



# HIRSCHMANN

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## Case Study

**CS00008**

### **Belden Supplies Powerful Network Solution for New Substation Automation System in India**

Systems integrator Venson Electric selects Hirschmann's industrial Ethernet switches for five new substations in northern Indian state of Haryana



A highly reliable communications network infrastructure is critical for power utility systems. With intense pressure to provide efficient and reliable electricity for homes and businesses, utility providers are investing in Ethernet-based technology when upgrading or building new substation communications infrastructure.

With the recent economic growth in India, particularly in the northern state of Haryana, the demand for electricity has greatly increased. To meet the demands for a reliable and uninterrupted power supply in order to continue fueling the region's economic development, the country has made great strides to expand its critical infrastructure.

Globally, the market is trending toward Ethernet based communications. Following this path, the utility industry is migrating to Internet-based devices in substations in order to expand the reach of their power supply and gather important, needed information from remote sites. Many utilities are also adopting and transitioning their communications technologies to follow the IEC-61850 protocol – a global, power system standard – which is designed to future-proof networks to meet evolving needs. IEC-61850 allows products from varying manufacturers to be combined into one network infrastructure for long-term network flexibility and expansion.

Venson Electric, a local systems integrator from Bangalore, was selected by a major power utility company in Haryana to provide a complete solution for the development of a new substation control and protection system (including the communications network) supporting growth in the city and surrounding rural areas.

Venson Electric was challenged with creating a reliable network able to relay critical information and operate securely in stressful networking situations with high traffic loads. In a country also faced with harsh environmental conditions, Venson Electric opted to select a recognized and trusted manufacturer of ruggedized connectivity products for the energy industry, Hirschmann.

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“For a company like Venson it was really important to have a market-leading company like Belden to support us with a future-proof and reliable solution, assuring also the interoperability with GE and iGrid devices for the complete control and protection network”

## Gangadhar K

General Manager, Venson Electric

After evaluating the technology available in the market, Venson Electric turned to Hirschmann's industrial-grade Ethernet switches for seamless connectivity according to the IEC-61850 protocol. Belden recommended and supplied its MACH1000 switches for five substations, based on the power utility's networking needs, the environmental conditions and the device's unique feature set.

### Project Details and Challenges

- Increasing demand for power required the utility company to expand and develop a new substation automation system (SAS)
- Needed a solution that would withstand environmental challenges, including altitude, extreme heat and humidity
- Substations were located in remote areas and equipment also needed to be placed in kiosks in the substation yard, creating a challenge for on-site maintenance
- Substations needed to service increasing demand for both domestic and industrial electricity consumption across more than 25,000 kilometers
- Facility protects, monitors and controls the switch gear operations for 66kV incoming lines, 66/33kV step down transformers and 33kV outgoing lines
- Data comes in from 30 protection relays mounted on the control and relay panels, then, the communication between the relays is done via an Ethernet network based on the IEC 61850 protocol
- Relay panels located in outdoor kiosks in remote locations
- SAS panels mounted with Hirschmann MACH1000 Ethernet switches

### The Belden Solution

Hirschmann's MACH1000 product was selected for the utility in India. These robust devices have been designed specifically to meet the requirements of the power generation and distribution sectors.

The MACH1000 high-performance switches for Gigabit Ethernet applications provide seamless connectivity within challenging environments. With the outdoor kiosks, the solution took into consideration the environmental concerns; the need for high-quality devices that would minimize on-site maintenance; interoperability with the protection and control equipment; and remote management across the network.

In addition to the MACH1000 devices, Venson Electric also integrated into the solution protection relays from General Electric; supervisory control and data acquisition (SCADA) software from iGrid; and iGrid gateways with embedded Hirschmann technology. The built-in Rapid Spanning Tree Protocol within iGrid's gateways enabled Belden to provide redundant ring functionality and eliminated the need for the customer to invest in additional hardware. This also enabled the customer to avoid any interoperability issues.

The complete project will be finished by the end of 2015. Belden will provide Venson Electric and the utility company with a 5-year warranty and local customer support.

### Product Benefits and Features

Hirschmann products deliver complete and integrated solutions for network automation and data and control information communication. The best-in-class, Layer 2 **MACH1000 Ruggedized Industrial Ethernet Switch** was selected for the substation in India based on its excellent performance, reliability and ability for rack mounting. The devices deliver the following benefits:



The Hirschmann EES25 brings network connectivity directly into the field device.



- **Greater efficiency:** high-port density in a modular design
- **Lower engineering costs:** future proof IT technology increases flexibility and saves engineering time
- **Reduced service costs:** reliability in changing ambient conditions reduces need for servicing
- **Maximized uptime:** Generic Object Oriented Substation Events (GOOSE) protocol handling, redundant ring topology and fanless design guarantees low failure rates
- **MMS Server:** Integrated MMS server allows the configuration and the data retrieval from a IEC61850 SCADA Software directly in the same way as other substation IEDs

With their compact design in a 19-inch housing, a high-port density of up to 28 ports, and simple and convenient ring configuration, the MACH1000 switches are ideal for ruggedized applications. The M12 plug-in connector is intended for use in harsh operating environments. In addition, the temperature range of  $-40^{\circ}\text{C}$  up to  $+85^{\circ}\text{C}$ , extreme electromagnetic interference (EMI) characteristics, and the shock and vibration resistance provide additional benefits.

