



SIMOCO CONNECTED WIND FARM

**EXPANDING POSSIBILITIES
WITH INTELLIGENT, SECURE AND
RELIABLE COMMUNICATIONS**

simoco
wireless solutions



Connected Wind Farm

The Challenge

Reducing greenhouse emissions and climate change have continued to make the headlines for the last few decades and providing a world powered by 100% renewable energy is slowly starting to become a real vision which governments are addressing globally. Offshore wind farm energy will form a major contribution to renewable energy in the future and demand for wind power generation is increasing year on year.

As wind power projects continue to increase and move further offshore, the importance of resilient wireless connectivity only increases. A constant, reliable network enables workers to operate safely and in new ways during construction and operation as they remotely monitor, inspect and optimize wind turbine performance in real time. Additionally, this connectivity allows for the movement of large amounts of data for digital workflows, implementation of IoT based predictive maintenance and improved voice and video communications. Ultimately, pervasive and seamless broadband connectivity go a long way to improving the overall functionality and productivity of the entire wind farm.

Velocity a unique solution for the renewables industry

Maintaining strong connection and communication quality is often a challenge at offshore wind farms because they are typically outside of the normal coverage range of 4G/5G mobile networks. Having optimal communications quality is vital to ensure the smooth operation of wind farms and the work safety of your personnel.

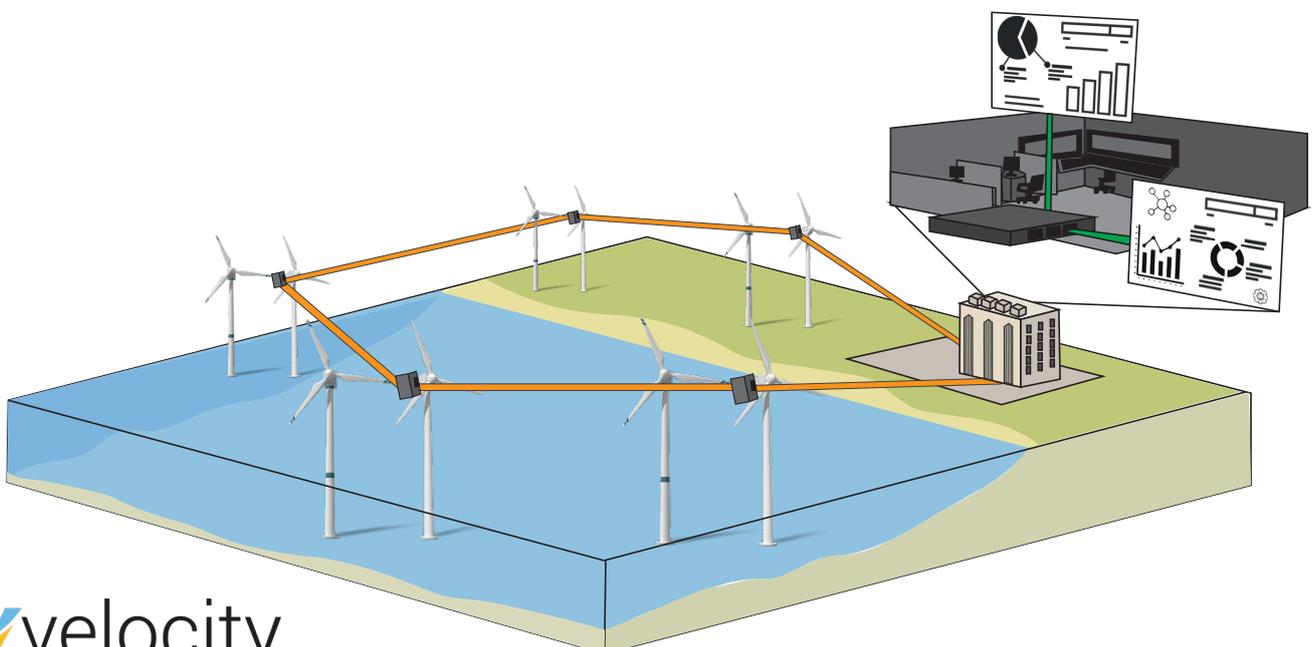
Push-to-talk and push-to-video communication is important between workers at the turbine towers, in helicopters, on-board vessels, and onshore during the construction phase. This enables collaboration between teams, remote assistance, communication with emergency services and communication with friends and family. In addition, an ability to share large data files is also necessary.

Overall, wind farms are faced with the challenge of providing wireless connectivity at speeds far beyond what could have been imagined a decade ago, but how can this be done in a way that is both efficient and cost-effective?

Velocity, an intelligent communications device provides wind farms a platform complemented to provide a solution for high speed, reliable communications with broadband bandwidth and low latency. Additionally, Land Mobile Radio (LMR) provides great coverage and reliable instant two way voice communications across wind farm sites. GPS, Man down and lone worker functionality provides increased occupational health and safety (OH&S) ensuring workers are kept safe at all times.

