



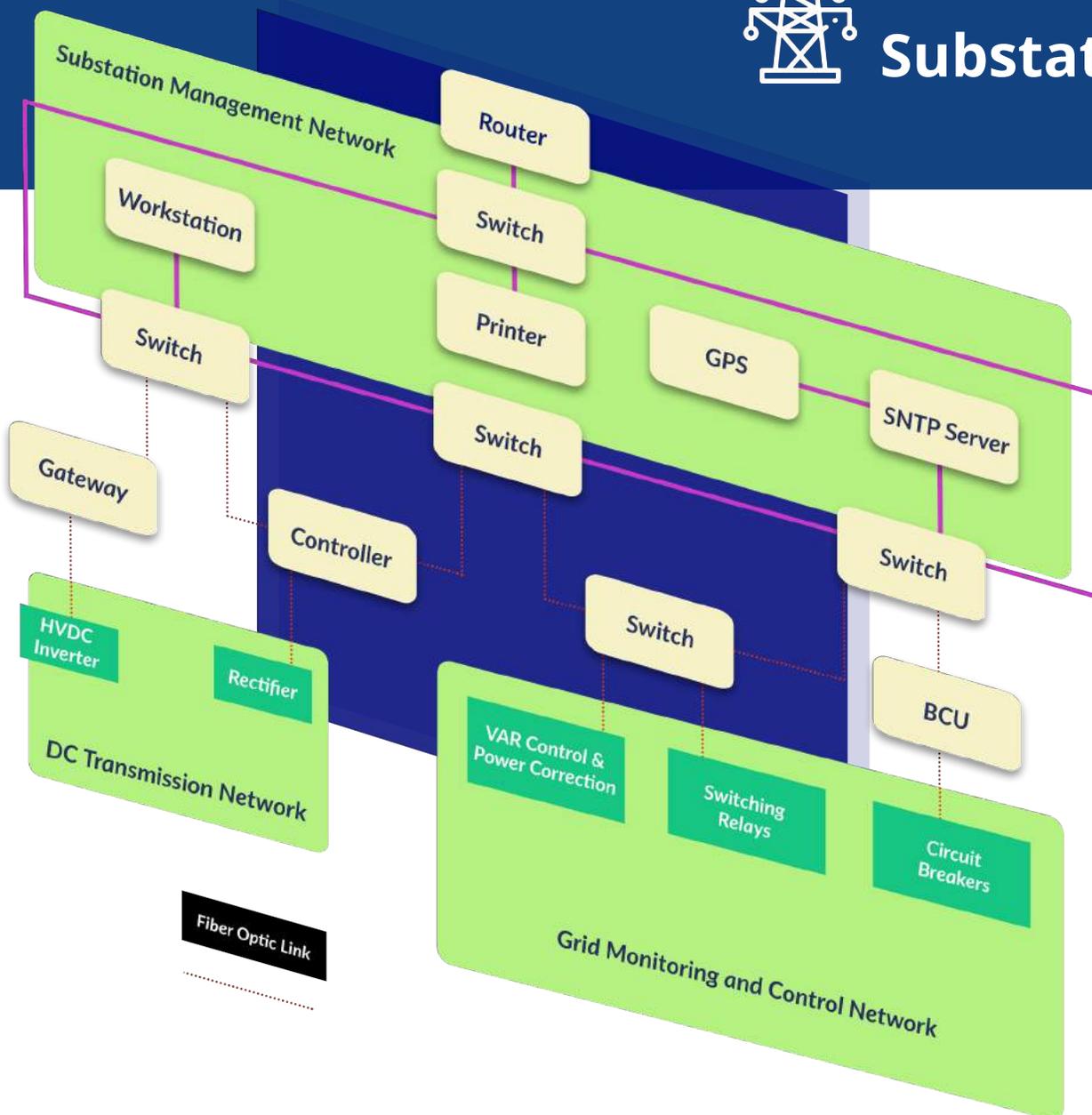
Smart Grid Automation Solutions



Firecomms fiber optic solutions deliver on the communication needs in the modern smart grid environment, meeting the needs of both utility managers and equipment designers. As utility managers employ the latest techniques to measure and optimize grid load factors to economically manage electricity demand and supply, equipment designers must ensure that the reliability of control and protection information within the modern transmission and substation network not be compromised by the harsh environment in which these applications operate.



Substation



Firecomms has developed light sources and communications ICs with the deep understanding of the needs of smart grid transmission and distribution networks. Our light sources use Resonant Cavity LED (RCLED) technology to ensure the strongest optical output at the lowest currents while preserving stability after decades of operation. Our robust receiver topologies guarantee error-free transmission every time.



