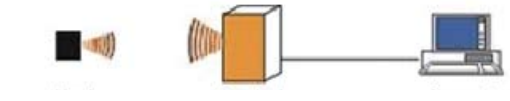
The Malaysian RFID scenario

Mohd Zahari Zakaria has the story on its current applications market and trends

Radio Frequency IDentification or its acronym RFID in particular is a fairly common buzzword among information technology circles these days. It is a small electronic device (a tag) incorporating a small chip and an antenna that enable its identification (ID) and information to be relayed to or be retrieved remotely using radio frequency (RF) via Interrogator (reader) and linked to a computer. RFID basically allows IT applications to identify, track the movement and the whereabouts of assets and people at distances below 30cm between RFID tag and reader up to as far as 100 metres depending on the types of application and technology deployed, and there are many of them.

While current interest in and publicity of RFID make it seem a hot new technology, in fact RFID concept is pretty old. The availability of newer and enhanced technologies enable the production and development costs of RFID to be competitive enough for RFID to be used in diverse applications. According to Wikipedia, a source place its first use in the 1920s, while the same source says it was first used as early as the 1920s or as late as the 1960s.



Tag / Transponder | Reader / Antenna (Interrogator) | Computer and Software / Infrastructur

RFID readers & EPC-RFID tag

Nevertheless, what is certain is that RFID was used in military applications during World War II.

For example, a similar technology was used in the 'identify friend or foe' (IFF) transponders invented in the United Kingdom in 1939 and these were used to automatically identify friendly or hostile aircraft.

RFID system basically involves two parts, namely the RFID reader and an RFID tag or multiple tags.

An RFID tag basically is an automatic radio transponder attached to the item or carried by the person it's being used to identify and track, while the RFID reader may be used in an access control system to a building or office, for asset tracking in offices, warehouses and stores, in toll gates or supermarket check out systems or anywhere that requires the tags to be tracked.

Modern RFID tags comprise an integrated circuit (IC) and a flat antenna. The IC processes information and performs modulation and demodulation of the radio-frequency signal between it and the reader and it can also contain memory for storing information on the item or person it is identifying.

RFID Tags

RFID tags come in two basic types, namely passive and active.

Passive tags are powered by radio waves from the reader which energizes the passive tags that enable it to transmit the ID and data to the reader.

Passive tags are best suited for short-range applications of below 30 cm up to several metres.

Active tags have their own batteries, which last up to five years depending on its applications, so they can be used in long-range applications such as tracking the movement of bulk assets, vehicles and persons in warehouses, military camps or oil refineries, the movement of containers in a port, track assets such as lorries, heavy machinery and so on.

For example, in high security areas such as military bases, certain hospital zones, airports and oil refineries, RFID can be used to track the movement of authorized vehicles entering the facility to ensure they go to their specific destination and that they leave the area afterwards. Alarms may be triggered if they exceed a time window or encroach into unauthorized areas.

RFID security gates

RFID can also be used to track the weapons inventory by identifying a particular weapon, such as a rifle to particular soldier and if any attempts are made to remove weapons without authorization, it will trigger an alarm. In this case the tags are embedded in the weapon itself.

Opportunity and apprehension

While technology entrepreneurs may savour the business opportunities that RFID offers, others fear its use by governments and those in authority to enhance and extend their capabilities and capacities to monitor and control their citizenry as a sort of "big brother" as depicted in British author George Orwell's book, '1984'.

While the end of the 1980s saw quite an opposite world to what Orwell describes, concerns still remain that the world scenario he depicted would come to pass later, while others with certain religious convictions, especially when implanted under one's skin, as one of many indications of the rule of the ungodly and a step towards the end of world as we know it.

There are also those who simply see it as enabling greater invasion of their privacy.

However, it appears that RFID is gaining acceptance and unless there's a big public backlash against it, it looks here to stay.

Big and growing market

The global market for RFID is big and growing. In its latest report, RFID Forecasts, Players & Opportunities 2008-2018, independent analysis and research firm, the UK-based ID TechEx Ltd, forecasts that the global RFID market will be worth US$5.29 billion in 2008, up from US$4.93 billion in 2007.

