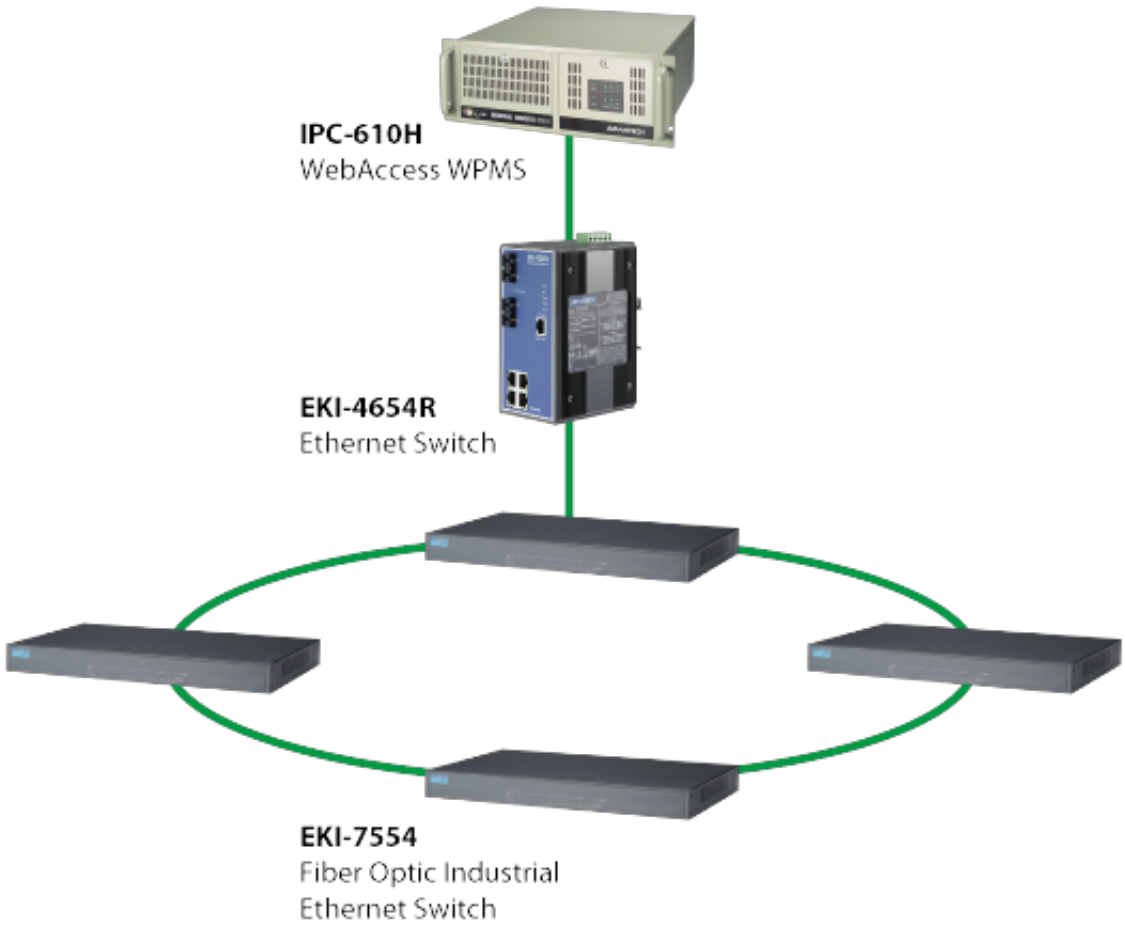
Integrated SCADA Solution for Wind Farm Management

Advantech proposed a total solution including a touch panel computer as a Human Machine Interface (HMI), two kinds of fiber optic networking devices to establish a redundant ring backbone, and specially designed software for renewable energy applications.



Project Introduction:

Renewable energy sources have become an important part of a balanced energy supply. Like other green energy sources, wind is a sustainable, clean, abundant source of energy that does not produce any emissions.Generally, each wind farm may install tens to hundreds of independent wind towers and cover an area of hundreds of square miles in harsh environments and only a few maintenance staff.

As a result, the question of how to supervise a large number of wind turbines at the same time and how to ensure reliable and secure operation in each wind farm are the essential elements to manage the wind power plant is a major question. Advantech has been involved in the field of renewable energy formany years and is able to provide all kinds of hardware devices and dedicated software programs to assist systemdevelopers and wind power plant owners to implement a comprehensive monitoring system so as to achieve professional management and optimum performance.

