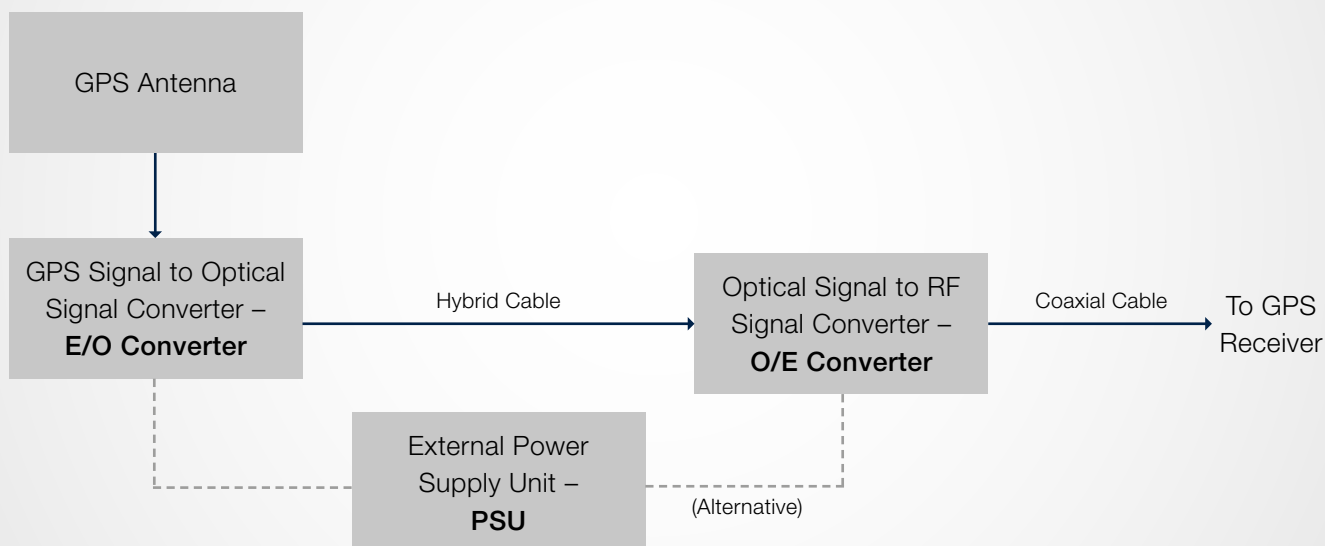


Distribution of the GPS Signal Over Long Distances

## GPS over Fiber System

COMMUNICATION





## System Overview

Rosenberger presents a new and innovative GPS over Fiber system for applications where coax cannot be used to route the GPS signal to base stations. With more centralized RAN and large-scale DAS applications, there are many cases where the GPS antennas are located too far from the base stations for coaxial losses to be acceptable. To overcome this issue, the GPS over Fiber system converts the RF signal to light, transmits it over the fiber, and then restores the light to the original RF signal. Working in contrast to the many systems that employ a bulky remote unit – which requires power and separate mounting space – as well as a large master unit encompassing an active GPS splitter, Rosenberger has rethought the process and designed a fiber-optic replacement for the coaxial cable. Instead of a master unit and a remote unit, the system uses an electro-optical converter (E/O converter) at the antenna and an opto-electrical converter (O/E converter) near the base station.

By employing this method, the E/O converter becomes a small, compact unit that connects directly to the GPS antenna. The unit is so small that it can even fit within a 1 ½ inch pipe of the kind often used to mount GPS antennas.

The O/E converter handles all alarms and is a compact unit. It can be used to power the E/O converter and can be connected to standard GPS splitters with full support for their redundancy functionality. This means that the GPS over Fiber system fully emulates the behavior of a passive copper cable and GPS antenna, allowing any device that is normally connected to the GPS antenna to maintain proper operation when connected to an O/E converter.

Interconnecting the two units i.e. E/O converter to the O/E converter is a thin hybrid cable comprised of fiber and power, which means no power source is required at the GPS antenna.

The individual link support for each GPS antenna allows for the flexibility of using a normal coaxial configuration and simply replacing each coax cable from a GPS antenna with an E/O converter, an O/E converter, and a hybrid cable. With a maximum hybrid cable length of 1.9 miles (3 km), this system can meet the demands of almost any installation.

### GPS over Fiber System

- Distribution of the GPS signal over long distances
- Converts the RF signal to an optical signal, then back again



GPS Antenna



O/E Converter



E/O Converter



External Power Supply Unit

## Product Description

### E/O Converter

The E/O converter directly connects to any active GPS antenna and converts the GPS RF signal to an optical one. Powered through a hybrid cable, the E/O converter not only transfers the GPS signal to the O/E converter, it also supplies power to the GPS antenna and detects any antenna faults, relaying the alarm information to the O/E converter. Small enough to fit inside a 1 ½ inch conduit, the E/O converter meets IP67 requirements and its rugged design is suitable for harsh environments.

