

Perfect Reconstruction Synthesis Filter Bank for Intel Agilex[®] FPGAs

Description

Intel Agilex[®] FPGAs provide unprecedented technological capabilities that minimize resource usage and power for a logic function. In addition, high-performing computational capabilities enable the integration of diverse data processing pipelines under many digital signal processing areas.

Perfect reconstruction is crucial in communication systems to allow consistency between the analysis and synthesis stages. It ensures that the information extracted during analysis can be synthesized to reconstruct the original signal.

In this design example, high signal-to-noise-ratio (SNR) quality is achieved through a synthesis filter bank implemented by the DSP Builder for Intel[®] FPGAs. Particularly in cognitive radio applications, the introduced technology can fracture the wideband signal spectrum to avoid occupied communication channels and move into vacant channels. Minimizing interference to other users increases spectrum efficiency and improves the quality of service (QoS).

Furthermore, this design features a graphical user interface (GUI) that displays SNR measurement results for the quadrature amplitude modulation (QAM) signal with various bandwidths in real time. The captured outputs of the synthesis filter bank are uploaded to the host and presented in viewers, providing constellations and SNR comparisons with the original signal.

Features

- Sampling rate: 4 GSPS
- Modulation: QPSK / 16QAM / 64QAM
- Symbol rate: 0.125 / 0.25 / 0.5 / 1.0 / 2.0 / 4.0 GSPS (roll-off factor: 0.15 / 0.25 / 0.5)
- Channel number: 64 / 128 / 256 reconfigurable in run-time
- Frequency processing for cognitive radio application
- Signal viewer
- Intel Agilex 7 FPGA Development Kit

Applications

- Frequency processing for cognitive radio application
- Audio and image processing
- Radar
- Electronic warfare (EW) system

For more information, [contact Intel](#).