System Requirements:

Our client is a well-known Systems Integrator on the China and international markets that specializes in wind power technology and sells its own brand of wind turbines and systems to domestic and foreign customers. As the company wants to focus on its core application development, it preferred to use available products rather than develop its own to complete the underlying data acquisition. According to the situation of this project, the wind farms would be set up with numerous on-site devices and need to acquire diverse types of data (such as electricity production, temperature, wind velocity, voltage, current and rotation speed) over a sparsely populated and large area. Therefore, the Supervisory Control and Data Acquisition (SCADA) system had to provide faster data collection and storage (sampling once per second), dynamic information display in real time, analysis and statistical reports, remote monitoring and control, easy to integrate third party devices and programs in order to meet the requirements of the environment and the administration. The hardware devices needed to provide high-level specifications with a robust design so that operating for 24 hours non-stop and extreme heat and cold outdoor temperature would not be a concern. Meanwhile, redundant network architecture is required to get the most solid and reliable connectivity.

System Description:

For optimal wind farm management, Advantech proposed a total solution including a touch panel computer as a Human Machine Interface (HMI), two kinds of fiber optic networking devices to establish a redundant ring backbone, and specially designed software for renewable energy applications. The TPC-1551, which is embedded in control box, can upload the on-site data to the IPC-610 server in the control center via EKI-7554 and EKI-4654R Ethernet switches. If the wind turbine is disconnected, the data can be temporarily stored in the TPC-1551 and will re-start the transfer after the connection is recovered. The system, through Advantech?s EKI series X-Ring technology, offers a fast redundant ring recovery time of less than 20ms. These hardware components are compliant with industrial grade reliability

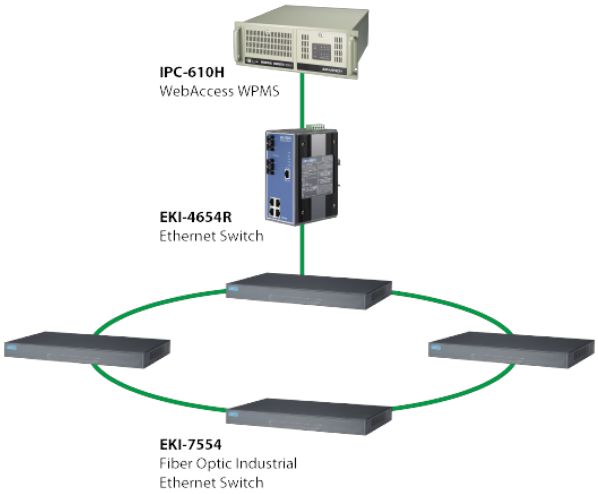
and temperature requirements, and have a longer Mean Time Between Failures (MTBF) and product life span to guarantee high quality and durability.Asregards to the software, Advantech?s Wind Power Management System (WPMS) and WebAccess not only offer instant and accurate data and produce detailed and tailored reports but also allow supervisors to manage and maintainthemultiple wind farms from a control center or to remotely access and monitor the wind power plant from anywhere due to the web browser-based feature. By using special data compression and access algorithms, our software provides super fast data access and storage while processing a large amount of data. Such outstanding performance is better than other commercial databases. Since WebAccess is a flexible open platform and supports many communication protocols to seamlessly integrate with various devices and other systems, System Integrators can easily increase the functionality as they need. Advantech also offers customization services by cooperating with our clients to design the customized user interface on screen making their applications to be more suitable for the specific operation conditions and users? requirements.

Project Implementation:

Advantech WebAccess	Browser-based HMI/SCADA Software
IPC-610	4U Rackmount Chassis with Visual Alarm Notification
EKI-7554	4+2 SC Type Fiber Optic Managed Industrial Ethernet Switch with Wide Temperature
EKI-4654R	24+2 SFPPort Managed Redundant Industrial Ethernet Switch
TPC-1551	15" XGA High Brightness LCD Intel® Atom? Touch Panel Computers

Advantechcontinues to supply a variety of products and services for this client to build up its wind power plant application from wind turbine monitoring system to wind farm cluster monitoring system, video surveillance system, online turbine gearbox vibration monitoring system, box-type transformer station control system, etc. As more green power sources are developed - displacing conventional generation, the power plants need better systems to properly manage. With a wealth of experience and product lines, Advantech is capable of helping power plants to fulfill safe and efficient operationmanagement.

System Diagram:



Conclusion:

Based on an advanced, feature-rich and reliable WebAccess platform, Advantech?s integrated SCADA solution can easily complete data exchange between different heterogeneous devices and systems such as wind turbine, substation and external weather station. Its quick response measures can shorten recovery time and thereby reduce operating costs when a fault occurs on site. Through our centralized management model, users can effortlessly monitor and control the operating conditions of their wind power plants at anywhere.