

## Transmitting GPS Signals via Fiber Optics over Long Distances

The use of GPS signals is certainly commonplace in today's technological age. Various locating systems, tracking systems and precision timing applications all use the common decoded NMEA and 1 PPS signals from a GPS satellite in a multitude of different ways. When a direct line of sight path exists to the various satellites there is not a problem but when direct satellite access is not available the GPS signal must first be received where there is a direct line-sight path, decoded and then the resulting signals must be routed to where they are needed. The **Luxlink**<sup>®</sup> GPSX-1001 manufactured by **Liteway Inc.** has been designed to do exactly that!

Figure 1 is a block diagram of the GPSX-1001 transceiver. As it can be seen from the diagram, it is a multifunctional device that is can be used as a transmitter or a receiver/repeater. In operation the NMEA signal and the 1 PPS signal are both multiplexed by the GPSX-1001 (set as a transmitter) and launched into a single optical fiber. The multiplexed signal is then received from the fiber at a second GPSX-1001 set as a receiver/repeater. Here the NMEA and 1PPS signal are de-multiplexed and available as individual outputs. The original multiplexed signal is also then re-applied to another integral optical transmitter for use at a third receiver/repeater. Additional receiver/repeaters can then be connected in the same fashion to allow the signals to be transmitted to numerous locations as desired.

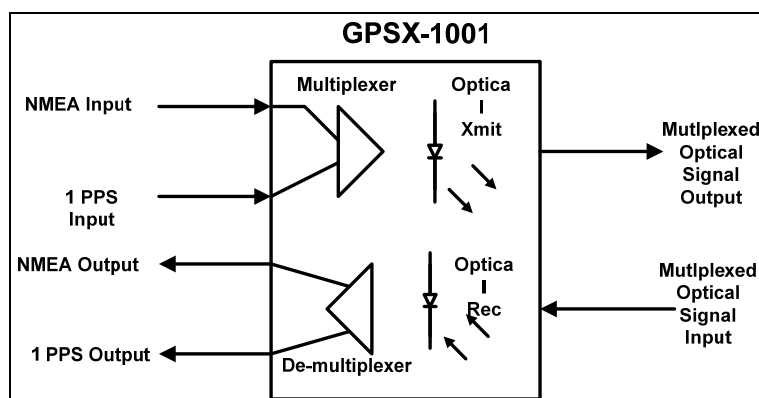
There are several distinct advantages when fiber optics is used to transmit these signals. Since fiber optic cable is virtually immune to electrical interference, it can be routed wherever convenient without regard the proximity of electrical noise producers, water or high voltages. Since fiber optic cable is also totally non-conducting, ground loops which can result in loss or corruption of the GPS signals are virtually eliminated. In addition the bandwidth of the fiber and circuitry in the GPSX-1001 is such that the fast rise and fall times of the 1 PPS signal are maintained and the NMEA signal is as noise free as the original input. It is also important to note that transmission distances using the GPSX-1001 can easily extend to a mile or more. For longer distances additional GPSX-1001 units can be added as previously described.

The GPSX-1001 is user configured by means of front panel DIP switches and integral LED indicators are provided to continuously monitor the NMEA, 1 PPS, Power and optical Link signals. Power is obtained from simple wall type plug-in adapters or low voltages and need not be regulated as the GPSX-1001 units contain internal regulators.

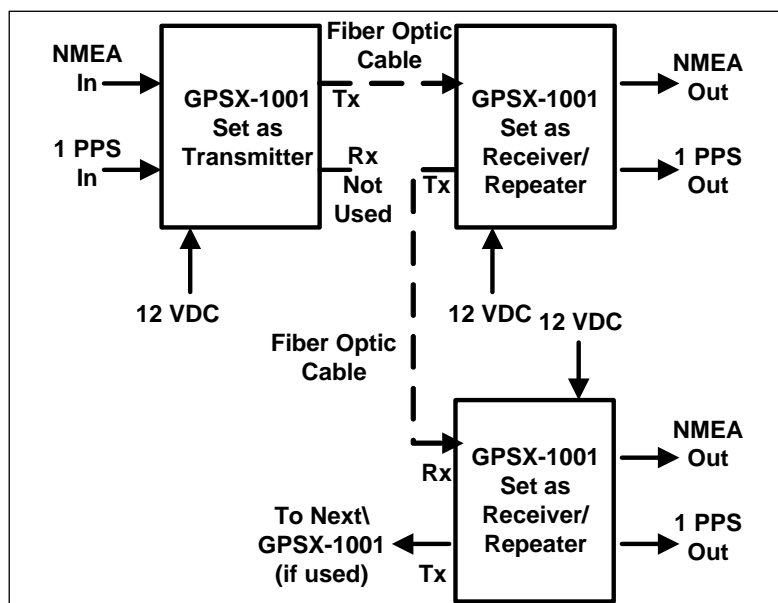
Figure 2 shows three GPSX-1001 units in a typical GPS signal distribution system. The NMEA interface can be RS-422 or RS-232 depending on the

requirements of the signal source. The 1 PPS signal is 50 ohm TTL compatible. Each transceiver pair will produce “textbook quality” signals over distances well in excess of several miles and will operate from –35 to +75C (-31 to 167F) thereby allowing them to be used both indoors and outdoors. Units are also available for use with multimode or single-mode fiber and with all standard fiber optic connectors. Figure 3 is a picture of a GPSX-1001.

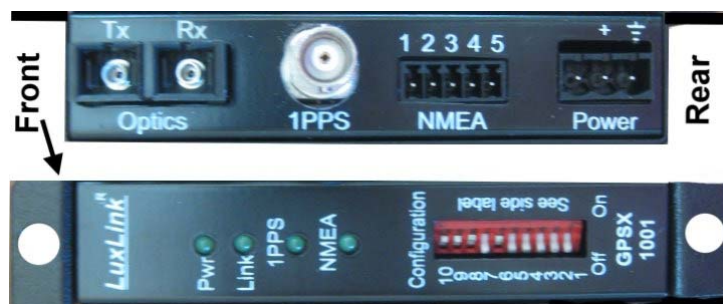
Additional details and specifications can be found at [www.luxlink.com](http://www.luxlink.com). or by contacting Liteway at 516-931-2800 or by email at [Sales2@liteway.com](mailto:Sales2@liteway.com)



**Figure 1 GPSX-1001 Block Diagram**



**Figure 2 GPS NMEA/1 PPS Transmission System**



**Figure 3 GPSX-1001 Fiber Optic Transceiver**

*For more information contact **Liteway Inc.** at 516-931-2800 or at [sales2@liteway.com](mailto:sales2@liteway.com)*