INNOVATION

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Antaira expands industrial networking infrastructure

Antaira Technologies, a global leading developer and manufacturer of industrial networking devices and communication solutions for harsh environment applications, recently announced the expansion of its industrial networking infrastructure family with the introduction of the IMP-C1000-SFP series.

The IMP-C1000-SFP series is a compact IP30-rated gigabit Ethernet-to-fiber media converter featuring a 10/100/1000Tx Ethernet port that supports IEEE 802.3 at high power PoE that can supply up to 30 watts and a dual rate 100/1000 SFP slot. It is designed to fulfill industrial applications that require distance extension and high bandwidth capabilities. This small form factor is ideal for saving space in outdoor applications such as factory automation, security, ITS transportation, power/utility, water wastewater treatment plants, and any other extreme ambient weather environments.

Antaira's IMP-C1000-SFP series has a built-in Link Fault Pass Through (LFP) and Far End Fault"(FEF) function with redundant power input 48~55VDC. This product can support DIN-rail as well as wall-mountable orientations and has two operating temperature range models in standard: -10 degrees Celsius to 70 degrees Celsius, and extended operating temperature: -40°C to 80°C.

Source: Antaira Technologies

For more information, go to www.antaira.com

Antaira Technologies' gigabyte media converter. (Courtesy: Antaira Technologies)

Billy Martin, director and research scientist at the NIAR Environmental Test Lab, invented the prototype. (Courtesy: Wichita State University)

Prototype protects turbines from multiple lightning strikes

Damage to wind turbines can easily cost hundreds of thousands in repairs, but a prototype developed at Wichita State's National Institute for Aviation Research (NIAR) will help protect them from multiple lightning strikes.

Billy Martin, director and research scientist at the NIAR Environmental Test Lab, invented the prototype, which is patent pending.

Previous devices for protecting wind-turbine blades have issues with reliability, are generally single use, and have significant down time when there is a needed repair.

Martin's design involves layers that allow turbine blades to withstand multiple lightning strikes without sustaining damage. A recent test showed no damage after up to eight lightning strikes.

The biggest advantage to this design is the time it allows for repairs, and the ease with which the repairs can be completed. The protective layering can be applied to turbine blades before installation and is repairable after taking multiple lightning strikes.

The damage to the protective layering can be repaired in approximately 20 minutes, not counting the time it takes to reach a blade that is already installed.

Martin continues to improve his prototype with additional tests, making it lighter, more marketable, and convenient for repairs high in the sky.

Source: Wichita State University

For more information, go to www.niar.wichita.edu

Nacelle-mounted ZephIR Lidar passes verification

An independent performance verification of a nacelle-mounted ZephIR Lidar has been undertaken by DNV GL on the test site in Janneby, Germany, which demonstrates the product is compliant with best-practice guidelines developed in the EUDP UniTTe programs — widely regarded and accepted as industry benchmarks for installations of turbine-mounted Remote Sensing Devices (RSDs).

In the verification, the ZephIR DM nacelle-mounted Lidar was mounted horizontally on a raised platform (FW-MM) — 180 meters away from two reference met masts (T-MM-N and T-MM-S) equipped with calibrated anemometers at DNV GL's test site 20 kilometers southwest of Flensburg, Germany.

DNV GL undertook a series of tests and subsequent analysis on the performance of the ZephIR DM with respect to:

- **Verification of inclinometers.** ZephIR DM uses highly sensitive positional sensors to account for turbine sway and nod to ensure a true hub height measurement is reported at several rotor diameters in front of the turbine within ±1 percent of hub height.
- **Availability.** ZephIR DM achieved a 100-percent availability of both system and data during the performance verification. A Continuous Wave Lidar, all power from the system's laser is focused at each measurement range, which helps to ensure the highest levels of sensitivity, and therefore data availability, in all environmental conditions.
- **Wind-speed comparison.** White box test results showed a correlation gradient of 1.00026 was achieved, i.e. a 0.026 percent difference between the Lidar line-of-sight and mast wind speeds were observed.

ZephIR Lidar's nacelle-based wind profiler, ZephIR DM, has been demonstrated to measure wind speed when mounted on a wind turbine at a very accurate

level. Additionally, the ZephIR DM offers the advantage of being mobile and scanning at up to several hundred meters ahead of the rotor in free stream wind flow for a power curve measurement.

Further, the individual unit used in this test will operate as a gold standard Nacelle-Lidar suitable for further tests, validations, and performance verifications at the UK Remote Sensing Test Site where a range of remote sensing devices undergo independent performance verification. For example, a sample of 250 ground-based ZephIR 300 Performance Verifications has been published openly and available at www.zephirlidar.com.

