

OneBase InSite[®] Connect Business Case



Executive Summary

OneBase InSite Connect is developed as a product to control and monitor several processes, remotely configure site equipment and consolidate alarms for various devices in a cell site. While many base station vendors offer some level of dry contact alarm management, InSite Connect is designed to provide more than just dry contacts, radio, and antenna alarming. It works in conjunction with subsystems from multiple vendors to enable centralized and remote access to those systems for monitoring, configuration, and other actions. The number and types of ports on an InSite Connect RCU (remote control unit) are intended to support a typical variety of devices. Dry contacts provide for basic monitoring while serial, USB, and Ethernet ports provide for remote monitoring and configuration of various selected devices. One such device is an IP remote controllable thermostat installed for energy savings through a passive cooling algorithm, a particularly significant operational cost.

InSite Connect also reduces on-site visits through its ability to monitor, control and reset certain alarms, provide initial problem troubleshooting, better equip dispatched technicians to minimize return trips, remotely configure selected devices in a site, and more efficiently manage energy consumption. The InSite Connect serves as remote eyes-ears -hands in all sites throughout a network. This is truly a solution for many of the challenges faced by wireless carriers, or anyone managing a remote network of just about any kind, in difficult economic environments.



Situation Analysis

Problem Description

As the wireless networks continue to grow and become more complex, the demand for increased maintenance also grows and it becomes increasingly more challenging to identify ways to make improvements in the efficiency of distributed network infrastructure management. The wireless marketplace has become more competitive and any operating expense saved on network maintenance without compromising network performance goes right to the bottom line. Five key areas with potential expense savings are identified below.

Cell Site Visit Expenses

One key expense associated with infrastructure maintenance regime is the cell technician workforce.

Cell technicians visit cell sites for a variety of reasons. They go to each cell site many times a year for preventive maintenance. They visit specific cell sites to address on-site equipment configuration requirements. They also travel to cell sites to identify and repair specific equipment and often require a second visit to bring the right replacement parts and equipment after identifying the actual cause of the problem. Additionally, a cell technician may need to visit a cell site whenever a RET antenna needs to be adjusted. Each visit to a cell site by a cell technician costs the operator money.

Additionally, sometimes it is difficult to manage cell site maintenance efficiently to clearly identify recurring problems, who had to repair what, and when a repair was done. As a result, it can be very difficult to identify equipment failure patterns to determine where the inefficiencies are and how they can be eliminated.

Energy Related Expenses

Another key component that has become more critical to expense management is network energy demand. This will become even more critical as energy costs continue to rise. Studies indicate that a temperature setting reduction of just 1 degree at a single cell site or use of a fan instead of an air conditioning unit up to a certain site temperature level for site cooling will result in a significant savings over a year's time.

Crime Related Expenses

Crime is also a problem that is becoming increasingly more difficult to manage. Theft and vandalism continue to be a costly problem particularly at remote cell sites. Monitoring of sites with IP cameras controlled by InSite Connect RCU provides a cost-effective solution to crime and vandalism related problems.

Environmental Issues

Companies, particularly high-profile companies such as wireless network providers are under increasing pressure from the public and governmental agencies to become more “green” in their operations by reducing fuel consumption and carbon emissions. Network providers must find ways to prevent unnecessary cell site visits and reduce energy consumption at those sites while ensuring proper network operation. By reducing their energy usage, these companies can help protect the environment and save on energy bills, while improving their image with the public as a “green” business.

Other Intangible Problems

Reduction of OpEx goes directly to the bottom line, but over time, finding these OpEx reduction opportunities has become more and more difficult.

Clearly, the benefits associated with OpEx reduction are quantifiable. However, there are other less quantifiable areas of potential improvement.

For example, although difficult to quantify, there is a clear relationship between cell performance (blocks, drops, etc) and both customer churn and reduced airtime. There are times when due to ineffective reporting or alarming capabilities, a network provider is not aware of the fact that a particular cell site is underperforming and could, therefore, be inducing increased churn and/or reducing customer airtime both of which would negatively affect revenue.

Another difficult to quantify cost is related to the effect that inefficient cell site status reporting has on certain regulatory demands. For example, without a source of data it is very difficult to prove compliance to any regulatory requirements for minimum emergency backup power.

These examples represent opportunities for improved efficiencies, reduced expenses, and increased margin.

Solution Description

The primary objective of this proposed solution is to significantly reduce OpEx and improve the performance and manageability of the network with a quick Return on Investment (ROI).

