



Case Study



Wireless as an alternative
communication network in
wind farms



Client

Vestas was founded in 1979, gaining a market-leading position with more than 58 GW of installed wind turbines, comprising around 19% of total global capacity.

Vestas is the only global energy company dedicated exclusively to wind energy, as shown by our superior cost-effective wind technologies, products and services.

Vestas works in close partnership with customers to offer the most effective solutions towards energy independence. Our core business is the development, manufacturing, sale and maintenance of wind power plants - with competencies that cover every aspect of the value chain from site studies to service and maintenance.

Every day, everyone at Vestas works on bringing wind on par with oil and gas, thereby addressing the growing demand for electricity.

Abstract

Wind farms communication networks are mainly supported by cabled infrastructures, either by using copper or fiber as the transmission medium. Among others, one phenomena that frequently disrupt copper based networks are lightning storms (or electric discharges), which, in limit, can result in terminal equipment failure and consequent replacement. This can lead to high times of inoperative networks and, in case these events become frequent, the replacement of the copper infrastructures by optical ones could be the only option.

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Objective

Over the last years wireless communications have become an ubiquitous solution as access technology and in certain outdoor scenarios it can be the only option for connectivity between remote locations or for traversing certain paths. Yet, in the specific case of wind farms, broadband wireless networks have not been considered as an alternative. We argue that wireless can be used on these scenarios offering the same requirements as the initial infrastructure while adding newer benefits.

The main objective is to raise awareness that other alternatives can be used to support data communications in wind farms. Wireless networks can be used either as a replacement technology for copper infrastructures or as an added redundancy to fiber connections. The absence of cables also reduces the time for installation of the data network and increases the number of options available to installers.

Operational challenge

Typical point-to-multipoint wireless networks are deployed in an infrastructure mode where a central node, also known as Access Point, is responsible for coordinating communications between the different nodes, or Stations. This mode poses the problem of a unique point of failure and could be difficult to implement on wind farms due to the different topologies that they can exhibit.

In order to cope with these different operating scenarios our solution consists in a secured Layer 2 mesh network operating in the worldwide available 5GHz unlicensed bands. This option was chosen in order to: support redundancy between connections; avoid a central point of failure; allow migration with minimum disruption; and avoid modifications to the other components of the existing network.



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The solution

This solution has been implemented in a small dimension wind farm with 15 turbines, with maximum distance of 1500 m between turbines, to replace the existing copper network and is currently in operation supporting the communications between the turbines and the control center.

No interferences were registered either in the implemented network or in the turbines and after a thunderstorm that hit the park the wireless network continued to operate properly. Apart from its current application, this solution can be also viewed as an alternative backup network in fiber based communications, support for communications in offshore deployments, or as plug and play solution for the installation phase of wind farms.

Conclusion

Data networks are a fundamental part of wind farms, ensuring the communication between the turbines and the control center and enabling the correct functioning of the entire park. Until now data communication has been supported with cabled infrastructures while wireless has not been considered as an alternative.

The present work proves that wireless communications can be a valid option and can support the data networks of a wind farm either by replacing old copper infrastructures or as an alternative backup for fiber connections.



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About Wavecom:

Wavecom was established in 2000 and has three core fields of activity: Wir Networks and Networking, Unified Communications and R&D.

Our core business consists of the development and integration of telecommunications solutions, specialized in Radio and Unified Communications technologies. The company started its activity as a telecommunications integrator specialized in Wireless, expanding then its activity to the Unified Communications field.

Beside Portugal, the company is also present in Cape Verde and Brazil. Wavecom is the market leader for wireless connections in unlicensed band and has developed the major VoIP project (Open Source) in Europe.

