

REMOTE PLANT MONITORING AND OPERATION THROUGH HAND HELD DEVICES



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ABSTRACT

Handheld devices were trialed in-house with existing remote access and SCADA technologies. After successfully trialing these devices, they were issued to staff throughout Cairns Regional Council, this included treatment plant and reticulation staff.

The main goal was to allow portable remote access to the SCADA system, especially for on call, after hours support. There was also an additional benefit found after deploying these devices to larger plants. This is that staff can take the SCADA system with them throughout the plant instead of having to return to a control room.

1.0 INTRODUCTION

Cairns Regional Council has 11 treatment plants with SCADA systems attached to them, along with a reticulation SCADA system that monitors over 300 pump stations, reservoirs and intakes.

Remote access to Cairns Regional Council SCADA systems has, in the past has been more complicated than necessary and this has made it difficult for staff for several reasons.

Staff had to learn additional IT related issues and how to deal with them. Laptops used were portable, however were bulky and had a short battery life. Also time taken to access the SCADA system was too long. Extra support was required from the SCADA team to assist with these issues on a regular basis.

Remote access was achieved by using a laptop with a separate 3G modem. To access the SCADA system required many steps before actually reaching any SCADA screens. As a result, this lead too many staff simply calling the SCADA team to check SCADA screens instead of logging in themselves.

Feedback from staff on remote access to the SCADA system was very negative. There were complaints about complexity and time taken to fix the simplest of problems.

To address these issues Apple iPads were trialed within the SCADA team to assess their suitability to access the SCADA system and whether they would address the issues above. It was found these devices made remote access very easy, simple to use and very portable. There is also a significant increase to battery life, thus increasing portability. Also no changes to the SCADA system were required to have iPads access these systems.

Significant cost savings were identified while trialing the iPads. The iPads are costing approximately 1/3 the cost of previous remote access solutions.

After deploying iPads to staff across the organization, feedback from staff was very positive.

Staff commented on ease of use and on short amount of time required to access the SCADA system. Another positive factor is that staff can be a lot more mobile while on call after hours.

2.0 DISCUSSION

2.1 Remote Access to SCADA before Handheld Devices

Originally remote access to the SCADA system was achieved via a laptop with a separate 3G modem for network access. To achieve a remote connection the following steps would be performed:

1. Turn on laptop
2. Log into Windows
3. Connect 3G modem to laptop
4. Connect to Internet via 3G modem
5. Connect to VPN server (This creates a network connection to the Cairns Regional Councils' network)
6. Connect to SCADA Server to monitor and operate plant.

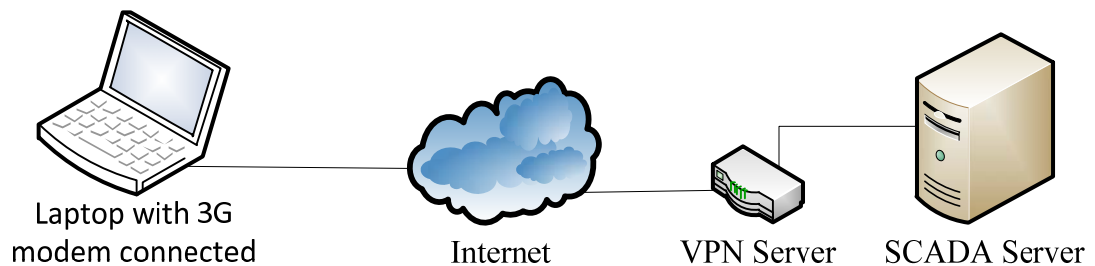


Figure 1: *Graphical representation of login process*

Steps 1 and 2 were the main reasons for causing this process to take an extended period of time. This process required the operator to login 3 times, once at step 3, 5 and 6. This is unnecessary, time consuming and can cause problems like account lock outs due to incorrect password being entered.

