433 modem control protocol specifications

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Introduction

This document specifies 433 modem control protocol and provides command reference for firmwares listed below. 433 modem is programmable mini PCIe communications device used in 433 MHz ISM frequency band.

As this device contains programmable microcontroller there can be specific implementation which does not implement this protocol.

Software developers, testers and network administrators are the specifications target audience.

General

Licensing

Vocabulary

Term	Definition
ISM	Industrial, Scientific and Medical
PLE	PiccoLink™ Emulation, refers to a compatible implementation of a terminal protocol.
RF	Radio Frequency
RSSI	Received Signal Strength Indicator
Rx	Receive
Tx	Transmit

Protocol applicability

This protocol is used in following firmwares provided by Vecly:

Firmware name	Description
m433-picco-fw	Piccolink ™ RF protocol implementation for mobile barcode and RFID scanner
m433-test-fw	Modem testing firmware

Not all commands are implemented in firmwares listed above. Please refer to particular firmware specifications for implemented commands. List of all possible commands is provided for consistency reasons and not to implement same command with different functionality in different firmwares.

Host communications interface

Protocol is implemented for serial port via USB communications device class. Both data and control messages are exchanged in same single serial port.

Air interface

This protocol does not specify air interface (RF parameters). Refer to specific firmware specifications for detailed information.

Message frame structure

DC1	LENGTH	COMMAND	ARGUMENTS

Field	Length (bytes)	Values	Description
DC1	1	0x11	Control message start identifier. ASCII character `device control 1`
LENGTH	1	bytes	Payload length. Number of bytes in arguments section
		0x00	For messages without arguments
COMMAND	1	bytes	Command identifier. See list of commands below
ARGUMENTS	Variable	bytes	Arguments to command. Number of bytes depends on command type

Commands from Host PC to modem

Command	Arguments	Description
0x02	-	Launch bootloader to allow modem firmware (user code) update
0x03	-	Request modem firmware name
0x04	-	Request modem firmware version
0x06	PA table no.	Set TX power
0x07	Channel on.	Set RF channel
0x08	-	Activate transceiver idle mode
0x09	-	Activate continuous RX mode
0x0a		Set RSSI reporting
	0x00	Disable continuous RSSI reporting
	0x01	Report last received message RSSI
	0x02	Report received message RSSI continuously before every message
0x10		Transmit unmodulated carrier
	0x00	Tx off
	0x01	Tx on
0x11		Report received carrier RSSI
	0x00	Rx off
	0x01	Rx on
0x12		Static text periodic transmission in ASK
	0x00	Tx off
	0x01	Tx on
0x13		Static text periodic transmission in GFSK
	0x00	Tx off
	0x01	Tx on

Command	Arguments	Description
0x14		Reception in GFSK
	0x00	Rx off
	0x01	Rx on
0x15 [1]		Switch 433 modem LEDs board or CC1111 USB eval. board LED on or off. Can be used to test LEDs
	0x00	Pins low
	0x01	Pins high
0x16		Test safety timer
	0x00	Discard safety timer to be triggered after period defined in firmware
	0x01	Order safety timer to be triggered after period defined in firmware

Responses and reports from modem to host

Command	Arguments	Description
0x03	NAME	Modem firmware name
0x04	VER	Modem firmware version
0x0a[2]	RSSI	Report of RSSI of last RX. Byte RSSI contains RSSI value `0..100`
0xFF		Modem status messages
	0x00	Status OK
	0x01	Command not implemented
	0x02	Safety timer was triggered

1. Board shall be defined in `Makefile`. ↩
2. Value interpretation is air interface specific. See transceiver documentation `Low-Power SoC (System-on-Chip) with MCU, Memory, Sub-1 GHz RF Transceiver, and USB Controller` for proper calculations. ↩