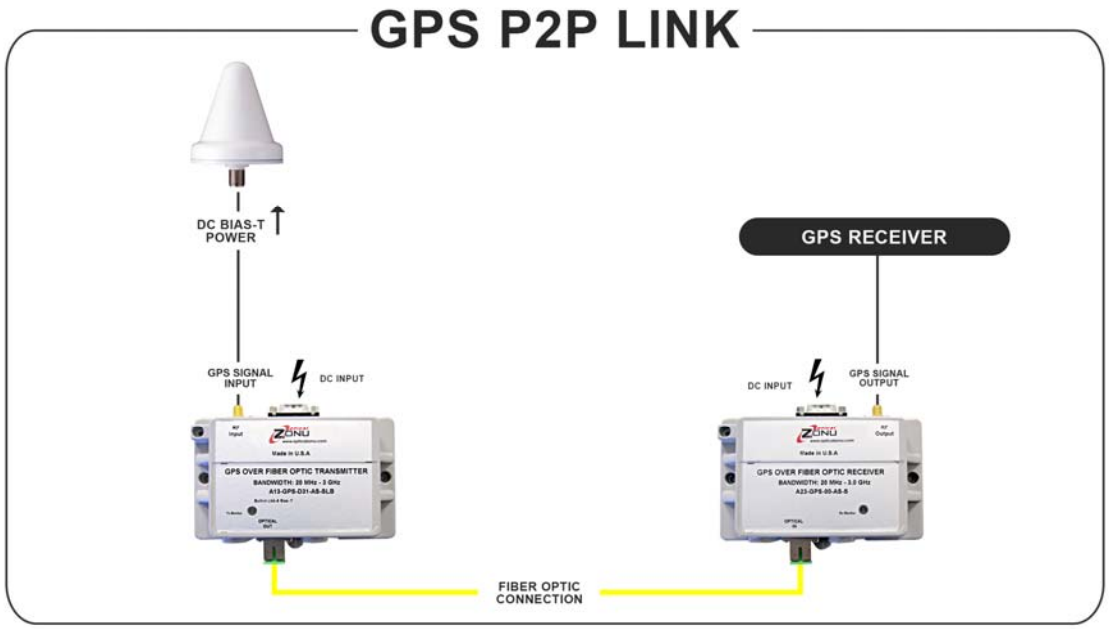
GPS Fiber Optic Link

GENERAL DESCRIPTION

Optical fiber provides a ***cost-effective solution*** for long cable runs in GPS systems. The Optical Zonu GPS over Fiber Optics System allows signals to be carried from an antenna to a GPS receiver with minimal signal degradation over a non-conducting dielectric glass media. This system provides a completely transparent cross-site connection between an antenna and receiver. As is the case in many types of in-building environments, networks require accurate clock synchronization. By utilizing broadband RF over Fiber Optics (RFoF) Technology, Optical Zonu GPS over Fiber Optics Links provide easy to operate, low cost and reliable solutions that enable GPS signal distribution using fiber optic cable.

The broad bandwidth (10 MHz to 3.0 GHz) of the RFoF transceivers used in our GPS over Fiber Optics Link allows transmission of the two main signals in the GPS band, L1 and L2, at 1575.42 MHz and 1227.6 MHz respectively. This GPS over Fiber Link is designed to offer low noise figure by integrating a built-in LNA with Lasers featuring low Relative intensity Noise (RIN) and low loss broadband matching, in order to optimize the Link performance. Optical Zonu's GPS RFoF Link consists of stand-alone transmitter and receiver units. Each module is housed in compact (3 x 5 x 1.5 inches) metal ruggedized boxes which allow convenient installation in small spaces. Both units are powered via a DB-9 plug using +12 Volts DC (optional power supplies are available upon request).

Optical Zonu's GPS RFoF Link is an ideal solution for providing GPS timing and reference signals over fiber optic cable. It acts as a low loss extender between the GPS antenna and GPS receiver in places where GPS signals are otherwise unavailable, or where running long coaxial lines is impractical.



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FIBER OPTIC versus COAX CABLE FOR GPS APPLICATIONS

Traditionally GPS systems have utilized coaxial cable to transfer signals between antenna and receiver. However, coax has a number of disadvantages, particularly over longer cable distances. It has a significant amount of signal loss over longer cable runs limiting its application for long distance links. Unfortunately, high quality low-loss coax is very bulky and expensive. Coax cable often has a large diameter, making it very inflexible and difficult to manipulate. There is also a direct electrical connection between the antenna and expensive receiver equipment. This direct electrical connection may conduct destructive electrical surges from environmental sources such as such as lightning.

Optical fiber supports very long cable distances, up to 15 Km or more, with minimal signal loss and degradation. Optical fiber operates by transmitting light along a dielectric glass fiber, rather than electrical signals over copper wires. This provides a highly secure tamper-proof medium for signal transfer, minimizing security risks and unauthorized signal interception concerns. Light is also unaffected by electro-magnetic interference, allowing signals to be transmitted unaffected through electrically noisy environments.

