



HIL Simulation User Guide

Calterah Semiconductor

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2020.06.08	V0.1.0	First version	Xudong Ran
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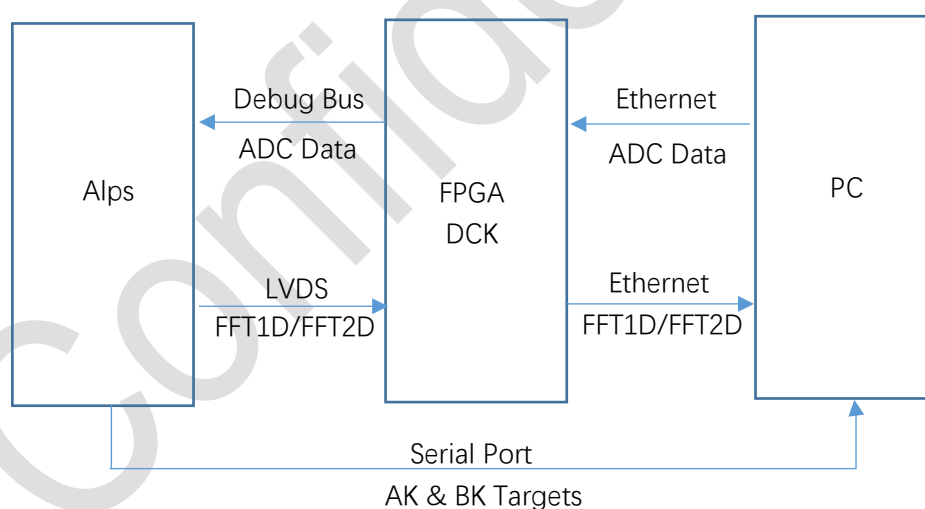
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INTRODUCTION

The purpose of this document is to help customer implement hardware-in-loop (HIL) simulation using Calterah Ethernet DCK and Calterah RDP board. This document applies to Alps and Rhine series only.

Hardware-in-loop (HIL) simulation is a type of real-time simulation. It allows customer doing on-board simulation using collected raw ADC data. The basic hardware loop includes a personal computer (PC), an FPGA Data Collection Kit (DCK), and a radar development platform (RDP). Calterah Radar GUI feeds raw ADC data to DCK through Ethernet. DCK sends data back to RDP board through Debug Bus. On RDP board, tracking algorithm is running and output the detected targets before and after Kalman Filter (AK, BK), and send them back to Calterah Radar GUI through serial port. In the meanwhile, FFT1D/FFT2D data can be looped back through LVDS interface to DCK and then save to personal computer.