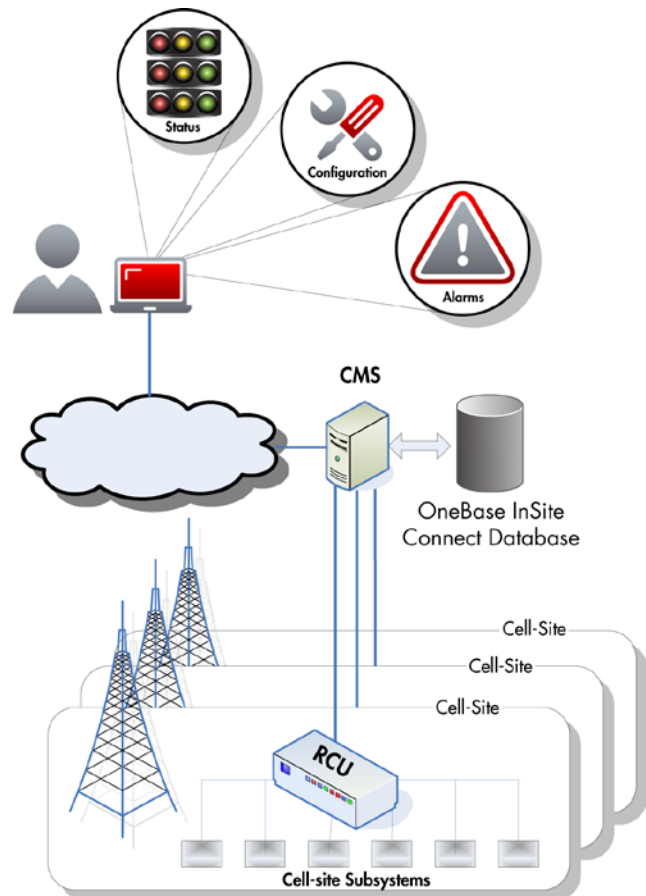
The solution that is being proposed is the adoption of the Andrew OneBase InSite™ Connect system.

The Andrew OneBase InSite Connect system is a comprehensive turnkey system designed to fully manage remote cell site equipment from centralized locations thus greatly reducing the need for cell site visits.

InSite Connect provides centralized notification of cell site alarms and equipment status as well as configuration and maintenance of remote cell site equipment. InSite Connect is a remote cell site control and monitoring solution that:

- Remotely controls and protects the network
- Tracks and measures cell site performance for peak operation
- Identifies root causes of performance problems with speed and precision
- Enables efficient, maintenance actions in case of site failures or breakdowns

The OneBase InSite Connect system is comprised of two primary components: the Central Management System (CMS) and the Remote Controller Units (RCU).



Central Management System

The CMS server is centrally installed in an operators core network and is designed to communicate with the RCU at cell sites. The CMS server is capable of managing up to 2000 cell sites. If more than 2000 cell sites need to be managed, then multiple CMS servers can be deployed. Furthermore, these servers are capable of being interconnected to perform like a single virtual server.

The CMS is not only capable of real-time cell site monitoring of equipment status, and alarming, but also is capable of scheduling site specific changes on either a one-time or a regular recurring schedule.

In addition, the CMS is capable of generating reports that summarize the cell site specific data that is constantly being gathered by the RCU units at each cell site.

Remote Controller Unit

The RCU is the central aggregation point at each cell site and provides the connectivity and control to manage all cell site operational subsystems. By design, all remote access to the cell site subsystems via the RCU is tightly controlled and is only possible through the centrally located Central Management System (CMS).



The RCU is a 1RU 19" rack-mountable unit with a total of 88 ports available for connectivity to local cell site subsystems. These ports include:

- 43 Dry contact ports (Monitoring Open/Closed conditions)
- 16 Analog ports (8 voltage and 8 current)
- 6 Form C Relay ports (Controlling cell site subsystems)
- 5 General purpose 10/100 Base-T Ethernet ports
- 11 General purpose serial ports (5 RS-232; 2 either RS-232 or RS-485; 4 RS-485)
- 2 USB 2.0 ports
- 3 AISG RET controller interface ports

The RCU can be optionally configured with three Remote Electrical Tilt (RET) Antenna controllers. With this feature, the RCU provides standard AISG interfaces for monitoring and controlling AISG 1.1 and AISG 2.0 compliant RET antennas and TMAs.

Some sample cell site subsystems that can be monitored and/or managed include:

- AC Power Transfer Switches
- Battery Discharge
- Battery Monitors
- Door entry control and alarms
- Fire/Smoke detectors
- Fuel Cell
- Generators
- Humidity Sensors
- Hydrogen Detectors
- SCPA/MCPA
- Microwave
- Power Fail
- RET Antenna Controllers
- Temperature
- Thermostats
- TMA
- Tower Light
- Water Intrusion
- Cameras

Cost Benefit Analysis

Solution Benefits

Cell Site Visit Expense Reduction

The InSite Connect solution offers centralized management of remote cell site equipment.

This centralized management provides for the measurement of cell site equipment performance, identification of cell site problems, and in some cases, cell site problem resolution without the requirement for expensive cell site visits thereby reducing OpEx.

Even for those cases when a cell site visit is still required to resolve a problem, remote access prior to the visit can help identify the actual problem and ensure that a single visit is all that is required. This reduces the expense of a preliminary site visit to identify the problem and a second return visit with the correct spares, equipment, or tools.

InSite Connect keeps complete detailed logs of every measurement, alarm, and configuration action performed at every cell site. This not only facilitates management of cell technician activities, but also provides for easy reporting on requirements such as historical battery backup power capabilities.