Often measuring less than 3 mm in diameter, optical fiber has a much smaller bend-radius than low-loss coax. Since it is much lighter, long reels of cable can be easily transported. Also, unlike coax, which has a larger minimum bend radius, optical fiber is very flexible and can be easily installed. Fiber also provides complete electrical isolation between an antenna and expensive receiving equipment, such as NTP (Network Time Protocol) servers and other network timing equipment. This means that an optical fiber system is immune to electrical surges such as lightning strikes that can easily damage or destroy expensive electronic equipment. Coax cable conducts electrical surges and often requires expensive surge suppressors that often need replacing in the event of activation by an electrical power surge.

Low-loss coax has a very high cost per meter ratio. Long cable runs can be very expensive to install. Optical fiber offers a relatively low cost per meter which is ideal for reducing installation costs when long cable distances are required. Additionally, GPS over optical fiber systems can often utilize legacy fiber that is part of a building's existing structured cabling. Pre-installed spare fiber cables can be utilized to save on expensive cabling costs. Optical fiber cable supports the transfer of multiple signals over a single cable. Often GPS and LF radio time and frequency signals may be combined and transmitted over a single fiber optic cable. Coax installations would require separate cables for each particular signal type.

GPS POINT-TO-POINT LINK

This segment addresses the most basic of all GPS applications, which requires point-to-point links over fiber optic cable. A link consists of transmitter and receiver modules. Both modules are packaged in a semi-ruggedized, dust-tight, cast metal housing. The transmitter has a built-in LNA with Lasers featuring low Relative intensity Noise (RIN) and low loss broadband matching, in order to optimize the Link performance. The transmitter also has an optional Bias-T to provide electrical power to the GPS Antenna. Specifications for this must be provided to the Factory, so OZC Support Engineering may determine the correct configuration.

The maximum RF input signal into the transmitter is +10 dBm and the RF interface is via a 50 Ohm SMA connector. The standard optical connector is SC/APC (FC/APC is also available upon request) for low back reflection applications. Each unit is powered through its DB-9 port and a power supply of +12 Volts DC is required to operate it safely. An optional RS 232 data modem, alarm and monitoring functions are all also available through a DB-9 connector. A Manual Gain Control, via a potentiometer accessible from the top of the box by a small screw driver (or "twiker"), to ease field integrations, is also available.