NodeRED workflows can be customised for each wind turbine allowing the management of numerous sensors required for predictive maintenance. Typically sensors at wind farms collect data such as temperature, vibration, humidity and current, which can be fed into Velocity and in turn, developing an interface that provides information in real time. Installing optical interfaces into sensors would be very expensive to manufacture and install, whereas LTE-ready private wireless networks are far more cost-effective.

The combination of an LMR, LTE-ready and intelligence smarts provides wind farm sites a secure, reliable and excellent communications coverage.





How wireless technologies can help

LTE is a 4G/5G technology that has long been used for public mobile networks. The growing availability of wireless spectrum for private networks such as LTE (4.9G) and 5G is revolutionizing communications. An industrial-grade version, which is a self-contained, secure, independent and resilient solution, enables wind farm operators to take advantage of this spectrum, in support of two universal use cases.

The first is to provide critical voice communications for workers alongside broadband data and video capabilities, which have traditionally presented challenges at offshore sites. A private wireless network allows workers to stay connected with co-workers, support vessels, helicopters and suppliers. Maintaining clear voice communications between all these different disciplines and organisations is essential for both safety, enhancing productivity to reduce the time to deploy and maintenance costs.

In addition, broadband provides connectivity to support personal protection equipment (PPE), digital workflows with an ability to share large-sized work plans and drawings and use of video for on-site remote support. Not only does this offer greater flexibility for data and voice applications, but it can cover the entire wind farm, transit route and operations at port, rather than being limited by geography. Further, it allows a much higher level of control over security and delivers coverage where public networks have a weak or non-existent signal.

The second use case is about ensuring the uptime and longevity of capital-intensive assets through incremental remote monitoring beyond current SCADA capabilities, and enhancing site physical security. It is essential to monitor wind turbines in order to prevent damage and schedule preventive maintenance. The repair costs associated with a turbine failure are exceptionally high. Estimated costs just to deploy the required crane to an onshore site are in excess of \$150,000 (and more for offshore). Compounding this is the lost value of energy that could have been produced during downtime.

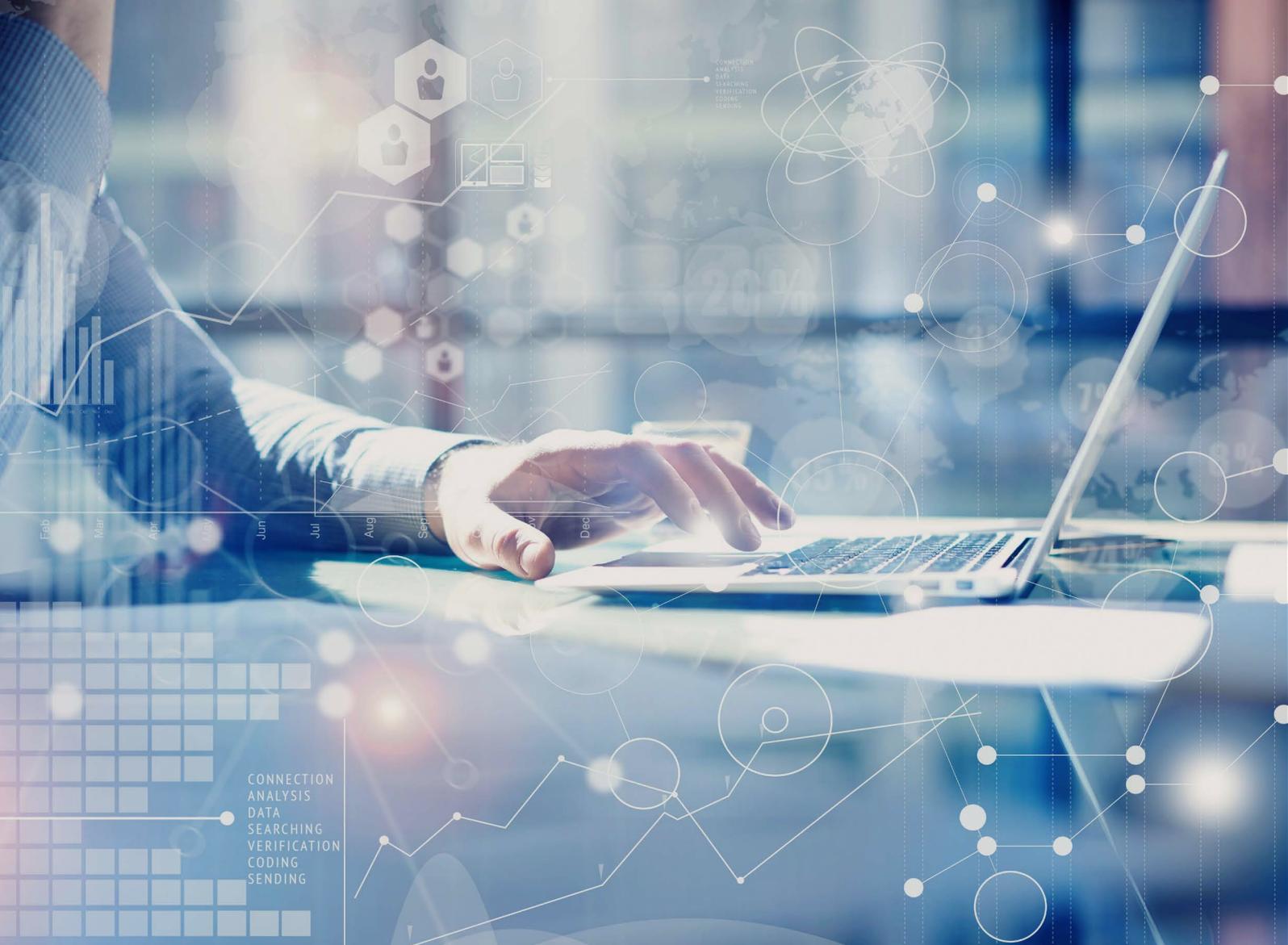
As a result, IoT sensor technology for data such as vibration, temperature and humidity, along with cameras for video surveillance, which utilise private wireless networks, play an increasingly important role in enhancing the monitoring of turbines and sites, which would otherwise only be possible through an in-person visual inspection. Critically, the ability to remotely monitor equipment and schedule maintenance saves money and improves overall safety.



