



CASE STUDY

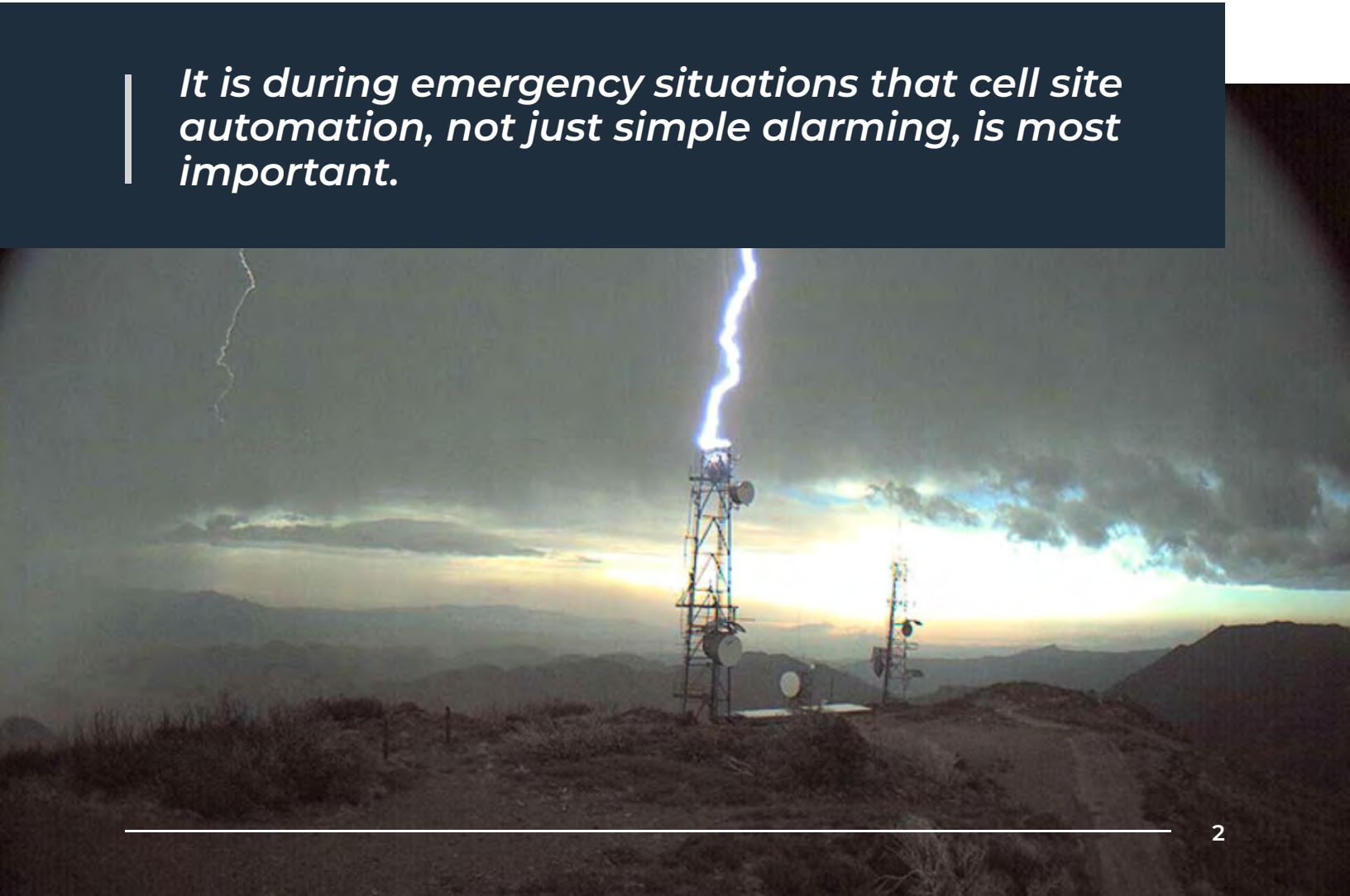
KEEPING NETWORKS ONLINE DURING EXTREME WEATHER CONDITIONS

Customer Challenge

Arguably the most critical time to keep a cellular network up and running is during an emergency situation like extreme weather or a natural disaster. This is not only when problems are most likely to occur, but also the time when fixing problems takes the most time, has the highest cost, and could be risky or impossible to accomplish. It is during emergency situations that cell site automation, not just simple alarming, is most important. Asentria has decades of experience creating solutions that allow a mobile network operator's remote sites to be as "hardened" as possible for any situation.

