**Slice-testboard low level interface and I2C configuration:**
**2022-11-17**
The slice testboard python GUI project repository is here:
https://gitlab.cern.ch/dawillia/slice-testboard
The master branch is stable and expected to work with every slice testboard.

I2C interface information are found in the “config” directory’s “chips.cfg” configuration file:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/config/chips.cfg
Each row in the file defines the I2C interface information for a specific chip. The LAUROCs and lpGBTs use 7-bit addresses, while the COLUTAs use 10-bit. There are generic configuration files in the project config directory for each type of chip ie LAUROC.cfg as well as chip-specific files that can override the values in the generic file if that is necessary.

The two control lpGBTs #12 and #13 are configured through the IC link by the FELIX card using the software library provided by BNL collaborators and called in the “flxMod” module. The associated function in the python GUI is:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L821

Every I2C configurable slice testboard chip is on the M1 bus of either lpGBT12 or lpGBT13. The lpGBT I2C interface operation is defined in chapter 12 of the lpGBT manual:
https://twiki.nevis.columbia.edu/twiki/pub/ATLAS/SliceTestboard/lpGBT.pdf

In the slice testboard python GUI the configuration of the data lpGBTs is found here:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L865
This function makes use of the “writeToDataLPGBT” function defined here:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L329
The writeToDataLPGBT function is a self-contained single I2C write to a data lpGBT on the control lpGBT M1 bus.

The LAUROC I2C interface and configuration process is defined in the “I2C” section here:
https://twiki.nevis.columbia.edu/twiki/pub/ATLAS/SliceTestboard/datasheet_Lauroc2_18juin21.pdf
The corresponding function to configure a LAUROC in the slice testboard software is here:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L900
This function makes use of the “writeToLAUROC” function here:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L420
The writeToLAUROC function is a self-contained single I2C write to a LAUROC register.

The I2C interface and configuration of the COLUTAv3s are defined in the “I2C control format” section here:
https://twiki.nevis.columbia.edu/twiki/pub/ATLAS/SliceTestboard/COLUTAV3_ds.pdf
The corresponding function to configure a COLUTA is found here:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L945
This function makes use of two separate functions that co-ordinate the multi-byte write for COLUTA global and channel-specific configuration bits, “writeToCOLUTAChannel” and “writeToCOLUTAGlobal”:
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L494
https://gitlab.cern.ch/dawillia/slice-testboard/-/blob/master/sliceBoardGUI.py#L572