Solution Brief

Waveforms Classification for Intel® Stratix® 10 AX FPGA

Design Example

Description

Intel® Stratix® 10 AX FPGA provides unprecedented technological capabilities that allow wideband and SWAP sensitive systems. Its unrivaled analog/digital sampling capabilities can be key enabler in many applications. In addition, high-performing computational capabilities, coupled with domain-specific development tools enable integration of diverse data processing pipelines.

In many applications there is a trend to augment traditional signal processing methods with emerging artificial intelligence using machine learnable neural networks. For this purpose, Intel developed Intel® FPGA AI Suite, which is a configurable and FPGA optimized IP, that can be instantiated and integrated into user designs.

To showcase how Intel FPGA AI Suite can be used in FPGA design to process a real-time stream of an analog signals, Intel developed Waveforms Classification example. This example shows how to classify RF signal modulation type, using specially trained neural network. The analog modulated signal is sampled using analog/digital integrated converter, passing through digital signal pre-processing, and fed into Intel FPGA AI Suite IP, where neural network inference is executed.

This design shows the tight integration of sophisticated and diverse processing pipeline into embedded form factor FPGAs, and low latency inference of neural networks.

This design can be used as an out-of-the-box demo to evaluate Intel Stratix 10 AX FPGA and Intel FPGA AI Suite capabilities, serve as a design starting point framework for inference of realtime streaming data applications.

Features

- 1xRX channel on Intel Stratix 10 AX A-tile in x32 mode at 48 GSPS
- Embedded application using SoC FPGA with Intel FPGA AI Suite IP
- Classify real-time RF signals using Convolutional Neural Network with Intel FPGA AI Suite IP and OpenVINO
- Streaming pre-processing with inline dataaugmentation
- EagleNet Dataset with 7 waveform classes: AM, FM, CW, OFDM, QPSK, Ramp, Background Noise
- Intel Stratix 10 AX FPGA Development kit

Applications

- Radar and electronic countermeasures
- Communication systems

For more information about Intel® FPGA design example, contact Intel.