



## A first look at RFID technology

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## **About Rugged and Mobile**

### **What do we do?**

Rugged and Mobile develops mobile, data and web solutions, delivering into the rugged, enterprise and consumer mobile markets. Offering end to end solutions our services include:

- Hardware reselling of rugged and mobile devices, selling anything from barcode readers to Windows mobile phones and supporting them.
- Bespoke software consultancy, delivering tailored software and project management into businesses. We deliver both Microsoft and Apple iPhone solutions.
- SOA/SaaS solutions, serving businesses and individual customers with new, exciting and flexible mobile services.

### **Our Culture**

Rugged and Mobile is a newly founded company. We understand how to run a tech company right and how to treat the people within it. We work hard, we play hard and mostly the two are the same thing!

### **Company Vision**

We want to become the leading UK provider of mobile solutions. We intend to do this by keeping at the forefront of mobile and data capture technologies, by providing excellent service to our customers and by employing the right people who can help deliver our vision.



### Overview

Radio Frequency Identification (RFID) is a technology that has actually been around for some time, despite the more recent industry buzz. It's a technology that has evolved slowly over the years rather than suddenly entering the scene with a bang, with its roots coming from military radar as far back as World War 2. It's said that German planes were encouraged to roll as they returned back to their bases and as they did so the radio signal they reflected back to the base radar systems changed and as such created a crude signature that identified them as friendly.

The British soon developed small receivers that were fixed to their planes. On activation from a specific radar signal, they would wake up and send back a code that effectively identified the plane as friendly. This was known as the IFF (Identify friend or foe) system and RFID as we know it today was born!

### How does RFID work?

RFID still works today by essentially having a transmitter or scanner and a transponder or "Tag". The scanner creates the power and the demand for communication, whilst the transponder, which is typically passive, wakes up on demand from the scanner to answer the communication in some way.

A common example of RFID at work is a door entry system that is used to secure offices. Many of us have seen the credit card sized employee badge that is "wafted" by a scanner in order to open a door and the chances are this will be RFID technology at work. As the card comes into range of the door transmitter, it wakes up and communicates with it. If the codes pass a certain test then the door will open.

RFID communication can be secured using industry standard protocols or it can be left open, depending on the application.

### Technical bit!

So we know that RFID uses radio waves to operate and today and it pretty much uses the same radio technology as many of the other wireless technologies we know and use daily such as Bluetooth and Wi-Fi. RFID sits within the 30 kHz to 300GHz bands where some frequency bands within this range (listed below) are available for licence-free RFID systems. These bands are typically where we sell hardware within and support RFID tag reading/writing solutions. This frequency range gives RFID a lot of flexibility in the way it can be used and we typically see the following areas ranges:

- Lower frequency (LF) 125-134 kHz.  
Used when a fast read rate is traded off for range. It can also be used in more rugged environments where liquid and or interference from metals could be prevalent. Typical applications include cattle identification and car immobiliser solutions.
- High frequency (HF) 13.56MHz  
This is the most commonly used RFID frequency band largely due to the wide adoption of smart card based RFID technology. It gives a good balance between ruggedness and range.



- Ultra high frequency (UHF) 860-960MHz  
This is the one the supermarkets are interested in and is thought of as being the most practical for item-level tracking as it offers a good balance between range and the ability to read multiple tags at speed.
- Microwave frequency 2.4GHz  
Microwave frequency is used where distance is the key driving force and we see it used in toll road collection booths. This is the same band used by Bluetooth and Wi-Fi systems.

### **Benefits of RFID**

RFID is similar in principle to barcode technology but in application it's very different and brings with it fantastic new functionality.

### **Contactless**

RFID is a contactless technology capable of identifying and counting a diverse range of objects without contact, line of sight or even human intervention. I have helped develop various asset tracking solutions where either barcodes or RFID were being used and the difference in the application was unbelievable.

Using barcodes you had to find them, then you had to scan them, cleaning or replacing them as you went along. Whilst still a pretty good solution in most cases, with RFID you could simply walk around, wafting your transmitter and all the RFID tags would simply report in as they came in range.

### **Fast, simultaneous scanning**

Depending on the equipment you use, the scanning rate compared to barcodes is unrivalled. Barcodes can only be scanned one at a time but an RFID solution can scan 100's tags simultaneously.