Energy Related Expense Reduction

Often, when visiting a cell site, a cell technician may change the temperature settings by many degrees to make it more comfortable to work. This can add significant cost if not returned to the previous temperature setting when the cell technician leaves. When paired with cell site remote-controllable thermostats, InSite Connect can identify these expensive conditions and can reset the temperature back to the standard setting.

Crime Related Expense Reduction

Criminal activities, such as theft and vandalism continue to be a problem particularly at remote cell sites. InSite Connect brings onsite IP cameras as well as motion detectors and door access control systems into play to help in crime deterrence as well as criminal detention, apprehension and prosecution.

An associated benefit of InSite Connect is the ability to remotely monitor cell site access. For critical sites, an IP remote camera could be used as a visual verification before remotely unlocking a door. Additionally, once a door alarm is noticed, remote cameras can be used to check for signs of unauthorized entry, theft, or vandalism.

“Soft” Alarm Benefits

InSite Connect provides the ability to establish flexible threshold “soft” alarms where the alarm measurement points can be remotely set (and then easily modified) to identify marginal conditions before they become critical problems. For example, these alarms can be used to give early warnings for upcoming HVAC issues when internal temperatures just start to move outside of optimal ranges but before the HVAC system is incapable of maintaining temperatures within critical temperature points.

Another example use of InSite Connect alarms is to identify when the amount of fuel in the cell site generator reaches predetermined levels. This would eliminate the expenses associated with unnecessary trips to the cell site to replenish the generator fuel when it is not yet needed or service down periods due to insufficient fuel.

RET Controlling Expense Reduction

InSite Connect includes an onboard Remote Electrical Tilt (RET) controller, hence, it supports remote tuning of RET antennas as opposed to having to send a cell technician to a site to adjust the antenna. This not only greatly reduces associated expenses, but also makes it possible to easily adjust these antennas as often as required. This will allow for very inexpensive fine tuning of the network to optimize performance.

This onboard RET controller provides standard AISG interfaces for monitoring and controlling all vendors’ AISG 1.1 or AISG 2.0 compliant RET antennas and TMA’s. Therefore, there is no need to buy separate AISG controllers for separate vendors’ equipment.

Additionally, InSite Connect can also be configured to remotely support an external stand-alone RET controller affording all of the same benefits as the on-board RET controller but with potentially more extensive functionality.

Quality Related Airtime Usage and Handset Churn Reduction

The early detection of impending problems before they become critical will have a substantial effect on the reduction of subscriber perceived quality problems that result from reduced cell site performance. Although it is difficult to quantify, this avoidance of quality issues will have a positive effect on airtime usage reduction and churn.

Consolidated Cell Site Management

InSite Connect is centralized and diversified, hence, it offers the advantage of removing the costs associated with managing multiple systems. Rather than having separate systems to manage RET control, dry contact alarms, temperature control, power management, etc, InSite Connect facilitates the management of all of these systems. This consolidated management will not only reduce software and hardware costs but will also increase reliability, maintainability, and efficiency while reducing learning curve costs.

Tangible Benefits Summary

The primary financial benefit of the InSite Connect solution is the reduction of OpEx as related to cell site operations. These expense reductions are:

- Reduction of wasted energy usage as related to temperature control
- Reduction of the number of cell technician or other maintenance related cell site visits
- Reduced expenses due to inefficient repeat cell technician cell site visits
- Elimination of cell site visits for RET antenna adjustment
- Reduced criminal theft and vandalism related expenses

Green Benefits Summary

The ability of the InSite Connect solution to reduce cell site visits, manage BTS building temperatures, and avoid costly dispatches of emergency repair crews, not only reduces yearly OpEx, it has a very direct impact on your company’s carbon footprint and preservation of the environment.

Cell site visits require fuel. The more trips taken, the more fuel burned, which translates to more CO₂ produced by your company and a larger carbon footprint. Table 1 below, provides a typical example of a carrier’s potential carbon output in a year.

MPG	15
Avg. miles to site	25
Number of sites in market	900
Times visited per year	6
Price of Gas	\$2.75
Number of trucks in fleet	50
Miles Driven	6,750,000
Gallons of fuel used	450,000
Cost of fuel	\$1,237,500
Pounds of CO ₂ produced per year	9,000,000
Tons of CO ₂ produced per year	4500

Table 1: CO₂ Yearly Output

The InSite Connect solution serves as a green partner, helping your company preserve and improve the environment while reducing your operating costs.

Intangible Benefits Summary

There are other direct benefits of the InSite Connect solution that are difficult to quantify financially. None the less, these are real benefits to the operator. These intangible benefits are:

- Identification of impending equipment problems or marginally effective equipment before critical problems arise
- Detailed history log of every measurement, alarm, and configuration action performed at every cell site. This capability provides for:
 - Better management of specific cell technician labor and accountability
 - Reporting on requirements such as historical battery backup power capabilities
- Better control of cell site access
- Reduced loss of airtime and churn due to avoidance of quality issues and reduced downtime
- Reduced costs and training requirements due to consolidated management of diverse cell site systems