Using low cost mobile phone technology to empower the utility workforce and enhance operational effectiveness

Field workers make up a significant proportion of most utilities workforces, and in many cases, these workers continue to perform their work in the same way as they have done for the past 25 or more years. Given the dramatic advances in ICT technology, it is time for utilities to re-examine how they support their field operations, and many utilities are starting to investigate and in some cases implement mobile computing and wireless workforce management (WFM) solutions. There are considerable advantages to utilities if all their field workers can be connected to their back offices. These advantages include increased efficiency, cost savings through better utilisation of resources, reduction of administration costs, more accurate and immediate data, and improved customer service.

The opportunity for the universally connected utility field-worker is becoming a possibility due to declining hardware and software costs, and the increasing availability of low cost wireless data infra-structure.

This paper examines how utilities can achieve universal connectivity at low cost, and looks at two applications of this in the context of revenue protection.

Wireless workforce management system trends

Many traditional wireless workforce solutions are built on client server architecture. This is where a client application, running on the mobile device interacts with a server to perform its function. In this model, the client application requests information from the server, via a communication channel whenever it needs to, but most functionality is embodied in the client application itself.

There is however, a clear trend for workforce management solutions to move away from client-server to a web-based architecture, with many vendors and utilities embracing this approach.

In the web-based architecture model, the mobile device uses a thin-client – such as a web-browser - to interact with server based applications to provide the mobile WFM functionality. Web-based architecture has significant advantages. Web-based architecture makes it relatively easy to build an interface for a mobile device to interact with utility systems – such as the customer information system (CIS). As functionality changes on the back-end, these automatically filter through to the mobile environment. Another advantage

is that it increases hardware flexibility. A key to providing universal wireless mobile access to field workers is the necessity that applications can work seamlessly across a number of different types of mobile devices. These could range from customised hardware, to low-cost consumer smart phones and tablets. The burden and disruption of upgrading traditional client-server based mobile software is considerable, and increases exponentially as the number of mobile devices increases.

Although client-server based mobile workforce management will remain relevant for some time – especially where utilities have already made an investment in this technology – utilities that are investing in new systems will be wise to consider web-based solutions.

Solutions built on web-based architecture, will in some cases still need to be supported by a new generation of client side application – built on web-based/tablet/smart phone operating systems – which provide increased portability across multiple hardware devices and easy maintenance.

An example of this kind of operating system is Android. It is interesting to note the explosive growth of this Google supported environment. Currently 400 000 Android based devices are being activated daily, and Ovum, a market analyst, expects Android to be the dominant smart-phone/tablet operating system by 2016. Currently, it holds a market share of 29%; the balance shared by IOS (Apple), RIM (Blackberry), Microsoft and Symbian. Android is supported by a number of major hardware vendors – including Samsung, Motorola, HTC, and given its open-source nature is likely to become a platform of choice. The other two important mobile operating systems – IOS and RIM – are equally relevant, and any wireless WFM system should support all of these platforms to enable universal access across a number of devices.

Mobile hardware trends

The rapid growth of smart-phones and tablet computers is transforming the options available to utilities, and making the vision of the universally connected utility fieldworker a possibility. Although most existing solutions use expensive customised hardware, some analysts are expecting to see an increased shift to these new low cost hardware platforms for some workers.

Each platform has its advantages and disadvantages, and some mobile utility workers will require the functionality and interface that a full sized computer can offer; however it makes most sense to make use of hardware appropriate to the specific role of the fieldworker – and in many cases, smart phones and tablets can provide the optimal mix of functionality and capital cost. It has been suggested that upwards of 70% of the utility field force can be served using smart-phone devices.

To give an example of how hardware costs have declined – Motorola's MB525 Defy Smart Phone – which is Android based, fully scratch, dust and water resistant, incorporates a high quality camera and GPS, is available for around R 135 per month in South Africa, including 30MB of data! At this cost level, universal fieldworker connectivity becomes more than viable.

Wireless coverage

Although wireless coverage is almost universal, there are still environments where it may become unavailable – and although for some utility applications this is not critical – for others it is important that the applications can continue to operate. We believe this is best provided by a self updating, flexible smart 'app'. This will enable the fieldworker to seamlessly operate irrespective of being connected to the wireless network or not. As soon as the device 'reconnects' with the network, it will upload any data that was collected while offline, and will download any operational data that it may have 'missed' while being disconnected. This allows the system to operate as near real-time as possible, with no manual overhead of synchronisation or application maintenance.

Utilities large and small

The trend of rapidly decreasing hardware cost, moves towards web-based architecture and increased wireless coverage means that wireless WFM solutions are becoming accessible to all utilities irrespective of their size, with payback periods for these investments decreasing to less than 18 months in most cases. There may also be a shift over time to application service provider (ASP) models, where software is 'rented' by utilities rather than being owned by them. Although there is still some resistance to this model by utilities, this is a trend that is re-shaping the entire software world and utilities will likely follow suit – especially smaller utilities such as co-op's and municipals will find this an attractive model.