### O/E Converter

The O/E converter receives the optical signal from the E/O converter via the hybrid cable connection and converts it back to an RF signal. The O/E converter also sends power to the E/O converter via the same hybrid cable. Available as a standalone unit or as part of a 19" rack unit that can hold up to 4 O/E converters, the O/E converter can be powered through PoE or a direct -48 VDC connection. Supporting SNMP, the O/E converter reports alarms in the event of antenna failure and faults in communication

with the E/O converter. An RF connection to any industry-standard active GPS splitter completes the system.

As the splitter is not included in the O/E converter, more flexibility is available for configuring the system.

### External Power Supply Unit (PSU)

In applications that intend to use existing fiber optics, a small external power supply is available for powering the E/O converter directly and providing a fiber cable for connecting to the O/E converter. The PSU connects to the E/O converter via a short hybrid cable, using the Rosenberger RQC hybrid connector to ensure a safe power and fiber connection as well as environmental protection. The PSU is available as PoE and AC options.

# Specifications

Electrical	E/O Converter	O/E Converter	Power Supply Unit
Frequency range	L1 (GPS, SBAS), E1 (Galileo), G1 (GLONASS), B1I (Beidou)		n.a.
Link gain (typical)	13 dB		n.a.
Input P1 dB (typical)	-42 dBm		n.a.
Impedance	50 Ω		n.a.
Input voltage	24 VDC	48 VDC or PoE	100 to 240 VAC @ 50/60 Hz or PoE
Output voltage	n.a.	n.a.	24 VDC
Power to GPS antenna	5 VDC / 120 mA max.		n.a.
Alarms	Loss of antenna Link failure indicated by LED Readout by SNMP		n.a.
Remote access	n.a.	SNMP (v1, v2c, v3) via Ethernet	n.a.
<b>Optical</b>			
Fiber length	SMF > 3.8 miles / 6 km		
Hybrid cable length	1.9 miles / 3 km (1 mm <sup>2</sup> / AWG 18)		
Wavelength (typical)	1310 nm		
Optical power (typical)	8 dBm		
<b>Mechanical</b>			
Dimensions	Ø 40 mm x 145 mm	105 mm x 185 mm x 47 mm (standalone) 483 mm x 215 mm x 44 mm (19" rack)	170 mm x 102 mm x 55 mm
Connectors	N male 50 Ω (RF) Rosenberger RQC Hybrid (optical & power)	SMA female 50 Ω (RF) LC APC (optical) RJ45 (PoE) 2 pin (power in) 2 pin (power out)	Rosenberger RQC hybrid (optical in) LC APC (optical out) RJ45 (power, PoE) 3 pin (power, AC)
Weight	295 g	250 g (O/E converter stand-alone) 1500 g (19" rack with 2 O/E converters included)	350 g
<b>Environmental</b>			
Operating temperature	-40 °C to +50 °C	0 °C to +40 °C	-40 °C to +85 °C
Compliance	FCC, CE		
Protection	IP67	IP11	IP67
<b>Ordering Information</b>			
GPS over Fiber System	98GOF002-TX	98GOF002-RX (standalone) 98GOF102-RX (2 O/E converters in 1 HU 19" rack)	98GOF001-PSU (PoE) 98GOF002-PSU (AC)
Hybrid cable	L98B-A0650-XXX (shielded hybrid cable, RQC connectors, XXX m) L98B-A0651-XXX (shielded hybrid cable, RQC - LC duplex APX, XXX m)		
GPS antenna	GPS-36-N-SC (GPS only) GPSGlonass-36-N-SC (GPS, Galileo, Glonass, Beidou)		





## Company Profile

### About Rosenberger

Rosenberger is a leading worldwide supplier of controlled impedance and optical connectivity solutions and system components. These are designed for use and integration with mobile communications networks and data centers as well as test and measurement and high voltage contact systems. The Rosenberger Group operates manufacturing and assembly locations in over 10 countries and has a global sales network.

### Rosenberger Communication

The Rosenberger Communication Business Area designs, manufactures and markets connectivity solutions for the communications market. Working in close cooperation with its customers Rosenberger Communication offers the complete product development package, from idea conception to volume production. The Communication team leverages the combined Group-wide resources and synergies available to it from around the world. These include research and development, purchasing, production

and sales know-how. By utilizing Rosenberger Group's global manufacturing infrastructure, both small and large production volumes can be accommodated.

### Quality and Environment

Rosenberger's quality philosophy is not simply focused on optimizing components and products. The company also continuously seeks to improve and optimize every single process in order to achieve total customer satisfaction. This encompasses everything from product development, planning, procurement, production, sales, logistics and services to environmental policy. In short, Rosenberger constantly strives to deliver maximum benefit and value to customers on a global scale.

In addition, when it comes to upholding quality standards Rosenberger's Corporate Social Responsibility policy extends to taking proactive steps for helping protect the environment and natural resources. As such, the company endeavours to avoid any environmental pollution, exceeding the requirements of legal regulations whenever possible.



## Website

For more information refer to our website:  
[www.rosenberger.com/communication](http://www.rosenberger.com/communication)

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