy.[2][6]

**Denial of Service**

It is an attempt to make a machine or network resource unavailable to its intended users

**Spoofing**

In addition to threats of passive eavesdropping and tracking, an infrastructure dependent on RFID tags may be susceptible to tag spoofing. There are two kinds of security issues about spoofing. One is theft and the other is counterfeiting which are discussed as follows.

**Theft**

By spoofing valid tags, a thief could fool automated checkout or security systems into thinking a product still on a shelf. Alternatively, a thief could rewrite or replace tags on expensive items with spoofed data from cheaper items. Saboteurs could disrupt supply chains by disabling or corrupting a large batch of tags.

## Eavesdropping

As organizations adopt and integrate RFID into their supply chain and inventory control infrastructure, more and more sensitive data will be entrusted on RFID tags. As these tags inevitably end up in consumer hands, they could leak sensitive data or be used for tracking individuals. An attacker able to eavesdrop from long range could possibly spy on a passive RFID system.

## Tag Cloning

Rather than simply trying to steal data from RFID tags, adversaries might try to imitate tags to readers. This is a threat to RFID systems currently being used for access. Intruder can steal the content of tag and similar tag can develop to imitate the behavior of original tag this we call as cloning of tag this he can use it further misuse create nuisance to users. Hence now RFID based systems are facing huge difficulties. In future applications like RFID based passport applications cloning is a more serious threat.[5]

## V Conclusion

In the present context RFID tags revolutionize society with their wonderful applications; we must understand their risks also. Implementing ubiquitous network connectivity in society will demand a close examination of personal privacy from both the technical and social aspects. The privacy problems raised by their are serious enough to demand a comprehensive and effective technique that can ensure user privacy while retaining their benefits As we go with technology there will be certain advantages and disadvantages Understanding RFID security today will aid in development of secure ubiquitous computing systems in the future. Our job is to provide better security features for the stakeholders to make this technology popular and user friendly. This is my little effort learn the basics of RFID systems..

## Acknowledgement

The complete work is highly supported by my mentor Dr Manjaiah D H and my teacher Dr U M Bhushi Principal Sahyadri College of Engineering and Management Adyar, Mangalore I am grateful to my parents and family, mentor, Principal and Management of SCEM Mangalore and to my colleague for their constant support in publishing this paper.

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