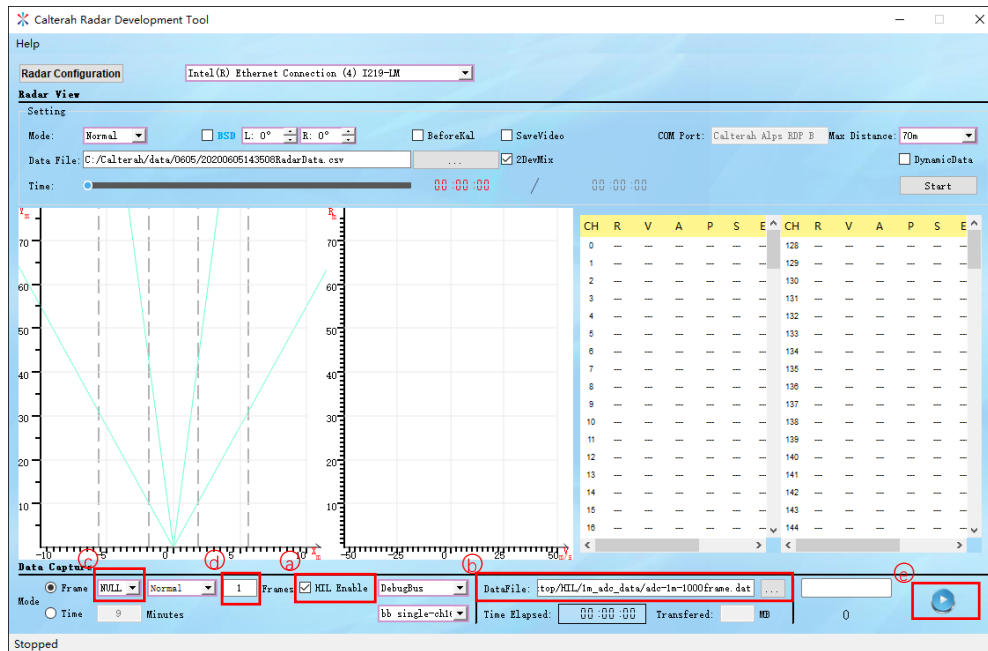
HIL SIMULATION

2.1 Preparation

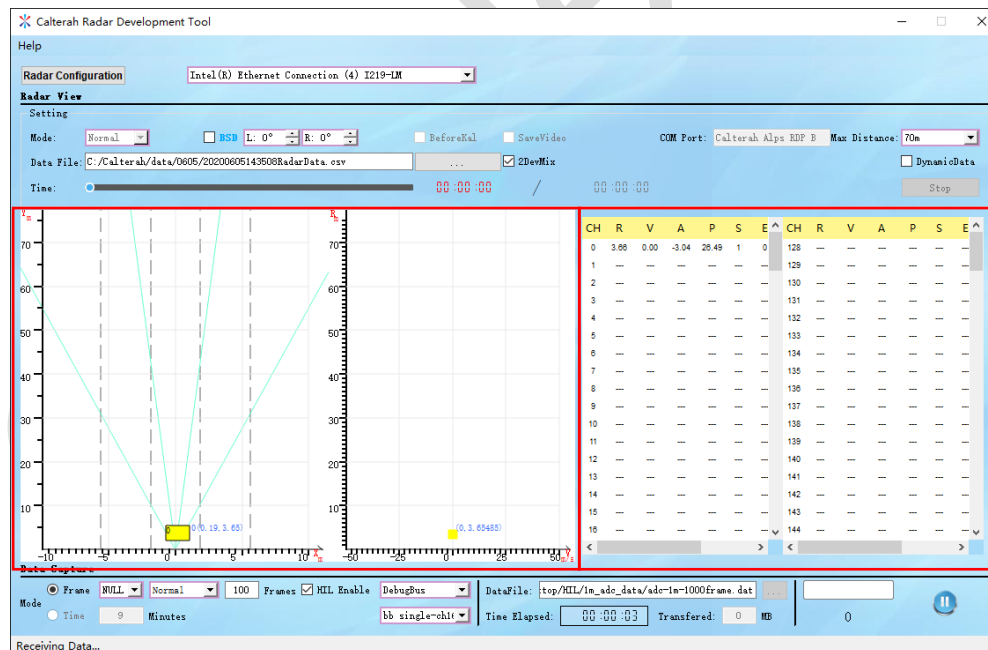
- 1) Prepare the raw ADC data collected using DCK board in the format of **.dat**.
- 2) Download firmware into QSPI Flash on Calterah RDP board with **the same radar chirp configuration** as doing data collection.
- 3) The hardware connection and network settings are the same as doing data collection. Please refer to **Ethernet Data Collection Kit User Guide** for more setup guidance.

2.2 Simulation

- 1) Make sure the hardware connection between Ethernet DCK and Calterah RDP board are correct and solid.
- 2) Power on Ethernet DCK board and Calterah RDP board.
- 3) Open Calterah Radar GUI.
- 4) The HIL simulation function is integrated in the Data Capture Panel at the bottom.
 - a) Click **HIL Enable checkbox**.
 - b) Specify the directory of ADC data.
 - c) Select loop back data type from **NULL/FFT1D/FFT2D**
 - d) Enter the number of frame to be simulated.
 - e) Set other settings as default value.
 - f) Click **Start Button** to start HIL simulation



- 5) The simulation result is display on the graphical interface below. The yellow rectangle on the left side indicates detected static target. On the right side shows the range, velocity, azimuth angle, power, static, and elevation information about all detected targets.



- 6) If the loop-back data FFT1D or FFT2D is selected, a file called XXX_HILback.dat will be generated in the data folder.

2.3 Limitation

You may need to press reset button and restart GUI when you are unable to do HIL simulation for the first time.

Reset Button