Job functionality

As new utility work processes get designed, supported by appropriate mobile technologies, it is likely that the utility workforce will have to take on new roles and responsibilities. Being virtually connected, and having real-time access to back-office systems means that field workers can do more than they have traditionally done in the past – it opens up opportunities for field workers to become more multi-functional rather than performing rote functions. This can range from reporting and resolving problems more rapidly, to being able to up-sell services to customers.

Flexible wireless WFM software tools

Many utility operational processes can benefit from wireless enablement. These include outage management, service orders, meter reading, asset management and inspection, customer service, revenue protection and much more. Most of these make use of custom built solutions to implement specific functionality.

Touchwork has developed SurveyThumb, which is a flexible wireless application system that enables utilities to develop mobile wireless applications on-the-fly. Using the system, utilities can identify work-processes that can benefit from automation, define both front-end and back-end functionality, and deploy these solutions in the field. This provides great flexibility to the utility as well as cost advantages over fully custom solutions.

Although a detailed discussion of the system is outside the scope of this paper, the tool is based on the following concepts:

- Fully configurable access control
- Concept of assets that are optionally linked to locations – assets can be of any type – meter, seal, transformer etc
- Route management
- Fully flexible data capture structures, including photo's and geo-location data
- Workflow
- Integration with back-end databases
- Fully flexible dash boarding and reporting

Using SurveyThumb, utilities can obtain the benefits of a customisable wireless workforce application, that is fully supported across multiple devices, universally accessible, and offers accelerated ROI.

In addition, Touchwork offers a suite of pre-defined applications, built on SurveyThumb, that implement specific functionality targeting the utility environment. These products are part of the Utiviti family of products.

Revenue Protection Applications

The previous discussion provided an overview of trends in wireless workforce management in general and a discussion of a technology framework that enables utilities to virtually connect the majority of its workforce at low cost using smart phones and tablets.

Wireless WFM can have specific relevance for revenue protection departments, since many RP processes are field intensive. In addition, many RP departments are under-funded, and

being able to derive field automation benefit at low cost is important from a budgeting perspective. This paper will describe two examples where this combination of technologies and tools can deliver value.

Example 1 - Seal management

A core principal of revenue assurance is integrity of the seal serial number management process. Without auditable seal tracking at each stage of the seal's life, it becomes impossible to rely on the integrity of the sealing process. The above wireless WFM model provides an easily deployable system where seals can be tracked from birth to destruction, with absolute data integrity through each stage (state) of a seals life.

Typically, seals go through the following stages or states:

Seal delivered to store -> Issued to meter installer -> Installed on meter -> Removed from meter -> Destroyed

The system uses mobile phones or other devices, running SurveyThumb software with secured log-in to record each seal transaction, and change of state.   Photographic evidence is used at certain stages to confirm for example that the seal is installed on a meter, or that it has been destroyed. Similarly, there is a two way hand-shake between parties to confirm who is responsible for a particular seal at any particular time. Responsibility for a seal is only transferred once the receiving party acknowledges receipt of this responsibility.

Using this system, any fieldworker can test whether a seal installed on a meter is the correct seal, and utility managers can track the location of all seals at all times, thereby ensuring procedural compliance, and identifying problem areas as soon as possible.

Example 2 - Ad-hoc meter inspections

Another area where universal access to wireless WFM can offer value is in the area of meter inspections. If all utility fieldworkers are connected, typically through their mobile phones, they can all have access to a web based meter inspection application. If any worker – for example a meter reader – comes across a suspicious installation, they can immediately report suspected tampering and collect evidence on the fly. For example, a meter reader would be able to check the seal number, take and upload photographs as evidence of tampering before there is the chance of it being removed and immediately open a tampering case for further investigation. All of this is done in real time using a standard mobile phone!

Conclusion

Utilities are exploring wireless workforce management applications that are built on web-based architecture, and that operate on low cost devices. There are significant benefits to automating as many utility processes as possible. The opportunity to deploy a flexible software platform means that utilities can leverage their investment and can deliver flexible solutions. The low cost nature of this approach means that many smaller utilities can also obtain the benefit of wireless workforce automation. Although this paper has only touched on two possible areas within the revenue protection space, there are many other opportunities within the utility environment where much value can be obtained. Ultimately, utilities are data driven organisations, and having better real-time mechanisms to collect and manage data results in better operational management, efficiency and competitiveness.

Biography

Rudi Leitner is co-founder and CEO of Touchwork, a company based in Cape Town that specialises in mobile business applications, including the *SurveyThumb* mobile software system. Rudi has a specific interest in smart metering and smart grid technology, and has consulted to numerous clients around the world. Before starting Touchwork, Rudi was founder and CEO of Spintelligent and created the associated family of brands ESI- Africa, Metering International and Mining Review Africa. Metering International has become the leader in providing media channels to the global metering and smart grid communities, and the portfolio includes Metering International magazine, metering.com, and more than 15 annual conferences and exhibitions serving the utility sector across the world. Spintelligent was sold to Clarion Events in 2009. Prior to establishing Spintelligent, Rudi worked as a consultant to the prepayment metering industry. He holds a B.Sc. (Elec) Eng degree from the University of Cape Town.