Center for Severe Weather Research

Doppler on Wheels, as Seen on the Popular Cable Television Series, Uses AirLink PinPoint X for Rugged, Reliable Connectivity

The Center for Severe Weather Research (CSWR) is a non-profit research organization located in Boulder, Colorado. Funded primarily by the National Science Foundation (NSF), the CSWR closely collaborates on projects with the National Center for Atmospheric Research (NCAR), Pennsylvania State University and the University of Colorado. The small organization has been fully functional since 2003, and its scope includes the Doppler On Wheels, Bistatic Network and Rapid-Scan programs; related tornado, hurricane, convective initiation studies; and educational efforts. The CSWR and its research efforts have been featured in programs on Discovery Channel, National Geographic, History Channel, CBS and NBC, as well as on PBS' NOVA.

BUSINESS CHALLENGE

When Joshua Wurman founded the CSWR, he didn't intend to have his work become part of reality television pop culture. As a university professor, he became tired of the politics of academia and began working with the NSF to create a small but nimble meteorology team to take-on project-based severe weather research experiments.

The CSWR's Doppler On Wheels (DOW) Project created several mobile Doppler weather radars mounted on trucks that permitted the first ever mappings of tornado winds, hurricane wind streaks and resolution of detailed tornado structure. The DOWs are used in a variety of storm chasing initiatives, and deploy from within a half mile to seven miles from tornadoes to measure inside, depending on the scientific mission. The DOWs stay far enough outside of the tornado to prevent damage to radar equipment and are used to track the position of smaller probe vehicles, which collect meteorological data that can be downloaded and analyzed by the CSWR team.

As the configuration of the DOWs evolved, a crude VHF tracking system was added and included a universal serial bus (USB) global positioning system (GPS) antenna. Unfortunately, the system was unreliable and often only worked out to two or three miles. As DOW usage became more frequent and the project's fleet grew, Wurman knew the communications system needed an upgrade for both efficiency and safety reasons. With probe trucks being placed directly in front of tornadoes, it's paramount to know where the probes are at all times. Lives depend on it.

AirLink PinPoint X

POWERED BY: ALEOS

APPLICATION: FIELD SERVICE AND LOGISTICS

CUSTOMER CRITICAL CHALLENGE:

- Mobile weather radar stations used in storm chase required to accurately track probe vehicle movement in the eye of the tornado
- Extend tracking coverage and consistent connectivity for two-way communication

SOLUTION:

- PinPoint X gateways service all vehicles deployed in Doppler on Wheels (DOW) project
- Power significant LAN to a dozen computers on each DOW

BENEFITS:

- Dependable GPS tracking to locate and guide probe through storms
- Peace of mind with secure, reliable connectivity
- Easy configuration, remote management and troubleshooting
- High performance with MIL-STD 810 certification

SIERRA WIRELESS™ | AirLink™

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BUSINESS CHALLENGE (CONT'D)

"We are in a constant process of upgrading equipment to create a mission control radar that can reliably see systems," said Wurman, founder and president of the CSWR. "There's been a constant frustration trying to track vehicles with all kinds of different VHF solutions – solutions didn't work or companies went out of business and could no longer provide support."

With IMAX and National Geographic movies under his belt, a television series funded by the Discovery Channel in process and a major tornado study - VORTEX2 - being funded by the National Science Foundation (NSF), Wurman had the funding for a more advanced communications solution. He turned to leading edge, communication systems provider Astral Communications, Inc. for an integrated mobile data and fleet tracking solution based on reliable cellular connectivity provided by the Sierra Wireless AirLink™ PinPoint X communications gateway.

SIERRA WIRELESS AIRLINK™ SOLUTION

Astral Communications worked with the CSWR to develop a solution using cellular connectivity on EV-DO Rev. A 3G cellular networks and VHF radio transmission. Astral started by integrating a sophisticated GPS mapping software, provided by TrackStar, International with the CSWR's other critical software on 30 laptops used for in-vehicle mobile data processing. They then focused on setting up and integrating VHF radio components and PinPoint X in-vehicle gateways, which provide connectivity and GPS functionality, as well as redundancy for VHF radio failover.

"It was a huge integration over about five months," explained Chip George, vice president at Astral Communications. "We had to focus a lot on the radio work, whereas setting up the PinPoint X devices was a no-brainer. That part was pretty much flawless."

The AirLink PinPoint X is a compact, intelligent and fully-featured mobile communications platform that includes a high-precision GPS receiver and rich, embedded intelligence provided by ALEOS™ technology. ALEOS also ensures persistent network connectivity, a broad set of application services and, in conjunction with the ACEware™ suite of tools and utilities, allows for easy setup and configuration and provides extensive remote management capabilities.

Using ACEnet™, an enterprise grade one-to-many remote management tool, Astral was easily able to configure the devices and change solution parameters as needed to provide optimal performance despite changes in the DOW fleet.

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SIERRA WIRELESS AIRLINK™ SOLUTION (CONT'D)

"The PinPoint X devices are powering a significant LAN (local area network), with at least a dozen different computers on each DOW, as well as a GPS connection," said George. "They are also on the TIVs – pickups, a hummer and several other vehicles."

Currently, the CSWR is involved in a project called VORTEX2, by far the largest and most ambitious effort ever made to understand tornadoes. More than 100 scientists and crew in up to 40 science and support vehicles will participate in the unique, fully nomadic, field program in May/June 2009-2010. The NSF and the National Oceanic and Atmospheric Administration (NOAA) together are contributing over $12 million towards this effort, which includes extensive use of the DOWs and their new PinPoint X communications solution.

RESULTS

The CSWR currently has 22 PinPoint X communications gateways, one for each service provider in each of its 11 vehicles – three DOWs, four probe cars, a tornado intercept vehicle (TIV), a laser disdrometer vehicle and two support vehicles - deployed in its DOW project.

"I'm simple to please; if the solution is reliable and I can see my map out there, I'm happy," said Wurman. "But this solution is also important because we send our vehicles on complex missions, and our drivers aren't always perfect. We need to be able to see them so we can help them improve upon their decisions or intercept their paths if they are headed in a dangerous direction."

Wurman went on to describe a night tornado chase in southeastern Colorado in which the DOW project was operating in dark, bad weather that was producing baseball-size hail that could crush fragile equipment. Despite the lack of visibility for the probe car drivers, the DOW operators were able to track the vehicles using reliable connectivity and GPS functionality provided by the rugged PinPoint X devices, enabling the operators to monitor the drivers and keep them out of harm's way.

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SIERRA WIRELESS AIRLINK™ RESULTS (CONT'D)

- **Reliable connectivity** – ALEOS intelligence provides "always-on" and "always-aware" connectivity required for critical mobile data applications.
- **Proven field ruggedness** – MIL-STD 810 certified for high performance in the harshest of environmental conditions, presented by tornadoes and other atmospheric conditions.
- **Fleet management** – GPS tracking provides ability to acquire vehicle information, such as location and speed, without interruption.
- **Peace of mind** – The PinPoint X gateway's unmatched performance helps the CSWR's DOWs track and guide probes through the most harried situations, providing the safety precautions necessary to protect vehicle operators.
- **Comprehensive remote management** – Deeply integrated with ALEOS, ACEware tools allow for quick and easy configuration, as well as control and management of remote PinPoint X gateways in the field.
- **Device portability** – Wireless PinPoint X devices allow for re-deployment if vehicles are retired or temporarily out of service.
- **Product support** – Sierra Wireless and its Reseller partners stand behind their product and work together to provide reliable, quality solutions.

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