The process of configuring a new laptop was also time consuming and required extra time to explain to the end user how to login to the SCADA system. Extra software would have to be installed on the laptop for operation of the 3G modem. Also software had to be installed to make the VPN and SCADA connections.

There are several maintenance problems with having laptops. Being a Windows operated laptop, virus protection and Windows updates had to be performed on a regular schedule. Battery replacements would have to be done 1-2 times within the lifetime of a laptop. Accidental breakages of the 3G modem would also occur, as they connect to a USB port and would sit in a position that makes them susceptible to bumps and knocks.

2.2 Handheld Device Configuration

The handheld device that was chosen to be tested and implemented is the Apple iPad tablet. This device has a suitable size screen for viewing SCADA screens while still being small enough to maintain portability. Additionally no modification was required to be made to the existing SCADA system or remote access methods.

The iPad is a touchscreen tablet with a built in 3G modem for network access.



Figure 2: *iPad handheld device*

The process to login with an iPad is a very simple process, as described below:

1. Wake up device (Instant On)
2. Connect to VPN server
3. Connect to SCADA server

The above process takes minimal time to complete and is easy to learn.

Configuring a newly purchased iPad to connect to the SCADA system requires only a short amount of time. This procedure has been documented and is can be easily picked up and used by a number of the SCADA team members.

Maintaining the iPad involves very little. Occasionally there is software updates required. These are able to be completed by the end user without assistance from the SCADA team. Any faults with the iPads are returned to the place of purchase for repair or replacement. In essence once the iPad had been configured and handed to the end user it is unlikely that the SCADA team will have to do any maintenance to the iPad.

2.3 Deploying Devices to the Organisation

Deploying the devices to the organisation was a relatively simple task. As the SCADA system could be used in its current state without any configuration changes to suit the iPad. This was also true for the remote access devices. All that was needed was some configuration on the iPads, along with a SIM card for the built in 3G modem.

There were some concerns from staff about screen size being too small and that they would not be able to see smaller objects. This was overcome by a simple zoom function that is built into the iPad. There is also the option of connecting the iPad to a normal computer monitor.

Another aspect that had some minor hesitation from staff was the virtual onscreen keyboard. This can be frustrating to use at first especially when someone is used to a physical keyboard, however this was addressed with wireless keyboards.

These can range from smaller style keyboards that integrate into the iPads case or full size desktop keyboards. Portability is usually a factor when deciding what size keyboard to use.

At present iPads are currently deployed with standard cases for basic protection from drops and knocks; however it is planned to purchase shock resistant and dust proof cases which make the iPad more durable in harsher environments.

Cost of supplying remote access is greatly reduced by replacing laptops with iPads. With the laptops that were being used for remote access there was the cost of buying the actual laptop and the software loaded on to the laptop. Additionally there was an initial cost of buying a 3G modem to give the laptop network access and a monthly fee to maintain an account for 3G data access.

Costing for iPad is significantly cheaper. Initial purchase price of the iPad and software and 3G network access are all substantially decreased. No 3G modem is required to be purchased as this is built into the iPad. As a result an iPad with everything needed to connect to the SCADA system along with case and keyboard is costing approximately 1/3 the amount that the laptops that were originally used.

Staff also found other features of the iPad useful as well which were implemented after a lot of interest was shown. Examples are access to other corporate systems like email, internal web sites and mapping software. Also several other software applications that available on the iPad have become popular, like note taking applications (inbuilt camera also gets used here) and phone directory software, which integrates with the Cairns Regional Councils' internal phone directory.

3.0 CONCLUSION

The handheld device rollout for the Cairns Regional Council has been successful in all of its goals and is being widely accepted by staff as a easy to use means of remote access to the SCADA system.

Staff are finding their duties are not impacting their personal life as much due to the ability to go about their business and be able to carry an iPad easily and conveniently.

The SCADA team is receiving fewer calls during and after hours to assist with remote access issues and are able to focus more time on other SCADA related matters.