FAST FORWARD　　　Smart Grid Components

FAST EnergyCam Modbus General

Table of Contents

Index of Tables

Introduction

FAST EnergyCam is able to communicate via a wired connection in Modbus protocol:

"Modbus is an application-layer messaging protocol, positioned at level 7 of the OSI model. It provides client/server communication between devices connected on different types of buses or networks.

The de facto industrial serial standard since 1979, Modbus continues to enable millions of automation devices to communicate. Today, support for the simple and elegant structure of Modbus continues to grow. The Internet community can access Modbus at a reserved system port 502 on the TCP/IP stack.

Modbus is a request/reply protocol and offers services specified by function codes. Modbus function codes are elements of Modbus request/reply PDUs." [1]

Please have a closer look at http://www.modbus.org/specs.php for basic concepts and more documentation.

Probably sufficient to read are documents http://www.modbus.org/docs/modbus_over_serial_line_V1_02.pdf and http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf

EnergyCam has implemented a subset of Modbus, utilizing the RTU transmission mode which is based on binary communication rather than ASCII.

Further protocol implementation depends on usage. Currently there is only:

- EnergyCam Modbus slave "EnergyCam Modbus Slave Protocol" (FAST_EnergyCam-Protocol-MODBUS-Slave.pdf)

Supported Data Models

EnergyCam supports the following types out of the MODUS data model:

- *Input Registers*
  - Read-only
  - Object Type: 16Bit
- *Holding Registers*
  - Read-write
  - Object Type: 16Bit

Please note that data and addresses transported via Modbus are always coded in big-endian. This means that when a numerical quantity larger than a single byte is transmitted, the most significant byte is sent first. So for example Register size value 16bits 0x1234 the first byte sent is 0x12 then 0x34.

1　Citation from http://www.modbus.org/specs.php

Supported Function Codes

EnergyCam supports these Modbus function codes:

Data model	Access type	Code	Description
Input register	Read multiple	0x04	
Holding register	Read multiple	0x03	
	Write single	0x06	
	Write multiple	0x10	

Timing

According to Modbus specification a silent interval named "t3.5" between frames has to be maintained (longer silents intervals are ok) in order to guaranteed valid operations. The t3.5 is used internally to recognize the end of frame which starts interpretation of the received frame. When t3.5 is not maintained consecutive frame would be treated as a single one which leads to CRC errors. These erroneous frame is then silently discard which is not recognized be the master because nothing is replied to them. This is because Modbus is a multi client protocol and responding to erroneous frames would flood the bus.

The Modbus specification demands a t3.5 interval for baud rates above 19200 Bps of 1.750 ms.

The Modbus specification demands a seconds timing named "t1.5"

As an addition to Modbus, EnergyCam implements a special wake-up procedure in case the device is in power-down and needs to be waken up by the master.

For further details check these documents "EnergyCam Modbus Slave Protocol" (FAST_EnergyCam-Protocol-MODBUS-Slave.pdf).

History

Date	Author	Version	Changes
8th May 12	SPR	0.1	Initial, reviewed by CRG
9th Dec 12	SPR	0.2	Added Modbus timing
14th Jan 13	SPR	0.3	Better text contrast
17th Mar 14	SPR	0.4	Cosmetic
28th Apr 14	SPR	1.0	Unification of naming
29th Apr 14	SPR	1.1	Removed reference to EC Modbus Simulator
25th Mar 14	SPR	1.2	Corrected filenames of referenced .pdf

Table 1: History