A great example of this is the often touted RFID supermarket trolley. Whilst costs still inhibit the replacement of barcodes as the primary source of "checking out" in the supermarket, if products all used RFID, then you would simply walk through an RFID archway and your whole trolley would be scanned in one go whilst your loyalty card is updated and your credit card details taken as you walk out the store. The very way we shop could change forever.

### **Automatic**

You don't need to present the tag to the reader. It enables automatic communication between devices where even the range of communication can even be controlled. Toll booths use this technology so that vehicles can quickly pass through, often only having to slow down to a reasonable speed for the barrier.

### **Large, programmable memory**

RFID is a programmable technology that can not only store huge amounts of different data in the tags but it can also be changed. If your door entry solution is compromised then you can simply reprogram the codes in the tags. Or change the tag data depending on some kind of workflow. For instance you could change a "Last scanned" date field on scanning or use a software application to change some other element of the tag data. I think this is the most exciting area of RFID that brings the most opportunity to the end user or business.



### **Tags are reusable**

Because you can reprogram a tag it means they can be wiped, reprogrammed and re-used. This is proving a vital component to RFID solutions in order to make the ongoing consumable replacement not quite as costly as it would otherwise be. Make sure you have a re-use policy in your RFID solution as well as choosing the right tags for the job because it can often make a huge difference to your bottom line.

### **Robust**

Tags are robust. You can get waterproof, sealed ones. Small ones, big ones and ones designed to be read from large ranges and most are tough enough to survive years of abuse. Added to that the solution they are part of is more robust too. If a tag is covered in dirt, it will still scan. If it's under water, it will still scan and if you physically can't find it then it will still scan if in range. Whilst you can get really tough, waterproof barcode labels, they are still susceptible to tearing, dirt coverage and will always require an ongoing replacement strategy if used in more rugged environments.

RFID is also much less susceptible to misreading due to the above.

### **Embeddable**

Tags don't have to be plastic dongle like devices or plastic card shaped! Car manufacturers are looking at ways to embed RFID tags into car parts in order to better identify specific parts in the fight against car theft. They can also be embedded into other items such as your passport, inside cardboard, clothes labels or even the human body!!

### **Why RFID isn't used everywhere**

So if RFID is so good why don't we use it everywhere I hear you say! RFID, great as it is, has still not quite reached its tipping point and the main reason for this is cost. The typical costs to implement an RFID system, to properly create software and to then maintain and replace tags is still extremely high compared to existing technologies such as barcodes. To apply a barcode you're usually talking 10ths of pennies, to apply the same RFID tag we need to talk full on pennies!

Another area is trust of the technology. We work with lots of new and emerging technologies at Rugged and mobile and what always frustrates me is how they get abused and then become misunderstood. Governments and large companies especially, jump on in there and always abuse or ill adopt technologies giving them a bad rap. We see it with GPS, with LBS, data capture in general and RFID is no exception. The public still see RFID as a way they are tracked and monitored which hides all of its great benefits. All new technology brings new problems that take us humans a little bit of time to get used to. Whilst businesses using RFID for internal projects seem to be gaining momentum now, we still see it hampered just a little bit with wide adoption as we still learn to trust how it is implemented and used.

Lastly standards, as always, have been a hindrance to progress but this is becoming less of an issue these days.



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It will be a few years yet before our packet of cornflakes has an RFID chip on it but we are seeing more and more examples of RFID in the mainstream as costs continue to come down.

**Who's using RFID?**

Whilst I harp on about RFID not being main stream, when you sit down and think about it, it is being used in many places. It's used in monitoring cattle or animals, that chip you can have injected in your cat or dog is RFID and it stores all sorts of data about your pet if it's found by the RSPCA. Marks and Spencer uses RFID tags in its Per Una range of clothing. Go and take a look next time you're in town and you'll see the tags that get programmed and then used to track and trace items through their supply chain and can ultimately be used to ID the wearer in the future

Most of the hardware manufacturers we resell offer RFID scanners of some nature. Cipherlab, Datamax and Intermec all offer integrated solutions, whereas Motorola, Honeywell, Zebra and Grabba all offer snap-on or 3<sup>rd</sup> party products.

Don't forget that Rugged and mobile offers a whole range of RFID hardware and software solutions and we're always happy to talk and advise you on how RFID can improve the identification and tracking process within your business.