

Turbo Chain Provides a Flexible and Cost-saving Redundant Solution for Wind Power Applications

Applications Wind Power System

Products EDS-408A 3 Fiber Series, IKS-6726 Series

Application Introduction



In wind power applications, the number of windmills ranges from just a few windmills to hundreds of windmills that cover hundreds of square kilometers. The wind turbines are scattered throughout this extended area and are usually lined up in multiple rows to accommodate the wind direction as well as turbulence. Redundant Ethernet network connections are an ideal solution 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, on the order of milliseconds. Because of the wide distances between windmills, wind power networking systems require fiber optic cabling for distance transmissions. Fiber cabling also ensures high scalability as well as expansion capability so that future turbines can be conveniently added.

System Requirements

- **Redundant Ethernet infrastructure** with secure data communication and fast fault recovery.
- **Cost-saving deployment** to reduce cabling and time.
- A highly scalable network that supports easy and **hassle-free network expansions**.
- **Fiber optic cabling** for long-distance and noise-immune transmissions.
- Network devices with **rugged design** for reliable wind farm operations.

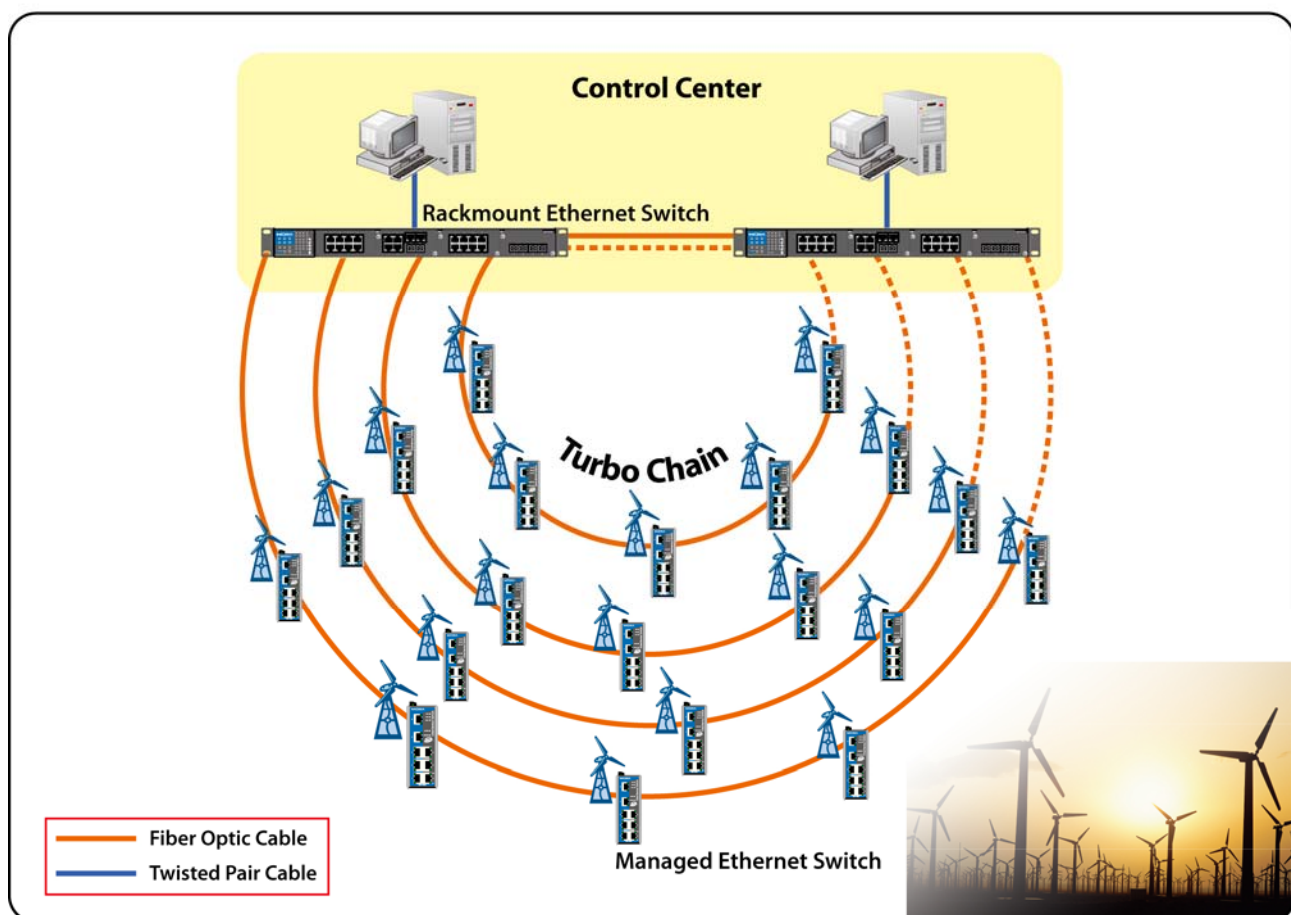
Moxa Solution

A multi-ring fiber network with simpler cabling to form a remote centralized control system that is well suited for wind farm applications that cover vast areas and long distances. Moxa's managed Ethernet switches support Turbo Chain redundant technology, which allows users to build unlimited multi-ring connections for a highly available windmill network infrastructure. Unlike traditional coupling technology, Moxa Turbo Chain is practical since it enables flexible connections, easy expansions, and saves on cabling, additional Ethernet ports, and time. Even with unlimited multi-ring connections, Turbo Chain can still provide reliable network redundancy with a recovery time under 20 ms. With Turbo Chain, 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 of a network for future wind turbine expansions.