These figures include the value of RFID tags, readers, as well as software and services for RFID cards, labels, fobs and all other form factors.

ID TechEx expects the global RFID market to grow to $26.88 billion in 2017, including new markets that are being created, such as for real-time locating systems, itself expected to be worth over US$6 billion in 2017.

The tagging of pallets and cases as required by retailers – currently mostly in the United States -- is expected to use about 325 million RFID labels in 2008, but ID TechEx sees strong uptake in retail outside mandates, for example, the British department store chain, Marks & Spencer which has used well over 100 million RFID tags to date.

The tagging of farm animals is quickly taking off as more countries and territories are making it a legal requirement, with 90 million RFID tags being used for this sector in 2008, with most use being in places such as China and Australia.

Overall, 2.16 billion tags will be sold in 2008 compared to 1.74 billion in 2007 and 1.02 billion in 2006.

RFID spending in East Asia was expected to be worth US$2.7 billion in 2007, of which China will spend US$1.9 billlion or 70% of East Asia spending.

The Malaysian scenario

Malaysian technology entrepreneurs haven't been sitting still. Many are involved in implementing RFID systems and solutions, while others are actively involved in research and development of RFID equipment and software.

RFID technology has hitherto been far too expensive for commercial use until this new century, though it's still too costly to use them to tag every small item such as a soft drink can.

"With current RFID readers costing US199 each and active RFID tags costing between US$30 and US$50 each, they cost far too much to use for tagging down to item level," said Liew Chon Lian, chairman and chief executive officer of MDT Innovations, a Malaysian company which develops

The writer, who is the current chairperson of the RFID Society with samples of RFID readers, passive and active tags

level, other megastores are following suit and what MDT has achieved is the ultimate goal of RFID use in manufacturing, systems integration, distribution and end users," Liew added.

MDT Innovations received the MSC Malaysia APICTA 2007 Prime Minister's "Best of the Best" Award for their MD770R RFID Reader Module on 17 May in conjunction with the recent World Congress on Information Technology 2008 (WCIT 2008) in Kuala Lumpur.

Liew claimed the MD770R which MDT invented, to be the world's smallest RFID reader module, measuring 9 x 9 mm (smaller than a Malaysian 10 sen coin) or 1/16th the size of competing readers and at 1/20th their cost.

Instead of transmit and receive channels, the MD770R uses a resonator for transmission and reception and it's compatible with ISO 15693 and ISO 14443-compliant RFID tags.

Even before it won that prestigious award, MDT had received much interest in its RFID products from India and China, while Silicon Valley companies were interested in forming partnerships with it. MDT is on the lookout for funding to manufacture its modules in Malaysia, instead of Japan where it currently assembles them.

RFID Society

There's been a growing interest in RFID in Malaysia for several years, leading to the idea for the Persatuan RFID Malaysia or RFID Society of Malaysia being mooted about three years ago and its application for registration with the Registrar of Societies (RoS) in 2006.

To date membership comprises about 50 members, including companies from various industries, lecturers and students from Malaysian universities and personnel from government agencies. However due to some RFID applications being of a high security nature, including in national security the RoS is still vetting the membership. Until full approval, it exists in protem form but have been allowed to conduct certain activities but not to collect funds.

RFID across the world

The worldwide trend is to use RFID to track merchandise but this is still expensive but it helps reduce costs of tracking where books are in a library, as well as operational costs.

For example, RFID tagging of books allows libraries in Switzerland to let borrowers return books at night, while most university libraries in Malaysia and National Library use passive RFID tags to track their books.

Besides books, RFID can also be used to tag other modern library items such CDs, VCDs and DVDs.

One key advantage is at check out, where instead of the clerk keying in each book's library code or scanning its bar code one by one, readers can check them out themselves by using their library card in conjunction with passing a stack of up to 10 books at a time past the RFID reader.

This also allows for automated monitoring irregularities in borrowing.

For example, in Switzerland, if the system detects that a minor has borrowed an adult book, it will trigger an alarm likewise is when someone tries to borrow an especially expensive book only meant to be read in the library.

