MOXA®
Reliable Networks ▲ Sincere Service

Europe

Pushing the Limits by Reinventing Network Technology

For a wind-power system integrator, the answer to their request was always a blunt "NO" until they approached Moxa. The customer faced two challenges: optimizing the system uptime and lowering the costs. Although Moxa was not their first choice, we were the ones to turn their ideas into reality by successfullly delivering a faster recovery time under 20 ms for unlimited multiring.

Harvesting Wind Energy

Wind farms located in remote locations can cover an area of hundreds of square kilometers. The wind turbines are scattered and usually lined up in multiple rows to accommodate the wind direction as well as turbulence.

An inefficient network design can dramatically increase the cost of cabling, and for this reason, implementing a reliable network with nonstop network communication can have a big impact on future maintenance costs.

Redundant Ethernet networks are ideal for bringing windmill nodes together and for creating a reliable communication network for remote data collection, equipment control, and adjustments to windmill settings. Such redundant networks must possess a fast recovery time—in the order of milliseconds. Because of the distances between windmills, wind power networking systems require fiber-optic cabling for long-range transmissions. Fiber cable also ensures expansion capability so that turbines can be conveniently added in the future.

Designing a cost-effective and ultra-flexible redundant network topology is one of the greatest challenges of wind farm deployment.

Overcoming the Bottleneck of Existing Network Technology

In 2009, existing redundant network technology could only reach a recovery time of 300 to 500 ms and required two fiber-optic cables for each turbine. It presented a functional challenge to support multiple redundant connections and higher cabling cost. A wind power system integrator required more:

- More fast recovery time
- Reduced operational risks
- Lower total cost of ownership

Their enquiries with several industrial networking solutions, however, ended in disappointment time and time again. When they approached Moxa, Moxa took the challenge of pushing the boundaries of its Turbo Ring redundant network technology to meet the customer's requirements.

A few months later, Moxa exceeded all expectations by delivering new breakthrough technology for multiple redundant connections. Moxa's Turbo Chain meets the challenge by achieving maximum uptime, optimized performance, and lower total cost of ownership.

Challenges

- **Redundant Ethernet infrastructure with faster recovery time to reduce operational risk**
- **Requiring long-distance and noise-immune transmissions**
- **Reducing cable runs and time to save costs**

SOLUTION & RESULT

Going Beyond Standard Ethernet Ring Redundancy

First released in 2009, Moxa's Turbo Chain significantly extends ring topologies, expanding these network backbones to be much more flexible, economical, and convenient than traditional ring coupling allows.

Unlike traditional coupling technology, Turbo Chain is practical since it enables flexible connections, easy expansions, and saves on cabling, additional Ethernet ports, and time. Even with unlimited multring connections, the system can still provide reliable network redundancy with a recovery time under 20 ms. Users simply link the wind turbines together into a switch-chain and then connect back to the control center directly. Redundant Turbo Chain networks can be easily extended into any segment for future expansions.

This innovative breakthrough allows Turbo Chain multiple redundant networks to go beyond the limitations of current redundant ring technology.

Moxa Solutions

- Moxa Turbo Chain self-healing recovery technology

Result

- **A recovery time under 20 ms for unlimited multiring connections**
- **A highly scalable network that supports easy and hassle-free network expansions**
- **One connection cable to adopt multiple redundant chains in the communication network**
- **Live node expansion without system interruptions**

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