SEU-100
Signal Excision Unit

Signal Processing

Overview

Comtech EF Data's SEU-100 Signal Excision Unit significantly enhances the performance of geolocation systems, improving location accuracy and enabling emitters to be successfully located in many situations where geolocation without signal excision is not possible. The SEU-100 is a signal suppression device that suppresses a strong signal from the satellite receive spectrum to enable the background signal(s) to have a higher effective signal-to-noise ratio (SNR). The strong signal can be any signal present on the satellite operating at conventional signal to noise levels such that commercial modems can be configured to demodulate the signal.

Typical Users

- Geolocation System Operators

Common Applications

- Geolocation system performance enhancement

Figure 1 below shows the data processing flow. The SEU-100 has two input channels and two output channels. Input Channel 1 contains a composite of the strong signal to be excised (S_E) and a copy of the signal to be located (S_L). Input Channel 2 contains the primary copy of S_L.Conceptually the terminal to be geolocated is transmitting the signal S_L to a primary satellite, and this received signal is input to the SEU on Channel 2. Due to antenna sidelobes, an attenuated copy of S_L is also received by a secondary satellite. The secondary satellite has the signal S_E occupying (or partially occupying) this frequency channel. The composite of S_E and the attenuated copy of S_L are input to the SEU on Channel 1.

<u>Channel 1 Processing:</u>

Signal S_E is suppressed in Channel 1 by demodulating and making hard decisions on the input composite waveform, then remodulating these decisions to generate the "reference" signal for a carrier cancellation algorithm.

<u>Channel 2 Processing:</u>

Signal S_L is delayed and frequency shifted such that the frequency and time offset between the input Channel 1 and Channel 2 signals are minimized. Any operation that affects frequency/phase/time delay on Channel 1 is matched by the same/similar operation on Channel 2 in order to maintain coherence between the two channels.

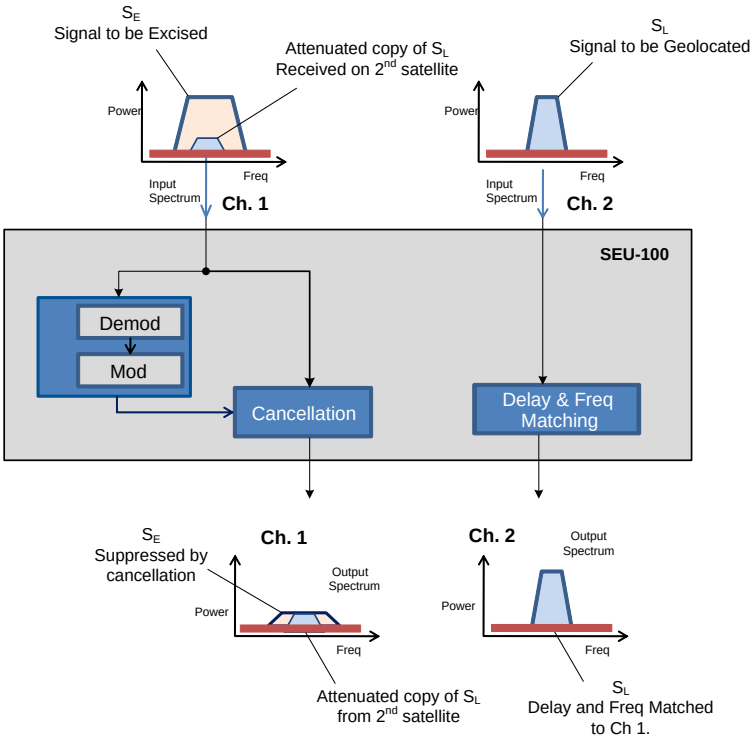

Figure 1

Features

- Suppresses strong signal on Channel 1 output below background noise level, improving SNR of background signals
- ±10 ns channel synchronization timing accuracy (Ch. 2 to Ch. 1)
- < 0.1mHz channel synchronization frequency accuracy (Ch. 2 to Ch. 1)
- Strong signal modulations: BPSK, QPSK/OQPSK, 8-PSK, 8-QAM, 16-QAM
- Strong signal symbol rates: 64 ksps to 36 Msps
- 40 MHz output bandwidth (both channels)
- 950 – 2150 MHz, input/output range
- Web, SNMP monitor & control via 10/100Base-T Ethernet port

Specifications

System

Strong Signal Modulation Types	BPSK, QPSK/OQPSK, 8-PSK, 8-QAM, 16-QAM
Strong Signal Symbol Rate Range	64 ksps to 36 Msps
Processed Bandwidth	40 MHz
Channel 1 Strong Signal Suppression	S_E spectral density suppressed below N_0 where N_0 is the noise floor spectral density.
Timing Accuracy (Ch. 2 to Ch. 1)	±10 ns
Freq. Accuracy (Ch. 2 to Ch. 1)	< 0.1mHz
Operation Over Satellite	Performance over commercial satellites in all cases when commercial can demodulate the signal to be cancelled
M&C Interface	Web, SNMP via 10/100Base-T Ethernet port

Input

Center Frequency	950 – 2150 MHz, 100 Hz resolution
Impedance	50 Ω, 14 dB minimum return loss
Connector	N-Type, female
S_E Input Level Channel 1	-130 + 10 log(SR_E) to -80 + 10 log(SR_E) dBm SR_E = symbol rate of S_E (Hz)
S_L Input Level Channel 2	-130 + 10 log(SR_L) to -80 + 10 log(SR_L) dBm SR_L = symbol rate of S_L (Hz)
Max. Composite Level (40 MHz)	95 – 10 log(SR_L) dBc, +10 dBm maximum

Output

Center Frequency	950 – 2150 MHz, 100 Hz resolution
Impedance	50 Ω, 14 dB minimum return loss
Connector	N-Type, female
Output Power Ch 1 & 2	-20 dBm to -35 dBm (0.5 dB steps)

Reference

Internal 10 MHz Accuracy	± 0.06 ppm < 0.001ppm /day, < 0.1 ppm /year
External 10 MHz Input Reference	BNC connector -6 dBm to +10 dBm 50 Ω/75 Ω (nominal)
External 10 MHz Output Reference	BNC connector 2.7 V peak-to-peak ± 0.4 V, low impedance output

Environmental And Physical

Prime Power	100-240 volts AC. +6% /-10% autosensing
Power Consumption	< 65 W
Mounting	1RU
Dimensions (height x width x depth)	1.75” x 19.0” x 18.65” (4.4 x 48 x 46.8 cm)
Weight	<10 lbs
Operating Temp Range	0°C to 50°C
Storage Temp Range	-20°C to 70°C
Humidity	0 to 95%, non-condensing

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