THINGE Main Documentation

# Introduction

# Connectors

## Scintillator Panel connections

J1/J2 comprise the Panel 1 connection and J3/J4 comprise the Panel 0 connection.

## Central station connections

J6/J7 are the primary central station connections, consisting of trigger out/tx and reset in/rx. There are additional spare connections on J8/J10 (4 total inputs) and J5/J9 (4 total outputs).

## CODALEMA trigger connections

On THINGEv2+, J13 (labelled as FP GPIO4-7) contains 2 LVDS outputs (on pins 1/2 and 3/4) which can be used for the CODALEMA trigger.

# Updating FPGA Firmware

## Using Vivado

Updating the FPGA firmware (permanently) requires reflashing the SPI flash chip on the TE0714.

The SPI flash chip is an S25FL127S. Note that the TE0714 (the FPGA on THINGE) *requires* the SPI to be programmed to boot in SPIx4 mode, otherwise it will not boot. The firmware is contained in either an MCS or BIN file.

### Generating the MCS/BIN file in Vivado

After writing the bitstream, go to Tools->Write Memory Configuration File.

Under Memory Part, click the three dots and enter “S25FL127S” in the Search. Click the result that comes up (it shows s25fl127s-spi-x1\_x2\_x4 under *Alias*).

Click on Filename and the three dots. Enter a location for the file to be generated.

**IMPORTANT:** Change the “Interface” to SPIx4. This *MUST* be done for the TE0714.

Check “Load bitstream files”. Click the three dots to select the bitfile.

*Note*: if you are overwriting an old file, you need to check the “overwrite” box.

### Programming the SPI in Vivado

Connect the USB cable to the port beside the FPGA. Open Vivado’s Hardware Manager (under Flow). Connect to the target, which should show as an xc7a35t.

Right click and select “Add configuration memory,” and again enter s25fl127s as the type. Then right click on the configuration memory, and select Program. Find the MCS file and load it.

After this process completes, right click on the FPGA and select “Boot from Configuration Memory Device.” Firmware update is complete.