

POWER FREQUENCY COMMUNICATION TECHNOLOGY ADDS NEW DIMENSIONS TO LOAD MANAGEMENT

This paper describes the operation and implementation and application of a versatile, yet not well understood, technique known as Power Frequency Communication (PFC), and how it is now being applied to a wide range of load management applications both at the Utility as well as the User level.

Power Frequency Communication, is fundamentally different than the more common Power Line Carrier (PLC). With PFC, a signal with frequency components that are close to the power frequency and have the propagation benefits of the supply network itself are utilized. Injection of the signal takes place between the neutral and each phase of the distribution transformer and is applied to the AC waveform. Because it is "broadcast" to all "downstream" points in the distribution network, coverage, unlike wireless, is not a problem in shielded or underground facilities. Transmission distances of up to 100 Kilometres are achievable with a single transmitter.

PFC enables load management through the use of low cost switching devices (receivers), which are connected at the low voltage side of the electric distribution network. Transmitters are connected at the low, medium or high voltage levels, without the need for conditioning equipment. Control data sent is unaffected by capacitor banks, overhead-to-underground transitions, voltage step-downs or harmonics. Transmitters may be controlled using simple software and accessed by a variety of media including the PSTN, over the Internet or directly through wired or fibre communications facilities.

PFC may also be applied in a private facility power supply system on the "user side" of the meter. Facilities such as large manufacturing complexes, campuses as well as large buildings can use PFC locally to efficiently and cost effectively implement demand control. Low cost receivers, using PFC technology, have been developed, which make possible a wide variety of switching devices that are suited for controlling small loads such as appliances or A/C compressors or for large industrial equipment such a motors, heaters and fans. Devices vary by control contact ratings and housings. Signals are sent using a binary code, utilizing CRC-16 error detection thus providing virtually error free operation. Up to four separate devices have been controlled by a single receiver address. Receiver designs permit controlling receiver groups simultaneously. 65,535 addresses per transmitter are possible. Separate PFC systems can share a common utility network.

In summary, Power Frequency Communications can open new doors for utilities and their customers to better manage their power at lower cost . PFC technology may be adopted on a small or large scale making it a useful tool for better electric power management, due to better load management economy.

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