1. Program configuration

Configuration flags allow to select functionality for master, slave or both. Please comment/uncomment corresponding #define in .ino file.

By default, master and slave shall use UART2 (RX2 and TX2 pins on NodeMCU board) . In case of loopback, Slave will use UART1 on GPIO21 (RxD) and GPIO22 (TxD) pins. Please uncomment #define LOOPBACK in order to use it.

Verbosity level (DEBUG, INFO, WARNING) is controlled by defines in the same file too.

The interval at which the recurrent commands are send is set in POLL\_INTERVAL in milliseconds. REPLY\_TIMEOUT specify the time window in which the master will wait for reply.

1. Communication system

Designed to implement lightweight bidirectional Command-Response style protocol over RS485 unidirectional bus. Architecture consist of one master (0x0) and up to 14 slave boards (0x1 – 0xE). Address 0xF is reserved for broadcast purposes. Every transaction consists of message containing command plus optional payload and reply message with response code for the command plus optional payload). Transactions can be originated by the master only. Up to 8 commands (0x0 – 0x7) are supported and there are corresponding 8 reply codes. The reply code is the same as with 4-th bit set (0x8 – 0xF).

For commands encoding and transmission, Nick Gammon RS485 lib is used, with few things hacked like message receive timeout support, embedded errors generation for testing, errors reporting, etc.

Commands and replies are delivered by messages, one message per command/reply. Message frame consist of up to 128bytes. The size is selected in order to match ESP32 FIFO size. Every message starts with one byte STX (0x3), up to 124 bytes encoded payload, two bytes encoded 8bit CRC and ends one byte ETX. Message payload and CRC are encoded for errors detection, every 4bits are shifted and complimented with they inverse values. As a result every byte is sent as two bytes and STX and ETX markers will not be present into the message frame.

Transmit of the message is blocking, but receive of the message is not blocking.

1. Program operation

Master main is in master.h file which is included in loop() function if corresponding MASTER is #define-ed.

First the code checks if message is available for processing by calling check4msg(). If message is available, it is processed by masterProcessMsg(). If no message and reply timeout has expired, the error is printed to console, next function which reports errors over MQTT is called and issued and execution continues.