Moxa's EDS-408A 3 fiber series products are managed Ethernet switches with five Ethernet ports and three fiber ports. Two of the fiber ports are for creating a Turbo Chain redundant network, and one fiber port is for uplinking to the wind turbine for connecting an unmanaged Ethernet switch. This unmanaged Ethernet switch connects to either a PLC, serial device sever, or an Ethernet I/O to collect and control real-time information such as the wind directions, wind speeds, and shaft rotation speeds. In addition, the EDS-408A features an extended MTBF, a wide operating temperature range, high reliability, and performance that is rugged enough for harsh windmill applications.

System Diagram



Why Moxa?

- Moxa Turbo Chain allows wind power systems to adopt multiple redundant chains in their communication network. In doing so, Turbo Chain saves installation time and costs by avoiding unnecessary rings and ring couplings.



- Turbo Chain features a link-failure recovery time that is under 20 milliseconds for building self-healing, reliable Ethernet infrastructures for wind power systems.
- Network extensions through Turbo Chain are both fast and easy. Excessive cabling or reconfiguration of the existing setup is not necessary.
- Moxa managed Ethernet switches support fiber optic connections (multi-mode/single-mode) for long-distance and noiseless transmission.
- Moxa products are ruggedly designed, fanless, and have high EMI immunity and a wide operating temperature range of -40 to 75°C to withstand the harsh environments of wind turbine applications.
- Moxa products come with an extended MTBF and a solid 5-year warranty.

Moxa Products

EDS-408A 3 Fiber Series

8-port Industrial Managed Ethernet Switch with 3 Fiber Ports

- 3 100BaseFX fiber ports (multi-mode/single-mode, SC/ST connectors); 2 fiber ports for redundant ring and 1 fiber port for uplinking to the wind turbine
- Turbo Ring, Turbo Chain, and RSTP/STP for Ethernet redundancy
- Supports QoS, port-based VLAN, SNMPv1/v2/v3, RMON
- -40 to 75°C operating temperature range
- Redundant power inputs and high EMI immunity

IKS-6726 Series

24+2G-port Industrial Rackmount Ethernet Switch

- Turbo Ring, Turbo Chain, and RSTP/STP for Ethernet redundancy
- Isolated redundant power inputs with universal 24/48 VDC or 110/220 VDC/VAC power supplies
- Various media modules offered: RJ45, fiber and SFP ports
- -40 to 75°C operating temperature range