Applications for nacelle-mounted Lidar include:

- Power-curve measurements.
- Turbine trouble-shooting, including yaw alignment studies and nacelle transfer function optimization
- Turbine end-of-warranty inspections

A photo illustration indicating verification results at the Janneby Lidar test site in Germany. (Courtesy: ZephIR Lidar)

Source: ZephIR Lidar

For more information, go to: www.zephirlidar.com

> "The individual unit used in this test will operate as a gold standard."

Collaborative wind-measurement campaign done

The Wind Forecasting Improvement Project (WFIP2), a $5 million collaborative study coordinated by Vaisala, a global leader in environmental and industrial measurement, in conjunction with the National Oceanic and Atmospheric Administration (NOAA), and funded by the U.S. Department of Energy (DOE), has completed the largest deployment of measurement technologies to assess the causes of wind-speed variability and their impact on wind energy generation in complex terrain.

The three-year project, based near the Columbia River Gorge, now advances into its 12-month final phase as Vaisala and its project partners use the data collected to enhance the underlying forecasting models used to predict wind variability in areas of challenging topography. Simultaneously, the measurement campaign data have been made open-source to help improve the global standards of wind-energy modeling and to aid further research.

GRID INTEGRATION, IN REMOTE REGIONS

As onshore wind development and operations are increasingly undertaken in regions of challenging topography worldwide, demand for a better understanding of atmospheric flow and wind behavior in complex terrain is increasingly urgent. Currently, the uncertainty associated with wind generation results in less favorable financing terms for projects in development and hinders full use of a free and clean energy source for projects already online.

WFIP2 brings together experts from government, industry, and academia to tackle this issue by improving the ability to understand

and forecast wind energy in difficult topography. This will make it possible for the grid to better leverage the U.S.'s significant wind resources and expand the number of places where wind energy is not only feasible, but also profitable.

Wind forecasting has already played a substantial role in making wind power part of the mainstream energy industry. Accurate forecasts allow operators to schedule and trade energy, supporting better overall management of the grid. They also help drive down operational costs by reducing imbalance penalties and facilitating better maintenance scheduling to avoid stranded crews and equipment, while improving personnel safety.

AN UNPRECEDENTED SCALE

WFIP2 seeks to improve existing models of wind variability, using the dataset collected during an extensive 18-month measurement campaign covering a 50,000-square-kilometer area of the rugged Columbia River Gorge region. Project teams deployed more than 200 measurement devices of more than 24 different types, ranging from SoDAR (Sonic Detection And Ranging) and LiDAR (Light Detection And Ranging) units to wind-profiling radars, radiative flux systems, and microbarographs. Capable of measuring wind conditions throughout the turbine rotor layer and aloft along with other variables, such as cloud position or air temperature, this broad combination of devices has allowed a much deeper insight into wind activity than a conventional anemometer.

"Deploying cutting-edge measurement technology on an unprecedented scale has allowed our project to collect high-value data in an understudied and complex domain," said Dr. James McCaa, manager of advanced applications at Vaisala and principal investigator for WFIP2. "The resultant data, much of it related to seldom measured atmospheric phenomena, will enable the profound enhancement of current forecasting methodologies, with applications throughout the wind-energy sector, both in the United States as well as overseas."

PUTTING PROJECT DATA TO USE

Over the coming 12-month period, project collaborators will use this dataset to upgrade existing forecasting models, with a focus on zero-to-24-hour-ahead wind forecasts. These models consist of the widely deployed Weather Research and Forecasting (WRF) model, which is used in both the National Oceanic and Atmospheric Administration's (NOAA) Rapid Refresh (RAP) and High Resolution Rapid Refresh (HRRR) modeling systems. Improvements to these models in complex terrain promises to increase the degree of accuracy to which short-term wind variability can be predicted.

Furthermore, the open-source data will afford opportunities that extend beyond the stated aims of WFIP2, with the potential to enrich further studies into wind variability, benefitting industry stakeholders and consumers alike.

"It is exciting to share the project's rich dataset publicly, which will be a valuable resource for the industry and wider research community to further its own understanding of wind behavior and modeling," McCaa said. We look forward to seeing the directions others take this and encourage them to share their findings with us."

Vaisala was selected to lead WFIP2 because of its work on numerous U.S. and overseas grid integration studies as well as its substantial renewable energy forecasting experience, which spans nearly two decades and includes forecasting 150 GW of global wind capacity on an ongoing, hourly basis.

Source: Vaisala Corporation

For more information,
go to www.vaisala.com