A regional mobile network operator (MNO) in the Great Plains region of the United States came to Asentria looking for an inexpensive and simple solution to help assist in keeping their network online during extreme weather conditions. From flooding to blizzards to tornadoes this region of the United States is struck by extreme weather conditions on a regular basis. This MNO had invested greatly in backup power solutions like generators and batteries, but was finding that they had little visibility into how ready these backup power solutions were to handle a power outage or other crisis.

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Objective

In particular this MNO knew that if they could increase visibility into how their generators were functioning, and use cell site automation to automate certain generator functions, they could avoid truck rolls to fix generator problems during emergency situations. Asentria and the network operator came up with this list of objectives for Asentria and cell site automation to solve.

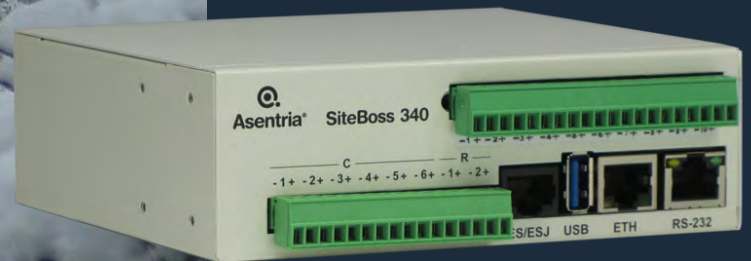
- ➔ **Fuel Level Visibility** – A backup generator is useless if it has no fuel. During emergency situations where the site may have to rely on a generator to provide power for days or even weeks it is critical that their operations staff have visibility of fuel level. Knowing detailed fuel levels is also useful during times of normal operation to make refueling more efficient or to prepare for imminent weather events.
- ➔ **Remote Generator Visibility** – Finding out a generator or other backup power has failed only because a site goes offline is unacceptable. Asentria could offer a solution that not only gives data on if the generator is running or has failed but also provide telemetry data, such as run hours, to help predict what sites will need maintenance.
- ➔ **Remote Generator Reset** – In the Great Plains, where temperatures can often reach below 0F, this operator had a problem with generators entering a fail state due to over cranking or other reasons related to the weather. Asentria aimed to offer a solution to remotely reset the generator instead of needing a tech to physically reset the generator by driving to the site.
- ➔ **“Flatten” Generator Data** – A mobile network operator may have dozens of different generator makes and models deployed across their network. Asentria’s goal is to “flatten” the data and make each generator type function identically remotely. If you want to exercise a generator remotely, you can’t have a separate process for every make and model of generator in your network.
- ➔ **Inexpensive and Simple** – For the MNO the solution cost was of utmost importance. Asentria prides itself in having flexible solutions and this means having smaller and more affordable solutions to fit more specific applications, as well as not being so complex as to add costs related to managing the solution.



Solution - The SiteBoss 340

Asentria quickly identified the SiteBoss 340 as the best fit for this project. This unit doesn't have the same modular card architecture nor can it handle as much I/O or have as many communication ports as larger SiteBoss units, but with the same scripting abilities and powerful Linux based OS it is an ideal unit when only one or two functions are needed. In this case, both generator control and fuel level monitoring were needed features. If additional features, such as advanced communications like Ethernet switches or wireless modes, HVAC control, or site access were needed, larger versions of the SiteBoss could have been used.

This particular MNO had propane generators throughout their network. Asentria was able to replace existing visual dials with a simple to install Hall Effect sensor without draining or modifying the tank, keeping the cost of the solution installation low. This is possible for most propane and diesel generator fuel tanks in North America. This simple solution allowed the MNO to have visibility into the actual fuel level for each site both visually via the dial at the site as well as in network operation center (NOC). Alarms were set to warn when fuel level had gotten to “low” and “very low” levels and “high” and “very high” levels if the tank was overfilled.



