

Using the ESAcademy CANopen Bootloader on the NXP LPC2119 and LPC2129 with MicroCANopen

This document refers to the MicroCANopen release V4.00 of September, 2007

Bootloader Configuration

The file coboot_LPC2.hex contains the CANopen bootloader demo version. It is located to the 3rd 8k Flash bank at address 0x00004000 to 0x00005FFF. In addition, it uses the first 4 bytes in RAM at 0x40000000 for a signature. These 4 bytes of RAM must not be used and must not be initialized by the application. This version requires a 12 Mhz external clock provided.

Application Configuration

The application program – here MicroCANopen – may use the first Flash banks from 0x00000000 to 0x00003FFFF. It is important that the startup code begins at 0x00000058 (default with the Gnu compiler system) as that is the address the bootloader will jump to.

The application may activate the CANopen bootloader by writing the signature 0x21654387 to the address 0x40000000 and then resetting (by hardware or by watchdog) the microcontroller.

After the generation of an application hex file, the utility hexsum.exe needs to be executed on the hex file. It calculates the checksum required by the bootloader and produces a new file xxxx_chk.hex with the checksum in place.

CANopen Bootloader Workings

Once loaded, the CANopen bootloader keeps control of the rest vector. After each reset it verifies the contents of the program area by calculating the checksum. If the checksum matches and the signature is not present, then the program is started by a jump to its startup code at 0x00000058. Otherwise the CANopen bootloader remains in boot mode.

Usage

Once the CANopen bootloader is in boot mode, it initializes CAN interface 1 to a speed of 125kbit and assigns itself the CANopen node ID 0x77. It then sends its boot-up message 777h.

Using any CANopen configuration tool, such as PCANopen Magic, the xxxx_chk.hex file can now be written to the Object Dictionary entry [1F50h,01h] "Program Download" of node 0x77. Once the download is completed a write of 1 to the entry [1F51h,01h] starts the application program loaded. With the MicroCANopen demo implementation the device now comes up as node 7 (free version) or 8 (commercial version).

Once the application program is running the bootloader can only be activated by writing the signature 0x21654387 to the address 0x40000000 and then resetting the microcontroller. The MicroCANopen demo implementation provides the Object Dictionary entry [1F50h,01h] as a method to activate the bootloader. Using a CANopen configuration tool, write the string "BOOT" to [1F50h,01h] of node 7 or 8. MicroCANopen then writes the signature and the bootloader becomes active after the next reset (for example by sending the node the NMT Master message "Reset Application").