## Hirschmann Embedded Ethernet EES25 switch

Hirschmann Embedded Ethernet switches bring network connectivity right into the field device. To reduce development costs and prevent development risks as well as getting faster to the market, Hirschmann has developed a smart Embedded Ethernet family to offer a cost effective way for integration of Ethernet into manufacturers' devices.

- Six Fast Ethernet ports that can be configured for either 10/100 BASE TX or 100 BASE FX
- Extensive management and filter functions plus a variety of redundancy protocols and port security

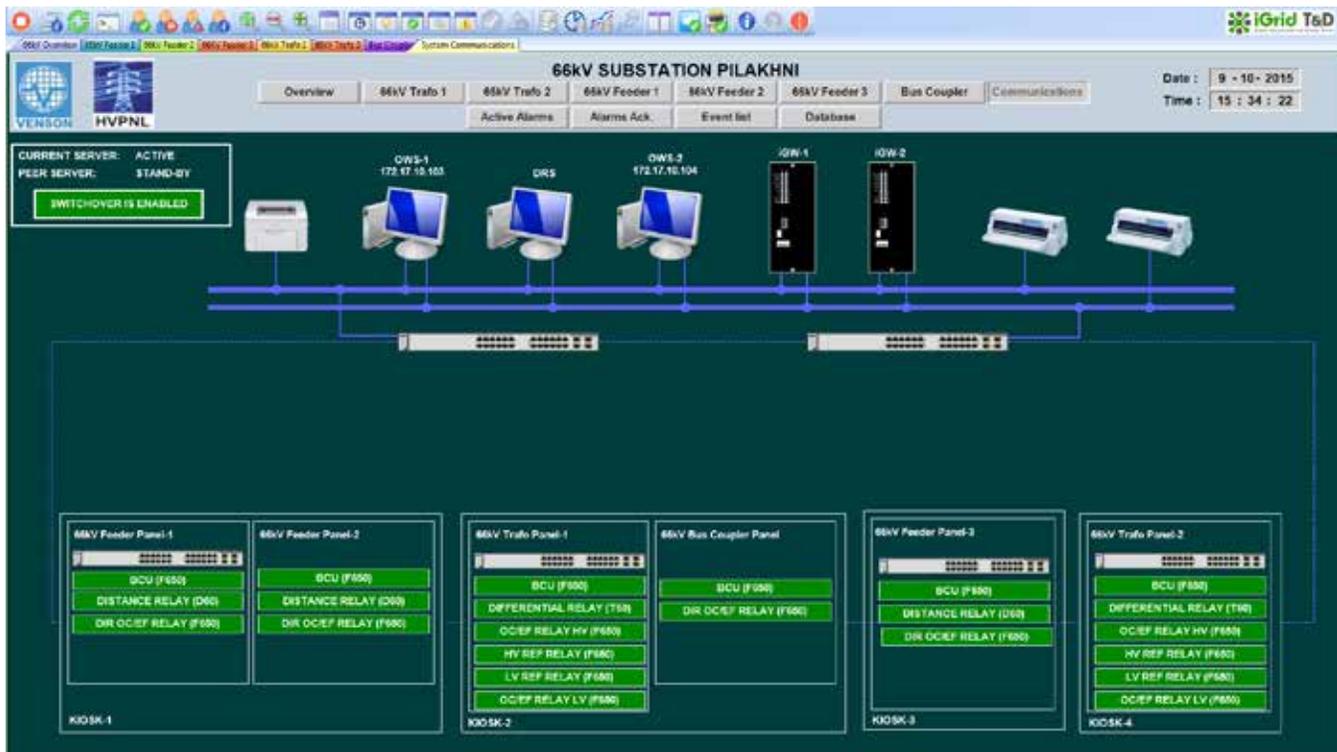


- Supports precise synchronization as per IEEE 1588v2, plus PRP (Parallel Redundancy Protocol) which guarantees uninterrupted data communication
- Possibility to be integrated into the Hirschmann network management software Industrial HiVision

## Summary

Venson Electric entered this project with the goal to develop a solution that would automate, monitor and control electrical installations efficiently. By using a distributed architecture in this application, they were able to offer a comprehensive, scalable, open and secure

solution that minimized costs. The solution's scalability allows for the variation in the amount of information that must be telecontrolled from substation to substation. Incorporating the highly reliable and ruggedized Hirschmann switches into the design enabled Venson's customer to reap the benefits of IEC 61850 while modernizing the entire substation program.



This SCADA screen capture shows the installation's ring topology using the Hirschmann switches.

### About iGrid

Working with iGrid, a Telecontrol Systems manufacturer based in Barcelona, Spain, Belden created a technology breakthrough by applying Hirschmann Embedded Ethernet Switches EES25 to provide near drop-in Ethernet functionality. This dramatically decreased the time it took to develop a state-of-the-art Ethernet-enabled product. iGrid has introduced a new range of iRTU E Bay Controllers, offering state-of-the-art switch technology that supports seamless Ethernet redundancy. These iRTU telecontrol units combine excellent performance with the advanced functionality of Hirschmann switches to provide a modular, flexible and economical solution for substations. The OEM module includes HSR/PRP technology compliant with IEC 62439-3 (2012), providing seamless redundancy for mission-critical application networks.

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### About Belden

Belden Inc., a global leader in high quality, end-to-end signal transmission solutions, delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio and video needed for today's applications, Belden is at the center of the global transformation to a connected world. Founded in 1902, the company is headquartered in St. Louis, USA, and has manufacturing capabilities in North and South America, Europe and Asia.

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