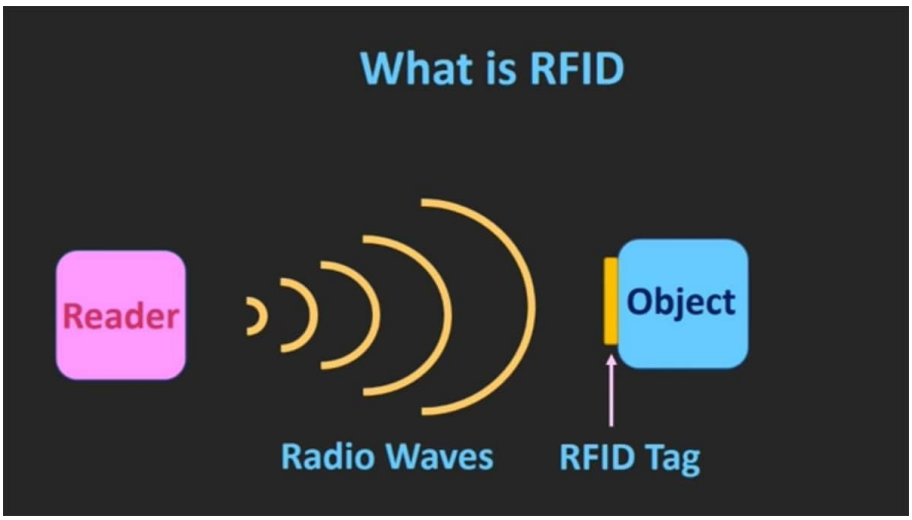
RFID

Ref: https://archive.nptel.ac.in/courses/106/105/106105166/

Ref: https://www.electrical4u.net/instrumentation/radio-frequency-identification-working-principle/

Ref: https://www.rfpage.com/components-of-rfid-technology-and-applications/

Ref: https://passive-components.eu/what-is-rfid-how-rfid-works-rfid-explained-in-detail/



- RFID is an acronym for "radio-frequency identification"
- Data digitally encoded in RFID tags, which can be read by areader.
- Somewhat similar to barcodes.
- Data read from tags are stored in a database by the reader.
- As compared to traditional barcodes and QR codes, RFID tagdata can be read outside the line-of-sight.
- By using RFID technology we can track multiple objects at the same time.

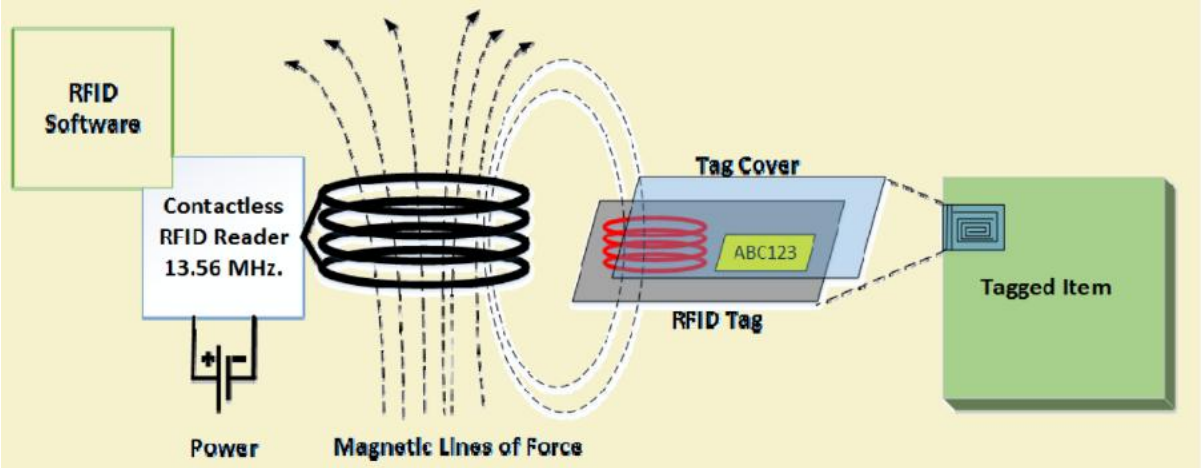
RFID Features

- RFID tag consists of an integrated circuit and an antenna.
- The tag is covered by a protective material which also acts asa shield against various environmental effects.
- Tags may be passive or active.
- Passive RFID tags are the most widely used.
- Passive tags have to be powered by a reader inductivelybefore they can transmit information, whereas active tagshave their own power supply.
- RFID reader is coming in many sizes and shapes. RFID reader may be handheld reader or as it may be size of door is in shopping malls.
- RFID reader mainly consists of three components.
    - RF signal generator

    - Micro controller
    - Receiver/signal detector
- Basic components inside RFID tag
    - Transponder
    - Rectifier circuit
    - Controller
    - Memory

Working Principle

The main components of an RFID system include an RFID tag orsmart label, an RFID reader, and an antenna.



The field which is generated by RFID reader is used to couple with the antenna of a RFID tag, because of the mutual coupling voltage will get induced across the coil of the RFID tag. Some portion of voltage is rectified uses a power supply for the controller and memory elements.RFID tag pick up the signal from the reader and activate the tag (in passive tags) by powering it.
Once the tag is activated, it starts to transmit data back to the reader using the same antenna coils using inductive coupling (backscatter coupling) method.

Low frequency

The low frequency operates in the range of 125 KHZ to 134 KHZ. This frequency travels very short distance up to 10 cm.

High frequency

The high frequency operates in the range of 13.5 MHZ. this frequency travel up to1 meter.

Ultra-high frequency

This frequency operates from 860 to 960 MHZ. this frequency travels up to 10 to 15 meter.

Applications

- Inventory management
- Asset tracking

- Personnel tracking
- Controlling access to restricted areas
- ID badging
- Supply chain management
- Counterfeit prevention (e.g. in the pharmaceutical industry)

Difference between RFID and Barcode :

S.No.	RFID	Barcode
1.	It is based totally on radio-frequency.	It is primarily based on optical technology.
2.	It does no longer require Line of sight.	It requires Line of sight because scanner must have an unobstructed view and must be oriented properly.
3.	It has greater data storage as in contrast to barcodes.	It has much less data storage up to solely 24 characters.
4.	Memory storage is possible in RFID with assist of tags.	Memory storage is not possible in barcodes.
5.	It is more resistant or durable than a barcode.	It is much less resistant than RFID.
6.	Several RFID tags can be examined simultaneously i.e. multiple read is allowed in RFID.	Only a single barcode can be scanned at a time i.e one card can be read at a time.
7.	Read/write abilities using RFID tags.	Barcode has totally reading capabilities and can’t write anything.
8.	It processes faster than Barcode.	It is slower than RFID.