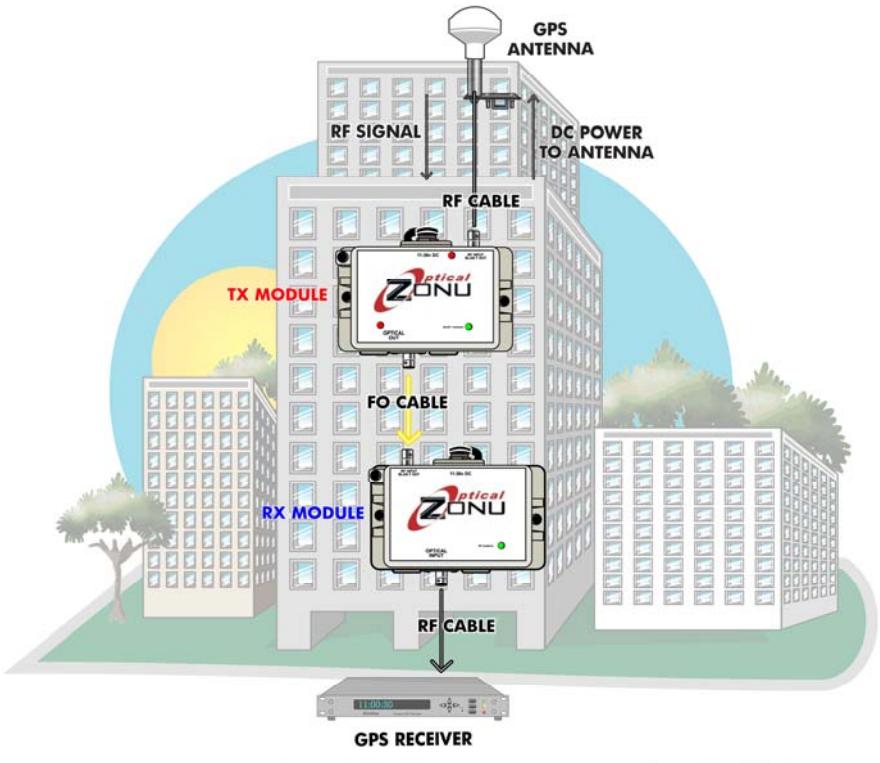

Illustration of point to point GPS over Fiber link

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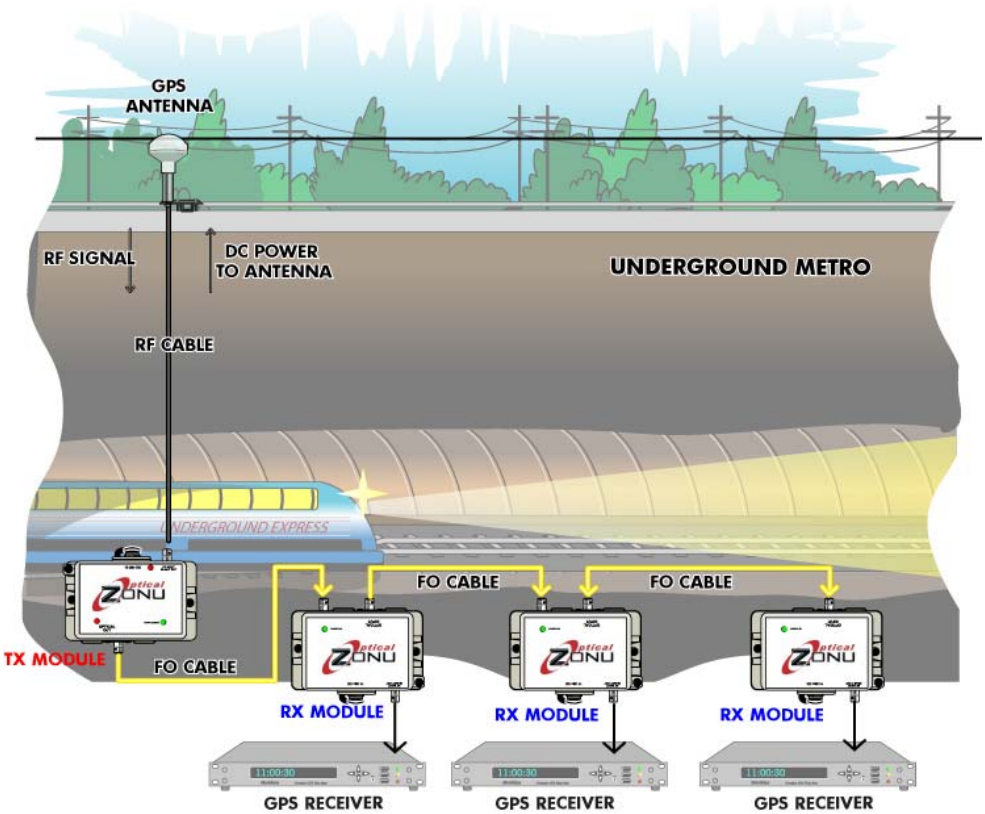
GPS POINT-TO-MULTIPOINT (*Daisy-Chain Type*) FIBER LINK

This type of link is used for sending GPS signals from a single source to multiple receivers which are connected by fiber optic cable in series (often called "daisy chained"). Common examples of such applications include subway, underground mine and other long tunnels. The fiber optic transmitter and receivers are packaged in semi-ruggedized, dust-tight, cast metal housings. An optional outdoor housing is available upon request. The transmitter has a built-in LNA with Laser featuring low Relative intensity Noise (RIN) and low loss broadband matching, in order to optimize the Link performance. The transmitter also has an optional Bias-T to provide electrical power to the GPS Antenna. The specifications for this must be provided to the OZC Factory, so Support Engineering may determine the correct configuration.

The receivers have built-in optical splitters, each with a different split-ratio, which are sequenced to optimally allocate the optical power among the receivers in such a way as to maximize the link distance between receivers, and ultimately, the overall end-to-end link distance from transmitter to the farthest receiver.

The maximum RF input signal into the transmitter is +10 dBm and the RF interface is via a 50 Ohm SMA connector. The standard optical connector is SC/APC (FC/APC is also available upon request) for low back reflection applications. Each unit is powered through its DB-9 port and a power supply of +12 V DC is required to operate it safely. Optional alarm and monitoring functions are all also available through a DB-9 connector. A Manual Gain Control, via a potentiometer accessible from the top of the box by a small screw driver ("twiker"), to ease field integrations, is also available.



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GPS Fiber Optic Link

SYSTEM SPECIFICATION

Frequency Range	1 GHz – 2 GHz.
Noise Figure P2P Link	18 dB (GPS antenna Gain not included)
IIP3	+8 dBm
Link Gain	18-20 dB (GPS antenna Gain not included)
Group Delay	<1nS
Fiber Optic Cable	~5 nS for 1m fiber optic cable
Power	12V DC
RF Connector	50 Ohm SMA
Bias-T Option	+5V to +12V
Fiber Optic Connector	SC/APC (FC/APC is optional)

ENCLOSURES

Master Unit	Stand Alone Box 3” x 1.5” x 5”
Remote Unit	Stand Alone Box 3” x 1.5” x 5”
Weight (Master Unit)	8.8 oz
Weight (Remote)	8.8 oz

ORDERING INFORMATION

NO.	PART NUMBER	DESCRIPTION
1	A13-GPS-D31-AS-SLB	GPS Fiber Optic Transmitter
2	A23-GPS-00-AS-S	GPS Fiber Optic Receiver
3	350-1212-02	AC to DC External Power Supply

Note: Please contact factory for additional options such as built-in Bias-T for powering your GPS antenna, multi-mode fiber compatible link, outdoor packaging, and different installation configurations involving multiple receivers.

MADE IN U. S. A.