SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Fixed and Broadcast Communications (1)

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X BAND TRANSMISSION EVOLUTION TOWARDS DVB-S2 FOR SMALL SATELLITES.

Abstract

DVB-S2 is a CCSDS adaptation standard fully reusing the ETSI DVB-S2 mass-market telecommunication standard, thus providing the advantage of a wide diversity of very robust commercial mass market receivers, cheaper than the receivers dedicated to space telemetry links. CNES is currently upgrading with Syrlinks an existing X Band Transmitter for cube nanosatellites (TRL 9), to use DVB-S2 CCSDS telemetry standard. This equipment will provide two configurations. Configuration noe, already available and in-flight proven, consists in filtered OQPSK CC (7, 1/2) with a Constant Bit Rate (CBR) up to 100 Mbps. Configuration 2 will provide DVB-S2 modulations and coding, with at least QPSK modulation and related Variable Coding and Modulation (VCM) mode. OQPSK CC (7, 1/2) scheme when used with Variable Bit Rate (VBR) allows a 100 DVB-S2 standard in VCM allows a 60The first version of this -band transmitter for was validated in orbit in GOMX-3, a GOMSPACE and ESA spacecraft, using a CNES ground station. The next missions using similar transmission equipment will be an ESA 3U CubeSat, OPS-SAT, in 2017, up to 50 Mbps (VBR), as well as a CNES/Students 3U CubeSat, EYE-SAT, at about 30 Mbps (CBR). Equipment is currently manufactured for several other missions. Validation results along

with the X-band EWC27 transmitter and the experimental X-band antenna will be presented in the first part of the paper. Secondly, paper will present the evolution of the X-band transmitter using a new powerful FPGA allowing a maximum data rate higher than 100 Mbps. All the DVB-S2 features have already been coded by Syrlinks. Necessary DVB-S2 blocks are included: baseband encapsulation, channel coding, mapping, physical layer encapsulation and filtering. Different steps of the X-band DVB-S2 transmitter development will be described as well as intermediate validation results and use examples with related link budgets. Then, the paper will present the next step for higher CubeSat data rate, like 200 Mbps in X-band, especially using directive on board antenna to precisely point toward the ground stations as in EYE-SAT and for SKYBOX spacecrafts. Endly, other evolutions of the Payload TeleMetry for small satellites, like the future DVB-S2 Ka band nano HDR-TM will be introduced.