FSU-2E Operational Description

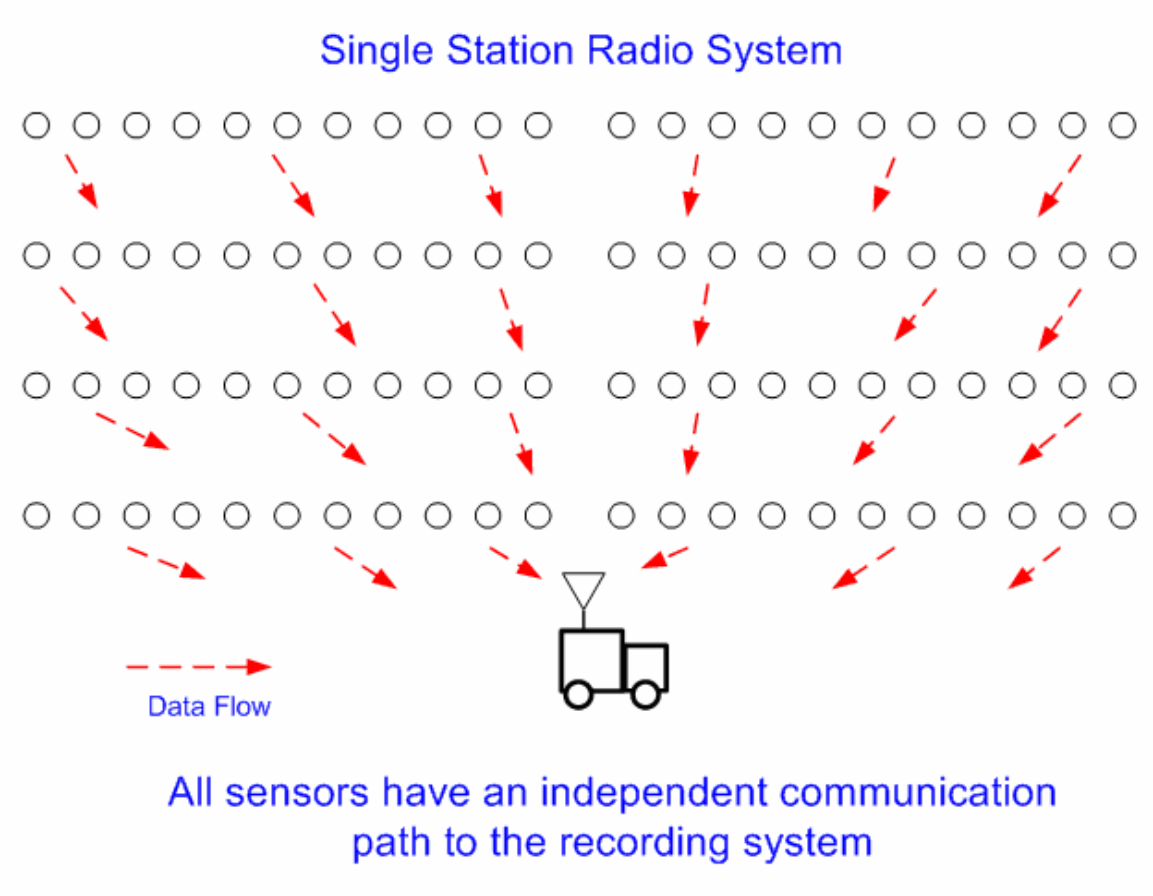

Figure 1 Single Station Radio System

In the Figure 1 above, each FSU2E (represented by a circle) has a wired interface to a VectorSeis sensor and a low-speed, long range wireless interface to the central command/control/recording system. This approach eliminates the need for a network of cabling and all the cost and reliability issues that are associated with it. Acquired data is stored in each field station unit for physical retrieval whenever practical (several days' worth of data may be stored).

Operational Details:

The FSU2E consists of two Printed Circuit Boards (Radio Board and CPU Board) inside the housing. The VectorSeis sensor is connected via a circular connector. An external battery pack is also part of the system.

CPU Board controls the system with a Power PC core within a Xilinx FPGA. The CPU board contains programmable memory for the operating system; also there is non-volatile memory to record the sensor readings when commanded via radio. The CPU board is powered by the external battery (up to 17 volts) and has power supplies on board to provide power to the various circuits in the system.

The Radio Board consists of a receiver section that amplifies signals from the antenna, down converts those signals using a DDS and PLL circuitry. The down converted signal is applied to a receiver chip that converts the signal to base band audio. The Digital Signal Controller (DSC) on the board converts the audio to a message protocol through. The incoming signal is timed by a GPS pulse per second provided by the Central Radio Unit (CRU2). This timing is decoded and applied to an algorithm to trim the master clock for the radio board (24.576 MHz). This is accomplished via a DAC within the DSC, The decode message is then sent to the CPU board via a Serial Protocol Bus (SPI). The CPU Board is commanded by this message, and replies to the radio board via the SPI bus.

The transmitter section of the radio board is controlled by the DSC. When a message is received from the CPU for transmission, the DSC controls the frequency, modulation and power of the transmitter. The modulation is accomplished by the DSC applying a modulation table to the DDS and PLL. These signals are mixed and filtered to provide a Frequency Modulation at 9600 bps.

This filtered signal is applied to a driver and power controlled Power Amplifier (PA) stage, this signal is filter and applied to the Antenna via a TR Switch. There is a circuit on board to measure the forward and reverse power to control the PA. The outputs of these circuits are read by the DSC, which in turn controls the power to the PA.

Also on the radio is a Bluetooth module, which communicates with the CPU board directly. The Bluetooth module utilizes a diplexer to communicate via the same VHF antenna as the radio board.