SiteBoss 340

Solution - The SiteBoss 340



Next Asentria tackled both seeing the generator status and “flattening” the generator data. This MNO had several different generator makes and models in their network ranging from old non-smart generators with just contact closures for “gen run” and “gen fail” alarms, to smarter Modbus generators with additional data such as “total run time” and “power output” through a Modbus connection. Using the SiteBoss a northbound alarm for “gen run” and “gen fail” were identical to the NOC whether interfaced with their oldest generator or their newest smart generator. Asentria used Form-C relays on the SiteBoss 340 to give the MNO the ability to remotely start the generator and transfer power from AC main power to generator backup power. By doing this through the SiteBoss the method to start the generator remotely is the same no matter the make or model of the generator. All of this remote start functionality can be added without inhibiting the generators ability to start automatically if commercial power is lost. The remote start feature also gave the MNO the ability to test their generators before an emergency situation or remotely change exercising schedules to comply with local laws and regulations.

Finally Asentria solved the problem of remotely resetting the generators. This MNO had a problem where generators that attempted to start when it was too cold, especially during blizzards, would “over crank” and go into a fail state that required a tech to visit the site to physically reset the generator. We once again used a Form-C relay on the SiteBoss 340 to simulate the tech physically resetting the generator. For the newer smart generators this involved wiring the Form-C relay to digital input on the generator and using that to clear the alarm state. For older generators though this was slightly more difficult, as the old generators don’t have digital inputs. Instead for these generators a physical switch must be toggled to clear the alarm state. For this we used a Form-C relay on the SiteBoss 340 to trigger a slim line external relay to simulate toggling the physical switch. Once this solution was completed the MNO was able to remotely reset their generators using the same method no matter what generator was at the site.

Customization

This particular mobile network operator was interested in making a custom dashboard for their SiteBoss units. The point of this dashboard was to have one screen in the web UI of the SiteBoss that would give their techs all the info they need as well as give them the ability to start the generator, transfer power and reset the generator. Basically they needed a way to wrap up this whole custom solution into one easy bundle that would make training their technicians as simple as possible.

Asentria was able to use the SiteBoss's powerful LUA scripting capabilities to make just the dashboard that the MNO needed. This shows how every SiteBoss has powerful customization tools to allow the SiteBoss to best suit the end user's needs.

The screenshot displays the SiteBoss 340 web interface. At the top, there is a header with the SiteBoss 340 logo, site name, serial, and version information, along with the Asentria logo and user login (admin). A left-hand navigation menu includes sections for Status, Settings Menu, General, Networking, Communication, Security, Events, Device Management, Scripting, Administration, Application, Power, and MySite. The main content area is titled 'Power System Information' and contains several sections:

- Running On Commercial Power**: Indicated by a red dot.
- Running on Generator**: Indicated by a green dot.
- Remote Start Generator**: A 'start' button.
- Transfer Switch**: A 'trasfer' button.
- Restart Generator Controller**: A 'restart' button.
- Transfer Switch System Overview**: A grid of status indicators for Contactor Off, Normal, Emerg, and Fault, along with Pref Source and Standby Source Avail.
- AC Mains**: A table showing voltage and source data for L1-L0, L2-L0, L3-L0, L1-L2, L2-L3, and L3-L1.
- Generator Status**: A table listing various engine and power metrics such as Engine Speed, Coolant Temperature, Pressure, Fuel Level, Battery Voltage, and Current.
- Generator State**: Indicators for Off, Cranking, Crank Pause, and Idle.

Conclusion

Today's telecom operators are faced with operating networks that are ever more relied upon by society during emergency situations. Through a crisis, the expectation is that these networks will continue to operate regardless of conditions. SiteBoss units provide a powerful tool to network operators and field technicians to provide both a wealth of information regarding conditions at a site, as well as the ability to remotely control functions at the site without a field visit.

Asentria helps create more resilient and cost-effective networks via telecom site automation. For more information on our products and the benefits of telecom site automation, visit our website at www.asentria.com.

