



Case Study



Wireless as an alternative
communication network in
wind farms



Framework

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, 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.

Our client, Vestas is the only global energy company dedicated exclusively to wind energy, as shown by their superior cost-effective wind technologies, products and services. IT works in close partnership with customers to offer the most effective solutions towards energy independence.

Their 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.

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The Challenge

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.

In Malhadas Windfarm, whenever there was a lightning storm, communications would be disrupted due to the failure of their VDSL Routers which granted communications between the control room, the turbines and the meteorological tower. This project main objective was to provide Malhadas wind farm with reliable, real-time, communications, doing it with minimum disruption time of the farm's energy production.

The Solution

The solution to our client's problem was Wavesys 1000. This modular communications equipment was installed one per location, with two 5GHz interfaces in each Wavesys 1000. We opted for two 5GHz interfaces for redundancy.

Wavesys 1000 was installed in 15 turbines, the meteorological tower and the control station, with maximum distance of 1500 m between them. The copper network was kept, as all the equipment was already paid for. 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.



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“...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.”

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.

The project in numbers

- Type of network deployed: Layer-2 Mesh Network;
- 17 Wavesys 1000 deployed:
 - 15 Wind Turbines;
 - 1 Meteorological Tower;
 - 1 Control Room;
- Deployment in 5 days;
- Longer radio link: 1200 meters ;
- Minimum IP throughput granted: 35 Mbps;
- Latency for 3 hops: 3-6ms.

“The network, including Wavesys 1000 radios, cables and antennas, has been through multiple lightning storms without any service disruption.”

Conclusion

The project ended up being the expected success. The network was deployed in only 5 days during which the wind farm kept its normal operation, with exception for each site that was being installed at a given moment.

The network, including Wavesys 1000 radios, cables and antennas, has been through multiple lightning storms without any service disruption.

This wireless network has proven its value and the client gladly operates its wind farm without any concern regarding the functionality of its communications infrastructure, maximizing wind generators availability and profit.



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About Wavecom:

Wavecom was established in 2000 and has three core fields of activity: Wireless 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.

