Automated field data collection and real time reporting

Mobile RFID systems provide instantaneous, accurate and simplified data collection for numerous field applications

Executive summary

For organisations that have to keep contact with employees in the field — whether they're maintenance workers, meter readers, security guards or cleaners — communication can be a real challenge. Traditional methods of recording work done or reporting faults rely on batch transfers or paperwork completed at the end of a shift, so are often slow, inefficient and prone to error.

Field service companies require a simple data collection system that works in real time, transferring to the field operative's manager a record of work done, or a report of a fault, at the moment it is recorded. This would eliminate the inefficiency and inaccuracy inherent in offline and paper-based systems, and provide managers with an accurate and immediate view of the status of their field operations.

An elegant solution to this challenge is to attach RFID tags to field assets, which personnel can read using a simple handheld device — preferably a mobile phone so that data read from tags can be transmitted immediately. These tags can be attached, for example, to the check-in points for a security guard or contain the status details of an asset to be checked. When a field operative uses the phone/reader to touch an RFID tag, the phone transmits the tag's data to a server, providing an instantaneous record.

For field operatives, the solution is easy to use and requires them to carry only one device — a mobile phone. For management, mobile RFID provides greater efficiency and control because information is sent in real time, making it easier to respond quickly to any omissions or faults. Communication is two-way, so information can be sent from the manager to a field operative's mobile phone.

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The challenge for field service companies

Firms that employ field service workers often face problems when it comes to collecting accurate and timely information from their employees, dealing with a fault that has been identified, or just knowing that a job has been completed.

For example, a maintenance and repair company that employs field service engineers to check the operation of refrigeration equipment. Typically, the engineer will enter the status of each item into a paper or electronic form. This information is then returned to the office at the end of the shift and recorded in the maintenance database. The process is inefficient and has potential for error:

1   If the system is paper-based the information has to be entered twice, first on site and later to record it in the maintenance database. Re-keying the information this way can lead to errors.

2   Information in the maintenance database inherently lags the actual status of equipment in the field by whatever time has elapsed between recording the data and filing the report.

3   The manager has no guarantee that the field service operative has really checked the items.

4   If there is a fault with a particular item, it may take time to correct it because of the delay in filing a report.

The same problems of inefficiency and lack of control can apply to any organisation that employs field workers. A simple and robust field data collection system is required, and some firms have turned to RFID (radio frequency identification) technology as a solution.

What is RFID?

An RFID system comprises three main elements: electronic tags, tag readers and software to store collected data.

The tags, which consist of a silicon chip and an antenna, provide each individual object to which they are attached with a unique identifier. When scanned, the tag transmits a wireless signal to the reader, which in turn sends the data to a database. The reader can also write information to the tag if required.

RFID technology is becoming prevalent in logistics where the movement of mobile tags, for example on pallets of consumer goods, is read by static readers, say, in goods in/out bays of a warehouse. However, for field service applications, this concept is reversed: the tags are static and the readers are mobile, ie carried by the field service personnel. Tags can be attached, say, to a fixed location for proof of attendance, or to a specific item of machinery to be checked.

How RFID can be used to help field service companies

If the tag reader is combined with a communications device, such as a mobile phone, RFID technology can give field service companies a much greater degree of control over what happens in the field. The engineer who has to check a set of items is now able to scan each item with a phone/reader, and that information is immediately transmitted to the maintenance database. If required, client software on the phone can enable the user to enter additional relevant information. This means that:

1   There is auditable proof that the job has been completed.

2   The database displays real-time information.

3   The potential for error is reduced because data is entered only once and the majority of data is extracted automatically by the reader from the tag or entered using a menu-driven interface.

4   A faulty item is identified instantly and so can be dealt with more quickly, increasing customer service.

Mobile RFID in action: JC Decaux Finland Oy

JCDecaux Finland Oy employs field personnel to maintain outdoor advertising sites; they have to report on the number of articles they take to or from the warehouse. Traditionally, employees had to keep a paper record of this and enter it into the company's information system at the end of the working day. From the employees' point of view, this was time-consuming; from the point of view of the company, it was inefficient and prone to error.

To solve this problem, JC Decaux uses Nokia Field Force Solution. There are RFID tags next to each item on the warehouse shelves. Employees touch their phone reader to the RFID tags that identify the articles, and then enter the work order and the number of articles taken using the keypad on the mobile phone. The client software on the phone sends the information over a secure link to the company's information management system via a server hosted by Nokia.

The new system is faster, more efficient and more accurate. New work assignments are sent directly to the employee's phone, further saving time.

Obviously the phone/reader has to be very easy to use, eliminating the potential for error and minimising training. It also has to be robust so as to withstand the rigours of field work.

