

Creonic Offers High-Throughput Single-Chip DVB-S2X Satellite Modem for Zynq UltraScale+ RFSoc



Kaiserslautern, Germany, July 22, 2022 – The DVB-S2X standard is very popular for satellite communication. Its outstanding error correction performance allows it to achieve excellent spectral efficiency for a broad range of signal-to-noise ratios (SNRs) – from less than -8 dB up to 20 dB.

As such it has been adopted for many applications, like broadcasting and professional services where high data rates or a high level of robustness are key. Creonic, as an IP core provider, has been selling DVB-S2X IP cores for more than a decade.

Recently, we started shipping high-throughput single-chip DVB-S2X modem solutions based on the Zynq UltraScale+ RFSoc device family, exploiting its integrated DAC/ADC and DUC/DDC cores.

The system satisfies the ever-increasing customer needs for high data rates, e.g., when it comes to sending high amounts of data from nanosatellites back to earth within minutes. The transmitter can operate at 4 Gbps while the receiver handles up to 1 Gbps. It is possible to achieve even higher data rates with the Creonic Wideband DVB-S2X IP core portfolio.

One of our customers uses this architecture to transmit live video footage from space, showing the dispensing process of nanosatellites shortly after rocket launch.

System Design

Creonic provides the customer with the entire design of the FPGA fabric. Furthermore, there are Linux drivers running on ARM cores, offering plenty of control and monitoring capabilities. The customer only needs to feed the design with IPv4 packets and the IP cores handle the rest. The RFSoc device provides an RF output with the DVB-S2X waveform.

About Creonic GmbH

Creonic is an ISO 9001:2015 certified provider of ready-for-use IP cores for several algorithms of communications such as forward error correction (LDPC, Turbo, Polar), modulation, and synchronization. The company offers the richest product portfolio in this field, covering standards like 5G, 4G, DVB-S2X, DVB-RCS2, DOCSIS 3.1, WiFi, WiGig, and UWB. The products are applicable for ASIC and FPGA technology and comply with the highest requirements with respect to quality and performance.

For more information please visit our website at www.creonic.com.

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The transmit system is comprised of the following Creonic IPs:

- DVB-GSE Encapsulator, performing generic stream encapsulation, i.e., converting IP packets into baseband frames, as expected by DVB-S2X.
- DVB-S2X Modulator, generating samples of the DVB-S2X waveform in the baseband. It is flexible in many aspects such as symbol rates, roll-off factors, code rates, and block sizes.

The output of the modulator is handled by the DUC and the DAC of the RF Data Converter, allowing to have the output either in baseband or L-band.

On the receive side, the following IPs are used:

- DVB-S2X Demodulator, taking samples in the baseband after processing with the ADC and DDC cores. The demodulator is flexible just like the modulator. It offers optional support for the very-low SNR (VLSNR) feature of the standard and provides fully synchronized complex symbols on the output.
- DVB-S2X LDPC and BCH decoder, performing deinterleaving and forward error correction on the demodulator output.
- DVB-GSE Decapsulator, assembling the originally sent IP packets from the DVB-S2X baseband frames.

Compared to conventional modem designs with separate ICs for ADC/DAC and DUC/DDC, customers significantly benefit from the higher level of integration due to smaller PCB footprint and reduced overall power consumption.

Next Steps

DVB-S2X multi-carrier solutions will be available shortly, allowing to demodulate more than 30 carriers in parallel.