Expanding the possibilities

A large number of sensors are required for effective monitoring on wind farms, and each collects data that must be transferred to central computing resources at the wind farm or onshore data centre. This requires a pervasive communications network, and though many wind farms have an existing fibre network for SCADA, private wireless is better suited to the task. This is because it possesses the bandwidth and flexibility to not only handle large amounts of data, but it can more rapidly and cost effectively extend connectivity to future sensor additions offering new innovative capabilities.

In particular, private wireless allows for a comprehensive IoT solution that can connect onshore and offshore teams with sensor data from the wind turbines. Each base station provides secure, high bandwidth connectivity, which can reliably interact with turbines, workers and vessels many miles away. This ensures that the entire wind farm area can be covered by one network for all applications with just a few base stations. Lastly, it provides a communications platform for exploring various automation, drone monitoring and predictive maintenance use cases in the future.



Enabling data analysis and action

Once data has been collected, operators can apply powerful analytics to yield insights to increase productivity and optimise asset lifecycles. Wind farm analytics can adjust asset maintenance programs in real time. Additionally, these analytics provide failure time predictions by drawing on additional sources that include maintenance records, weather and traffic. From this, an optimised repair schedule can be created and implemented. This has the net effect of saving time and money due to reduced downtime and operational costs.

In addition, video from cameras serving as sensors, enable video analytics to enhance situational awareness. This improves the safety and security of workers and offshore structures.

Technological advancements in digitalisation and automation are changing the way that the industry operates. Wind farms are moving further offshore and to more remote land-based operations to meet increased demand. It is therefore more critical to have a pervasive network in place which securely supports increased and advanced communications. This ultimately has the resulting effect of improving safety and optimising asset performance. Ubiquitous, reliable private wireless can help to ensure the safety of workers, improve productivity and support future capabilities as new use cases inevitably arise.

Wireless solutions built to drive efficiency



Improved and reliable Communications

Wind farms can enjoy access to multiple bearers on sites which can provide persistent, real-time two-way connectivity and communications between its remote wind farm equipment and regional office sites.

Keep workers safe

GPS, Man down and lone worker functionality available on two-way radio communication equipment provides increased occupational health and safety (OH&S) ensuring workers are kept safe at all times.



Maximise response times

Traditionally field technicians would need to visit wind farm sites regularly for downloading data typically to data cards. Our wireless solutions enable real time communication without creating a delay which provides better response times in the event of equipment malfunctions or technical issues on the wind farm site.

Improved operations

Any technical issues with wind monitoring equipment can be identified and relayed immediately to control room staff.



Network Security

Wind farms require policies in mitigating networking risks to protect sensitive information. Velocity is designed with security in mind and includes the use of advanced security protocols such as virtual private networks (VPN). Other security features include setting up Demilitarized Zones (DMZ), MAC filtering, IP filtering, port filtering and port forwarding provide a standards-based security solution for connecting and managing remote assets, enabling customers to guard against malicious access to sensitive data.

Immediate return of investment (ROI)

We anticipate wind farms can recover the cost of Velocity units within a short time frame from initial deployment due to overall reduced operating costs.



Provide workers with the necessary information

Equip your workers with the information they can access remotely without having to visit wind farm sites periodically. Velocity offers a reliable wireless solution to remotely manage data in real time.

Reduced operating costs

Velocity is an effective wireless solution for wind farm sites and can eliminate the need for field engineers to travel on site to retrieve data.



Remote asset monitoring

Simoco's end to end network management tool, Velocity Remote Manager enables simplified, remote and simultaneous real-time configuration, control and troubleshooting of Velocity units, configurations and maintenance to your wireless on board device from a remote location while ensuring that sensitive data stays safe. Wind farm sites can completely automate the collection and retrieval of critical data from its wind farm sites.

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