Readers can also be used to read an RFID personnel badge, so a field employee can log in each day, linking a reader to a specific person. The tasks the employee carries out can then be time-stamped, and an alert raised if a task isn't carried out in the right sequence or at an appropriate time.

Applications

Here are some examples of mobile RFID systems used in field service scenarios:

1 *Security*
A security guard may be expected to patrol a site at particular intervals, checking a number of locations in turn. By putting an RFID tag at each location, and specifying the order in which they must be checked, the organisation can make sure that the guard is checking the locations at the right time and in the right order. If a location isn't checked, exception can be raised, to guard and supervisor, if required. Clearly this will improve safety for guards patrolling remote sites at unsociable hours. The use of a time stamp means that the customer is billed for the exact amount of time the security officer spends on the site.

2 *Service & maintenance*
Engineers can report the status of equipment in the field. Information, such as time-to-next-service, warranty period, upgrade history and revision details can be held in the tag and transmitted immediately to base, furnishing a real-time overview of equipment and, for example, accurate parts provisioning.

3 *Utilities*
Field workers can read meters, report on their location and status and receive service information and updated instructions while in the field.

4 *Healthcare*
Mobile RFID can be used to monitor the time and attendance of community homecare workers with tags in the patient's home read by the healthcare worker's phone, proving when and for how long the healthcare worker visited. Tags embedded in wristbands can also allow accurate patient identification and show when the patient was last visited, what medication was given, and by whom.

5 *Pharmaceuticals*
By tagging medicine bottles and containers with individual IDs, it is possible to keep track of their exact location and reduce the potential for forgery.

Why Nokia Field Force Solution?

Nokia Field Force has been designed to be very simple to use. Its one-touch operation uses technology that most field operatives will be already comfortable with — a mobile phone. It has the following components:

1 *RFID/NFC shell*
This is an RFID reader that is attached, like a replacement phone cover, to a Nokia 5410 or 3220 mobile phone.

2 *Local Interactions (LI) client software*
This is a customer-specific application with a simple menu-driven interface that resides on the phone. It transmits the data read from the RFID tag to the LI server.

3 *Local Interactions (LI) server software*
This receives information from and sends information to the mobile phone over a secure encrypted link. The data is stored in a format that can be extracted easily in real-time into Excel or other reporting application. The LI server is available both as a Nokia hosted service and as a purchasable software package.

Mobile RFID in action: Biffa

Waste management company Biffa adopted RFID tagging to meet new European legislation demanding that waste containers out in the field have to be checked by engineers, and a record kept of each check.

To meet the requirements, Biffa also adopted Nokia Field Force Solution, attaching RFID tags to all the containers. Each time an engineer touches the RFID tag with the reader, it sends a message to the waste container coordinator that the container has been checked, and the time it was checked. At the same time, the engineers instantly report on which containers have passed the inspection and which failed, so Biffa has a record of which containers are in use, and which are damaged or quarantined.

As well as enabling Biffa to comply with the new legislation, the system has improved efficiency in the organisation. Biffa now has a central view of the location and repair status of every waste container. Previously this information was held on paper, at a regional level. Now the company can see where it has spare capacity so that if it needs more containers in one region, it can bring into service unused ones from another region, saving money on buying new containers.

Conclusion and call to action

RFID-based systems provide a simple and effective way of ensuring that field data is collected and transmitted in real time, with guaranteed accuracy. Information can also be sent to the field operative, so that errors can be rectified immediately.

For field workers RFID can provide an easier way of doing the job. Automatic time-stamping and location-tracking means that employees no longer need to phone back to the office to report on where they are. The laborious manual process of filling in paper forms is replaced by an automated process that requires minimal effort. A worker who encounters a difficulty can notify the office and receive immediate instructions on what to do next.

The use of an RFID reader attached to a mobile phone means that employees have to carry only one familiar tool item — a mobile phone. One-touch operation requires minimal training.

Organisations using Nokia Field Force Solution have already discovered the benefits of being able to track and record the work of field employees more closely. As well as eliminating inefficient manual processes, Nokia Field Force makes it possible to take a centralised view of work done. Not only can an individual problem be identified, and therefore rectified, more quickly, but the use of reporting software makes it possible to identify continuing problems or failures.

At a time of increasing regulatory burden for many businesses, the ability to monitor and record tasks done is invaluable. Nokia Field Force is able to provide a permanent, authoritative audit of when a particular task was completed and by whom. A third party, such as an auditor or customer, can see an accurate, real-time report of the organisation's activity.

In a rapidly moving world, modern businesses know that their customers expect them to be more flexible, more responsive and more efficient than ever before. Nokia Field Force enables businesses to deliver on all three counts.

For further information about Nokia Field Force Solutions go to www.nokia.com/fieldforce or email FieldForce@nokia.com

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