



Using the TCP/IP Protocol for Remote Monitoring of Wind Farms



Today, one of the most known and broadly used communication protocols in information systems is the TCP/IP (Transmission Control Protocol/Internet Protocol). The success of the protocol in commercial applications has gradually increased the interest in TCP/IP as a communication platform for industrial communication as well. Using TCP/IP for industrial communication is a very cost-efficient alternative because the availability of communication equipment and devices is excellent and the integration of communication systems is easy due to the commonly agreed communication platform. Consequently, industrial communication standards are developed

for, and adapted to, the TCP/IP protocol.

The IEC (International Electrotechnical Commission) is developing a standard considering communications for monitoring of wind power plants using TCP/IP as the preferred transmission protocol. This standardisation effort is the IEC 61400-25. In IEC 61400-25, information models for wind power plants, information exchange models and mappings of these models to standard communication profiles, are given. The standard provides thus an open and uniform communications basis to vendors, operators, owners, system integrators, planners and designers of wind power plants.

DENSY –program

DENSY is the Finnish national technology program for distributed energy systems for the years 2003-2007. The Power Systems and High Voltage Laboratory of Helsinki University of Technology and the Wind Energy Group at the Technical Research Centre of Finland have in a DENSY project developed a pilot installation for the assessment of TCP/IP and IEC 61400-25 in remote monitoring of wind power plants. The Olos fell in Lapland having 5 wind turbines of 600 MW and located approximately 1000 km north of Helsinki, was chosen for the pilot installation.

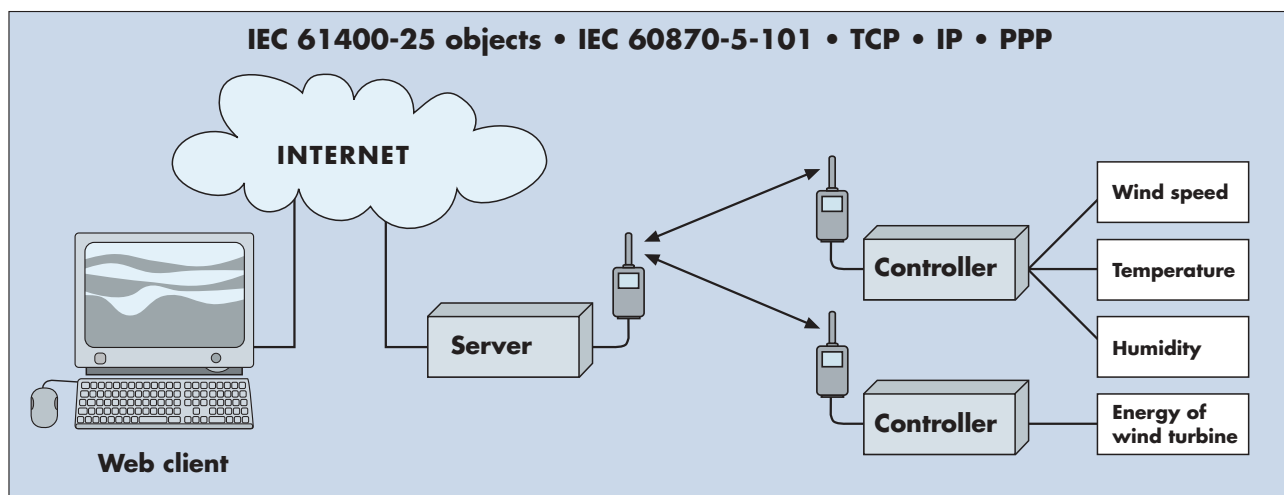
IEC communication protocol over SATELLINE radio link

The technical solution selected was based on the SATELLINE radio modems, embedded controllers, the client-server architecture and the IEC 61400-25 information models. At the wind farm, sensors measuring the wind speed, humidity and temperature were connected to one embedded controller while an energy meter measuring the produced energy of one of the wind turbines, was connected to another controller. The controllers communicated via the SATELLINE radio modems with a data server located in the city of Muonio, approximately on a 6-kilometre distance from the controllers at the Olos fell. The communication protocol used with the SATELLINE radio modems was based on PPP (Point-to-Point Protocol), TCP/IP with the IEC 60870-5-101 as the application

protocol used to map the IEC 61400-25 information objects to the communication protocol stack. The communication between the server and remote clients was arranged as a Web service over the Internet. According to the tests conducted in the pilot project, the achieved system performance met very well the expectation of a reliable and fast monitoring application.

Cost-efficient, reliable and easy to extend

Generally, low-cost and efficient communication for monitoring of wind power plants is essential for the successful and reliable energy production with wind turbines. Using SATELLINE radio modems and the TCP/IP protocol provide a communication platform that is cost-efficient, reliable and that easily can be extended. Combined with the IEC 61400-25 standard information models, this platform provides an open and interoperable solution that is compatible with the existing and the future systems.



Manufacturer:

Satel Oy, Meriniitynkatu 17, P.O.Box 142, FIN-24101 Salo
Tel. +358 02 777 7800, fax +358 02 777 7810, E-mail info@satel.fi
www.satel.fi