

Interfacing FlashRunner 2.0 with ELMOS_LIN devices

Algorithm Flow

- **API:** manages the commands and parameters sent by the user.
- **ALGO:** selects the correct COM functions and manages the FRB files and data buffers.
- **COM:** executes the Bootloader instructions.
- **HAL:** manages transmission and reception of data.

Supported Protocol

- **LIN:** baudrates between 2'500 baud and 120'000 baud are supported. Not every baud rate is accepted by the device. If the selected frequency is not accepted, the driver will automatically calculate the closest accepted baudrate.

Supported Memories for E521.39

- **Flash:** addresses 0x8000-FFFF. Fully programmable.
- **EEPROM (NVM):** addresses 0x400-46F. Can be programmed without being erased first. The addresses 0x470-0x47F are reserved for the Runtime Configuration registers, and thus they are not programmable.
- **User Configuration** (Only E521.39): addresses 0x1200-13FF. Fully programmable.
- **Static Configuration** (Only E521.39): addresses 0x1000-11FF, read-only.

Supported Memories for E523.62

- **Flash:** addresses 0x0000-FFFF. Fully programmable.
- **EEPROM:** addresses 0x04000000-040001FF.

Additional Parameters

- No additional parameters.

Daisy-chain Management (Only E521.39)

The elmos_lin driver can manage multiple devices on the same LIN bus, setting/changing their NAD and executing commands on single devices, sets of devices or on all devices.

The specific commands for the Daisy-chain management are

- **SEARCH_DEVICES:** finds all slave devices by searching for all possible NADs. If the devices of the LIN bus are blank, they will all have the NAD 0x01, and thus only one device will be found.
- **AUTO_ADDRESSING:** executes the auto-addressing procedure, setting the specified NAD values for each device of the daisy-chain. These NADs can be permanently stored in the memory of the devices, so that they will keep the new NAD even after a reset.

• **SELECT_DEVICES:**

Selects the transmission mode and the NADs to which to communicate with. There are 3 available transmission modes.

- **BROADCAST mode:** Default mode, transmits using the broadcast NAD 0x7F. All the devices of the daisy-chain will receive the commands sent with this mode. Use this mode when there is only one device on the daisy-chain, or if you want to repeat a command only once for all the devices. All the devices will receive and execute the requests sent by the driver, but only one can respond to the requests, and so the response of the other devices will be lost. Thus, the broadcast option is not suggested for reading commands (BLANKCHECK and VERIFY), on a daisy-chain with more than one device.
- **SEPARATE_ALL mode:** You can specify a single NAD value, or multiple NADs. The driver will communicate separately with each device, and thus it will repeat the transmissions for each specified NAD. This is the safest mode of transmission for daisy-chains with several devices, but it is also the slowest, since each command must be repeated for each device.
- **SEPARATE_READS mode:** Intermediate mode between the BROADCAST and SEPARATE_ALL modes. Commands MASSERASE and PROGRAM are transmitted in broadcast, while commands BLANKCHECK and VERIFY are repeated for each device. This allows to reduce the cycle times, since the commands MASSERASE and PROGRAM are done only once.

Algorithm Commands

The letter after the command names specifies on which memory region the command is to be executed:

- F: Flash
- N: EEPROM (NVM)
- U: User Configuration
- S: Static Configuration

Many commands support the parameters <start_addr> and <size>, that specify to execute the command, respectively, from which address and for how many addresses.

CONNECT

Powers-on the device, enters programming mode and checks the connection.

MASSERASE

MASSERASE <F|N|U>

Erases the selected memory.

BLANKCHECK

BLANKCHECK <F|N|U> or **BLANKCHECK** <F|N|U> <start_addr> <size>

Checks that the selected memory is blank by reading back the selected memory.

BLANKCHECK <F|N|U> S, or **BLANKCHECK** <F|N|U> S <start_addr> <size>

Checks that the selected memory is blank by comparing the expected CRC value, calculated on the selected memory, to the CRC calculated by the device.

PROGRAM

PROGRAM <F|N|U>, or **PROGRAM** <F|N|U> <start_addr> <size>

Programs the selected memory using the data loaded into the FRB file.

VERIFY

VERIFY <F|N|U> R, or **VERIFY** <F|N|U> R <start_addr> <size>

Verifies that the data written into the selected memory corresponds to the data of the FRB file.

VERIFY <F|N|U> S, or **VERIFY** <F|N|U> S <start_addr> <size>

Verifies the content of the memory by comparing the expected CRC value, calculated on the selected memory, to the CRC calculated by the device.

READ

READ <F|N|U|S>, or **READ** <F|N|U|S> <start_addr> <size>

Reads the selected memory, printing it into the terminal.

DUMP

DUMP <F|N|U|S>, or **DUMP** <F|N|U|S> <start_addr> <size>

Reads the selected memory, dumping it into the dumping file.

SEARCH_DEVICES

Finds all slave devices searching for all possible NADs.

AUTO_ADDRESSING

AUTO_ADDRESSING <SAVE|DONT_SAVE> <NAD1> <NAD2> ...

Executes the auto-addressing procedure, setting the specified NAD values for each device of the daisy-chain. If the saving option is set to SAVE, the new NADs will be permanently stored inside the memory of the devices.

SELECT_DEVICES

SELECT_DEVICES BROADCAST or **SELECT_DEVICES** <SEPARATE_ALL|SEPARATE_READS> <NAD1> <NAD2> ...

selects the the transmission mode and NADs to which to communicate with for the commands that follow. Depending on the mode, certain commands will be transmitted in broadcast or separately for each specified NAD.

DISCONNECT

Powers-off the device.

###Version updates

- 1.01, 01/02/2023: added retries in connect
- 1.02, 09/05/2023: supported devices in daisy-chain
- 1.03, 27/05/2023: fixed verify N S
- 2.00, 18/01/2024: supported device E523.62. Rewriting of the algorithm with LIN submodule.