Library users tend to have the lazy habit of putting say a book on biology back onto a shelf for books on history or they selfishly secret a good book they've found in some place where other students are unlikely to find them and discovering them in manual audits is a long and tedious task for library staff.

However, with RFID tagging, staff just walks down the aisles with an RFID handheld reader, typically with a range of one metre and they not only identify all the books on the shelves but also those which are on the wrong shelves and those which are hidden.

RFID also enables the management of books to be automated by seeing which books are in high demand, those which have a high turnover rate, hence higher wear and tear and to plan their replacement cycle in advance. European libraries that invested in RFID systems have reported a good enough return on their investments to justify their adoption of RFID systems.

RFID tagging in libraries began in the late 1990s or early 2000s and the initial high cost of tags was certainly a deterrent back then but now tags are much more affordable, with prices 70% lower than back then.

Also prices of passive tags which typically cost RM15 each three years ago now cost as low as RM2 each based on quality and volume or even below RM1 for high volume.

Personal tracking

RFID tags can also be used in personal tracking of prisoners, students or pilgrims going to Mecca.

For example, university in the north of Peninsular Malaysia is collaborating with the government to test it out.

Such tagging does not involve below skin tag implantation but is implemented in a bracelet or chains worn by the persons.

Besides tracking patients, healthcare applications could also use either passive or active tags to track the movement and whereabouts of a hospital's expensive portable medical testing devices which are shared among its medical staff.

A hospital is also implementing RFID tracking of pharmaceuticals down to the box to prevent abuse and pilferage, while enabling better auditing and inventory keeping.

In safety applications, especially in factories, industrial plants or work sites, active tags could have panic button which users can press when in distress and summon assistance, such as when they feel themselves passing out due to inhalation of hazardous gases or other reasons. This has already been implemented in the oil and gas industry overseas and Malaysia will follow soon.

RFID-enabled ID cards can also be used for access control into restricted or hazardous areas in oil refineries and the system will sound an alarm if someone enters an unauthorised area.

It can also trigger the alarm if a person has not moved for too long and summon assistance, which helps prevent fatalities.

Manufacturing

Some members of the RFID Society use active RFID tags to track the movement of products at various stages of the production process to identify the bottlenecks and assess the efficiency of the production line, so they can improve the production process.

Such factories would include garment factories, where products require multiple processes to make them and where volume is generally high.

Also related to manufacturing is the use of RFID in tracking the number of palettes loaded on lorries. Tracking of individual items on the palettes is generally not yet done in Malaysia due to cost, unless the customer, such as Wal Mart demands it.

Tagging individual items would enable mass check out of supermarket items simply by pushing the trolley they're in past the RFID reader and paying for them, thus speeding up the check out process, instead of having to take them out of the trolley and put them on the counter for the clerk to check out, then put them back in the trolley again after paying for them.

However, such applications are still said to be not feasible in Malaysia yet due to the relatively low labour costs here.

Potential for growth

Overall the RFID Society of Malaysia sees huge potential for application of the technology in manufacturing, road tax, the national identity card, other identification and security cards, in secure car parking, ticketing and payment systems, as well as for tracking the movement of children in shopping malls.

RFID Access Control

For example, Malaysia could potentially have evergreen road tax disks based on RFID tags, where one just has to pay the road tax and the counter staff would just update records of payment and its validity stored within.

However, it may take between 10 to 15 years before this is viable, when prices of RFID readers are low enough for them to be issued to all inspection and enforcement personnel and it will also require re-writeable RFID tags.

There is also a plan to set up an RFID special interest group within the Institution of Engineers Malaysia, so that engineers can promote the technology, its applications and to share knowledge.

The regulator's role

The Malaysian Communications and Multimedia Commission's (MCMC's) role in RFID is to regulate its use of frequency spectrum, such as 919 MHz to 923 MHz used in Near Field Communications (NFC) or short haul communications in general.

SKMM ensures there is no harmful interference with communication systems and devices, especially by longer range RFID equipment.

Some RFID devices operate in the unlicensed ISM (industrial, scientific and medical) band, while some countries use lower frequencies to achieve longer range but these could interfere with other communication, especially emergency services and the functioning of certain equipment. .my

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