17.2 IEC 62056-21

Introduction

IEC 61107, currently IEC 62056-21, was an international standard for a computer protocol to read utility meters. It is designed to operate over any media, including the Internet. A meter sends ASCII (in modes A..D) or HDLC (mode E) data to a nearby hand-held unit (HHU) using a serial port. The physical media are usually either modulated light, sent with an LED and received with a photodiode, or a pair of wires, usually modulated by a 20mA current loop. The protocol is usually half-duplex.

The following exchange usually takes a second or two and occurs when a person from the utility company presses a meter-reading gun against a transparent faceplate on the meter or plugs into the metering bus at the mailbox of an apartment building.

The general protocol consists of a "sign on" sequence, in which a handheld unit identifies itself to the metering unit. During sign-on, the handheld unit addresses a particular meter by number. The meter and hand-held unit negotiate various parameters such as the maximum frame length during transmission and reception, whether multiple frames can be sent without acknowledging individual frames (windowing), the fastest communication rate that they can both manage (only in case of mode E switching to HDLC) etc.

Next, the meter informs the handheld unit about the various parameters that are available with it in various security settings viz. the 'no-security logical group', ' the low-security logical groups' and ' the high-security logical groups'.

If the parameter required is in the no-security group, just a get.request will provide the HHU with the desired response. If the parameter required is in the low-security group, a password authentication of the HHU is required before information can be read.

In the case of high-security parameters, the meter challenges the handheld unit with a cryptographic password. The handheld unit must return an encrypted password. If the password exchange is correct, the meter accepts the handheld unit: it is "signed on."

After signing on, the handheld unit generally reads a meter description. This describes some registers that describe the current count of metered units (i.e. kilowatt hours, megajoules, litres of gas or water) and the metering unit's reliability (is it still operating correctly?). Occasionally a manufacturer will define a new quantity to measure, and in this case, a new or different data type will appear in the meter definition. Most metering units have special modes for calibration and resetting meter registers. These modes are usually protected by anti-tampering features such as switches that sense if the meter enclosure has been opened.

The HHU may also be given limited rights to set or reset certain parameters in the meter.

The handheld unit then sends a sign-off message. If no sign-off message is sent, the meter automatically signs off after a previously negotiated time interval after the last message.

Source: https://en.wikipedia.org/wiki/IEC_62056#IEC_62056-21

Overview

The IEC 62056-21 standard defines protocol specifications for local meter data exchange.
Data is read out via serial port in modes A, B or C. The default initial serial port settings are 300 bps 7E1, as per standard, but can be user-configured.

The driver implementation additionally allows for communication via TCP/IP, which is not described in the standard. In this case, baud rate acknowledgement is allowed however actual switchover between baud rates is not possible.

Mode A: data is requested and read out at the configured baud rate.

Mode B: data is requested at the configured baud rate and mutually switched to the baud rate proposed by the meter. Baud rate confirmation is absent.

Mode C: data is requested at the configured baud rate, a new baud rate is proposed by the meter and, if acknowledged, data is read out at the proposed baud rate.

Currently, data readout is supported in modes A, B and C.

For data readout, it is necessary to know the port settings and the format of OBIS code representation as they can slightly differ (see table) depending on the configuration of the meter.

Configuration

Device section

The serialnumber defines the serial number of the meter. 0 (zero) will result in a '/?!' handshake string and may cause issues if more than one meter is wired to the serial port.

The baudrate defines the initial connection baud rate. In modes B and C this will be switched to whatever baud rate is proposed by the meter.

The meter_model defines the meter profile. This is reserved for future use and should be set to 1. type defines the connection mode. Modes A, B and C are supported.

> ⚠ If **ip** or **port** parameters are configured, any serial port settings are ignored and connections are initiated via TCP.

> ℹ Serialnumber, manufacturer-specific, 32 characters maximum. The characters can be digits (0…9), upper-case letters (A…Z), lower-case letters (a…z), or spaces ( ). Upper and lower case letters and the space character are unique*. Leading zeros shall not be evaluated. This means that all leading zeros in the transmitted address are ignored and all leading zeros in the tariff device address are ignored (i.e. 10203 = 010203 = 000010203).

IEC 62056-21 device configuration parameters:

Parameter	Type	Description	Required		Default Value (when not specified)	Range	
			TCP	RTU		Min	Max
name	string	User-friendly name for a device	Yes	Yes			
description	string	Description of a device	No	No			
device_alias	string	Alphanumeric string to identify a device	Yes	Yes			
enable	boolean	Enabling/disabling of a device	No	No	1	0	1
protocol	string	Protocol to be used	Yes	Yes		IEC 62056-21	
poll_delay_ms	integer	Minimum time delay in milliseconds to wait before sending any data on port.	No	No	200		
scan_rate_ms	integer		No	No	10000		
device	string	Communication port	-	Yes		PORT1	PORT2
baudrate	integer	Communication speed (bauds/s)	-	No	9600	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	
databits	integer	Data bit count for communication	-	No	8	6	9
stopbits	integer	Stop bit count for communication	-	No	1	1	2
parity	string	Communication parity option	-	No	NONE	NONE, EVEN, ODD	
flowcontrol	string	Communication device flow control option	-	No		NONE	

			Yes	Yes		1	
serialnumber	unsigned long	Meter serial number	Yes	Yes		1	
serial_close_delay	integer	Delay before closing serial port	-	No	400		
timeout_ms	integer	Timeout of waiting for incoming request	No	No	2500		
type	string	Defines a connection mode	No	No	C	A, B, C	
t2	integer	Time to wait before acknowledging the suggested baud rate in mode C	No	No	300	200	1500
ip	string	The IP address for TCP connection	Yes	-			
port	integer	TCP port	Yes	-		0	65535
protocol_control_char	integer	Protocol control character	No	No	0	0	9
mode_control_char	integer	mode control character	No	No	0	0	9

Signals section

tag_job_todo defines the job sub-job. This field should contain the exact representation of the OBIS code as it is configured in the meter. E.g. if the parameter of interest is represented as

"1.8.0*24(0147238.4*kWh)", the value of the configuration field should be "1.8.0*24" (excluding quotation marks).

IEC 62056-21 tags configuration parameters:

Parameter	Type	Description	Required		Default Value (when not specified)	Range	
			TCP	RTU		Min	Max
signal_name	string	User-friendly signal name	Yes	Yes			
device_alias	string	Device alias from a Devices tab	Yes	Yes			
signal_alias	string	Unique alphanumeric name of the signal to be used	Yes	Yes			
enable	boolean		No	No	1	0	1
log	integer	Allow signal to be logged. If the **log is 0 signal** will not be logged. If the **log is more than 0** signal will be logged	No	No	0	0	
number_type	string	Number format type	Yes	Yes			
job_todo	string	Tag job in OBIS format	Yes	Yes			
tag_job_todo	string	Tag job in OBIS format (the same as in job_todo)	Yes	Yes			

> ℹ️ For **tag_job_todo** configuration, it is best to first manually read the meter via PC or HHU (hand-held unit) to determine the exact OBIS representation format of the parameter as they can differ between meter manufacturers and utility companies.