

## Programming of the CPLD using I2C

Version	Comment
20130402	Draft proposal

There exist probably I2C programmer for the CPLD, but building one make it possible to adopt it better to our MCM.

### Overview

The CPLD has two sectors of flash memory:  
configuration organized in 5758 pages of 128 bits each = 737024 bits  
user memory organized in 768 pages of 128 bits each = 98304 bits

The user code on the CPLD is stored in the configuration flash memory, and is transferred to the core, where the user code runs, at power on or a refresh command from I2C.

The user memory can be used for storage of parameters needed by the user code.

The access to the flash memories can be done from JTAG/I2C/SPI and from the user code. We will use I2C for the programming.

The CPLD has two I2C ports:

primary - bound to specific IO pins with access to either flash memory OR user code

secondary – can be at any IO pins. This port has access to user code but no access to the flash memory.

### Procedure

We must use the primary I2C port to program the CPLD. The primary I2C port of the CPLD must be enabled with access to the flash memory.

Worry:

is the port enabled by default on an unprogrammed CPLD?

what happens if one by accident disable the I2C port?

The I2C address of the primary port accessing the flash memory is in binary `yyywwwww00`, where `yyy` is for ten bit addressing (we do not use this), `wwwww` is by default `10000`, but can be changed via a JTAG interface. Propose to keep the default value (`0x40`), it is not in conflict with other I2C devices on the MCM.

The actual programming is done by normal I2C access with a string of bytes:

`<I2C address,read/write bit><command><byte1 of data>...<byteN of data>`

To program the CPLD on the MCM we will build a standalone programmer with a microprocessor.

The program is downloaded from a PC to the programmer via a serial RS232, which stores it in a local flash memory.

The downloaded format is either JEDEC or BIT. The processor will convert and store it locally in a binary format suitable for programming the CPLD.

It will have two buttons:

- 1 Program
- 2 Verify

One knob with the options:

Erase Program1 Program2 Test

Erase will erase the CPLD flash memory.

Program1 and Program2 are two different programs that can be stored in the local programmer memory.

Test will test the I2C connection with the CPLD flash memory

Two LEDs:

- 1 green OK
- 1 red FAILED

The programmer can be used standalone for standard use, for more complex programming must it be connected to a console on the RS232 port (e.g. for initially setting a unique CPLD identifier).

Question:

Power to the MCM and CPLD will provided from the programmer?

The only power on the CPLD needed for the programming is Vcore.

The protoMCM will be used to test the concept.

The CPLD can be programmed when the MCM is mounted on the padplane. To restart the CPLD with the new code is a power cycle not needed, there is a 'refresh' command from I2C that will restart the CPLD with the new code.

