Application Note AN2014-03

Using an SEL Satellite-Synchronized Clock to Synchronize Devices Via Serial Port Time Broadcasting

David Gonzalez, Jesus Carrillo, and Jorge Espitia

INTRODUCTION

One of the most important requirements for an integrated system is the time synchronization of all of its elements. Time synchronization allows you to have an exact reference when analyzing data related to power system disturbances and also when collecting data for billing and revenue purposes.

This application note describes an SEL solution to synchronize intelligent electronic devices (IEDs) that do not support the IRIG-B signal but do support time synchronization via serial communication and periodic ASCII time-synchronization message broadcasting.

PROBLEM

Some IEDs in the integrated systems of substations do not have the ability to receive the IRIG-B signal coming from satellite-synchronized clocks for time synchronization but can accept an ASCII serial data stream to synchronize their internal clocks.

SEL SOLUTION

The SEL-2401, SEL-2404, and SEL-2407® Satellite-Synchronized Clocks include a serial port with a DB-9 connector for configuration. This port is able to periodically broadcast an ASCII time stream that allows the connected IEDs to synchronize properly.

The serial port uses a standard EIA-232 connection with a DB-9 connector for configuration and time broadcasting. Using the EIA-232 interface allows you to synchronize one device using a standard SEL-C272 or SEL-C234A communications cable. Using an SEL-2886 EIA-232 to EIA-485 Interface Converter allows you to synchronize up to 31 devices using a data bus with a twisted pair connection.

Figure 1 shows an example of typical connections for time synchronization using serial interfaces.

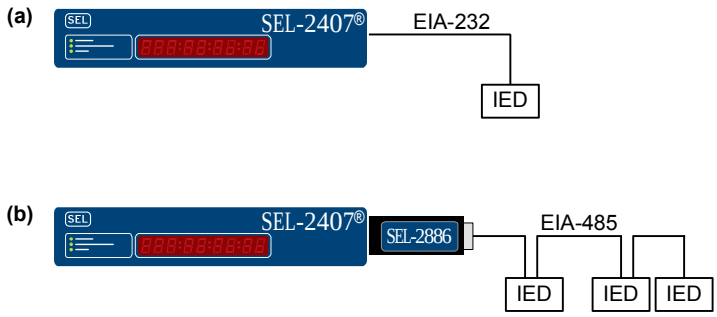

Figure 1 Typical Connections for One Device With an EIA-232 Interface (a) and Multiple Devices With EIA-485 Interfaces (b)

SEL satellite-synchronized clocks are designed and tested to endure the same harsh conditions as SEL protective relays.

Depending on the SEL clock model, single or multiple IRIG-B outputs are provided for substation IED synchronization in addition to the serial port for configuration and ASCII time-synchronization broadcasting discussed in this application note.

Devices from several manufacturers accept ASCII data streams.

When multiple devices need to be synchronized, the use of an EIA-232 to EIA-485 interface converter is required. The SEL-2886 provides the proper interface for the data bus connection and transmits the data to each of the different IEDs.

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SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 USA
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
www.selinc.com • info@selinc.com