IRIG S-Band Missile Telemetry

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***Abstract*—This article demonstrates the design methodology based on Software Defined Radio (SDR), the result of which proves the flexibility of this method. Reconstructable IRIG datagram are presented without the need to reconfigure the receiver. Some of the functions of commutator/decommutator desired by the platform include missile telemetry, temperature and pressure measurement, GPS location transmission and a continuous sensor-data feed of sensor and missile status.**

Keywords*—*IRIG106; SDR; Telemetry; Missile; Commutator; Decommutator;

I. INTRODUCTION

According to the missile telemetry data acquisition system's features and special requirements, this paper introduces a novel missile telemetry data acquisition system. With SDR system [1], IRIG-106 acquisition function has been realized using hundreds of adaptively-changing transceiver control. There are inherent requirements for this device as a result of its tactical use. It must be small and rugged. The environment that this device is will work in includes extreme temperatures, constant movement, and small space. The power consumption of the device must be low in order to prevent drain on the power source, the rocket battery. To meet these mission requirements, the weight of the device should be as low as possible while still maintaining structural integrity and reliability. After considering numerous technologies, the team settled on a set of SDR solutions that will satisfy or exceed all requirements while still remain under budget and can be completed in the given time frame.

In this paper the system analysis and design was discussed, followed by the IRIG-106 standard. The transmission frequency was chosen by the user to be 2.2-2.4 GHz (S-Band frequency spectrum), in compliance with the IRIG-106 regulations. The transmission range is a minimum of 10 km. To be able to operate in a missile, the device must accept the power from the missile itself or be equipped with an external charging mechanism. The on/off operation is to be dictated by the input signal. This design reports deploy several applications in which the IRIG-106 Chapter 10 recorder can be used as a telemetry system. It will include the transmission of bulk MIL-STD-1553 data per IRIG-106 Chapter 8, transmission of multiple Video/Audio and PCM data channels, and transmission of selected avionics data per IRIG-106 Chapter 4.

As flight test instrumentation becomes more sophisticated it has become increasingly desirable to have a high-quality, high-speed telemetry link between the aircraft or the missile and the ground monitoring station. PCM/FM [2] has been the primary modulation scheme used for such links for over 30 years, mainly due to its simplicity and reliability. Due to the longevity of PCM/FM, most airborne telemetry facilities have invested significant capital in equipment specifically for use with this standard. A typical PCM/FM transmitter assembly consists of a PCM encoder, pre-modulation filter, FM transmitter and transmitting antenna. A pre-modulation filter may be thought of as a component that accepts a sequence of impulses generated from the data stream and filters these impulses for the purpose of spectral containment after modulation.

II. SOFTWARE DEFINED RADIO ON TRANCEIVER

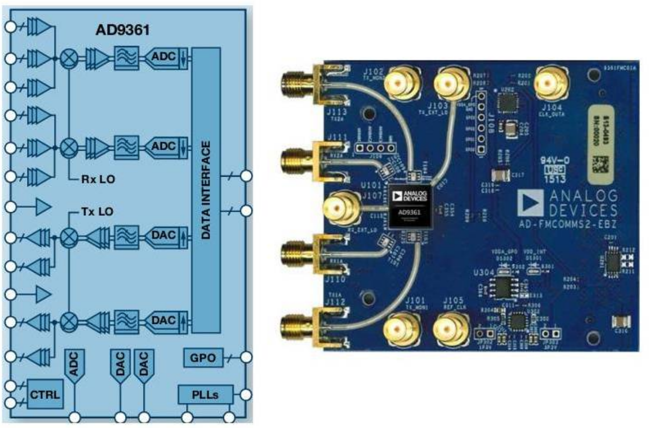

Fig. 1. ADI SDR Board

IRIG telemetry development is the target of an analogue-FPGA design partnership between Analog Devices and Xilinx. The platform is intended to be used in the design of multi-carrier FM and multi-standard SDR (software-defined radio) transceiver with the creation of FPGA-based digital pre-distortion algorithms. ADI board, as in figure1, has embedded transceiver components into a development platform which can be used to evaluate DPD algorithms running on Avnet's ZC702 MicroZed evaluation kit. ADI's FMCOMMS2 platform provides an RF and mixed-signal transmit and

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