Protect, Control, Sense

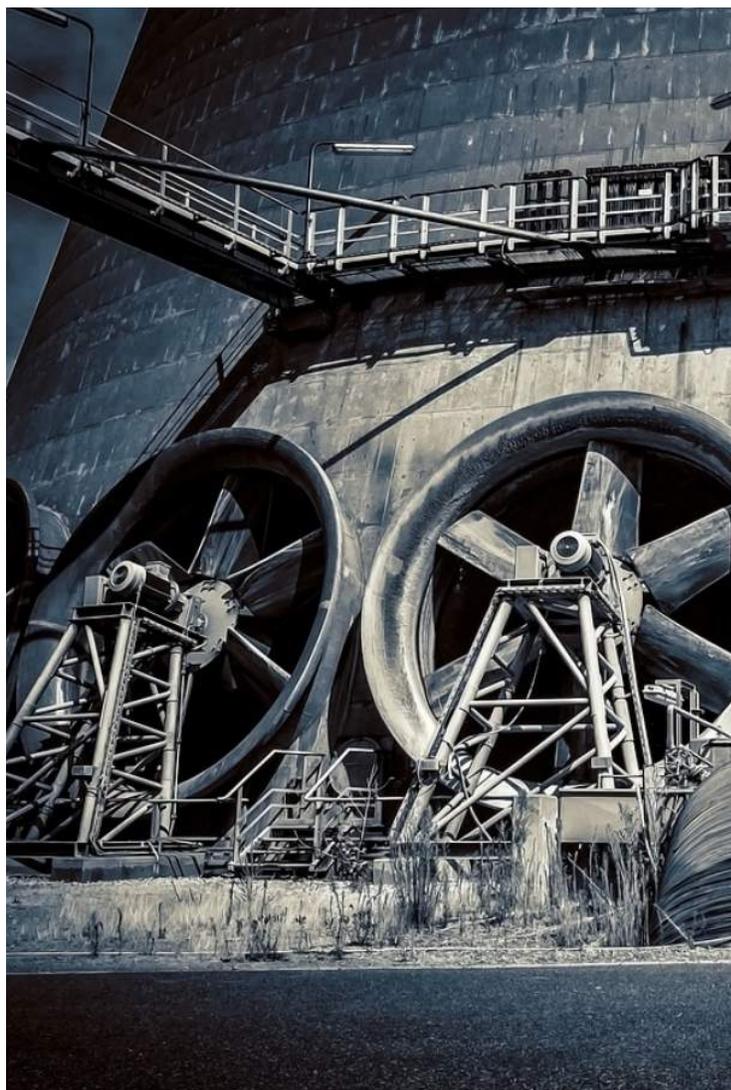
Today's transmission networks require intelligent monitoring and control of the substation environment. Due to its immunity to the significant electrical and electromagnetic interference within these environments, fiber optic communications can effectively ensure reliable data transfer from and within the substation network.

Firecomms DC-50 MBd fiber optic transmitters and receivers transfer control and feedback data to IGBT/IGCT semiconductors within the HVDC inverters.

To provide isolation within the rectifier voltage monitoring circuits, designers can take advantage of Firecomms DC-5 MBd transceivers over Plastic Optical Fiber (POF) for the short distances required.

Modern day substation automation requires control of various elements within the network examples of which include control of circuit breakers and switching relays. Due to the very high voltages and currents involved, together with significant EMI, POF or Plastic/Polymer Clad Silica (PCS) fibers are used to transfer information to and from the control center. Over these fibers, various proprietary and standardized bus protocols such as CAN, RS485 or LON are employed at data rates in the order of a few MBd. Firecomms DC-10 MBd and DC-50 MBd transceivers are designed to operate with these fibers.

In order to maximize the efficiency of the grid network for utilities and substation



operators several data points are measured throughout the grid on line-mounted sensors or from users' homes and factories using smart meter feedback. These measurements are used to optimize substation VARs and power correction circuits. At several points throughout the substation Intelligent Electronic Devices (IEDs) conforming to IEC-61850 communication standards monitor and control the VARs and circuits. In this application, it is becoming increasingly common to utilize IP communications protocols for which Firecomms' Fast Ethernet range of 125 Mbps or Gigabit transceivers make an ideal fit.



Flexible Solutions from Firecomms

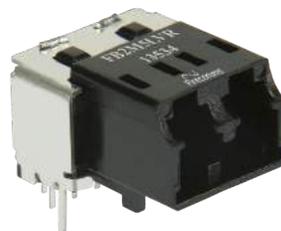
To ensure compatibility and versatility, Firecomms offers the widest choice of fiber optic solutions with our range of transmitter, receiver and transceiver products in three different connector configurations: OptoLock[®] LC and RedLink[®]

- ***Industrial Transceivers (1Mbps-1 Gbps)***
- ***Analog Transmitters & Receivers***
- ***Industrial RedLink[®] Transmitters & Receivers (DC-1/5/10/50 MBd)***

OptoLock[®]



LC Transceivers



RedLink[®]



Fiber Optic Communications for Smart Grid Automation Applications

Firecomms is a global leader in the provision of fiber optic solutions and optical transceivers, skillfully combining state-of-the-art compound and silicon semiconductor technology with inventive small-scale integration.

Together with a far reaching network of representatives and distribution channels, Firecomms serves its global clients across a range of power and energy, industrial, transportation, medical and con-sumer markets.

Firecomms leverages its deep knowledge across our multi-disciplinary teams in developing the broadest range of fiber optic transmitters and receivers specifically suited to our target markets. With an emphasis on world class performance in reliability, Firecomms utilizes internally developed market leading Resonant Cavity LED (RCLED) photonics with ultra low power CMOS drivers in our transmitters. Together with robust receiver IC architectures, Firecomms products enable ultra low power fiber optic links, from DC up to Gigabit data rates, to ensure extended lifetimes in the harshest of environments.

Firecomms products with Plastic Optical or Plastic Clad Fiber (POF/PCS) links offer many advantages in smart grid and substation automation applications:

- **EMI/RFI immunity** ideal for industrial, harsh, noisy environments
- **Galvanic isolation** between transmitter and receiver, ideal for harsh, noisy industrial environments
- **Visible spectrum** operation enables eye-safe, fast troubleshooting
- **Low power** consumption, transmitters capable of operation at 3-4 mA
- **Resilient** to bending and vibrations
- **Durable**, flexible and lightweight
- **High reliability** for extended machine uptime
- **Industrial temperature** in range of -40 to +85° C
- **Reduced maintenance cycle time** provides up to a 20-year life-cycle on transceivers and cables
- **Simplified field installation** for easy termination of large core optical fibers in custom distances