Goodwe GW6000-EH – CAN Bus protocol for default battery

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That is not an official specification provided by the manufacturer of the inverter (Goodwe). I obtained it via reverse engineering and from sources found on the web (the openems.io project). It may be incomplete or/and inaccurate. Use with caution.

If there is no BMS communication, the inverter sends a frame with ID 0x420, which contains a message "GWBATTHV". That frame is transmitted every 1.3 sec (a timeout frame). The battery parameters needed by the inverter are in the table 1. When all data is correct and sent within a timeout interval, there is no 0x420 frame.

Table 1 -Data sent to inverter / CAN bus: 11 bit CAN ID, 250kbps, update period - 1sec

ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x453	Battery string							
0x455	BMS Alarms		0x00	0x00	BMS Warnings		0x00	0x00
0x456	Charge Voltage [0.1V]		Charge Current [0.1A]		Max. discharge I [0.1A]		Min. discharge V [0.1V]	
0x457	SOC [0.01%]		SOH [0.01%]		0x00	0x00	0x00	0x00
0x458	Battery voltage [0.1V]		Battery current [0.1A]		Battery temperature [0.1 °C]		0x00	0x00
0x45A	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00
0x460	0x00	0x00						

- All parameters are 16-bit format, little-endian, with resolution 0.1 units, except SOC and SOH, which with resolution 0.01% (65% = 6500). BMS alarms and warnings are bit encoded (table 3 and table 4).
- ID 0x453: short string for the battery name. That frame resets timeout counter.
- ID 0x458: The inverter needs an actual value of battery voltage. The current can be set to zero if there is no current sensor.
- ID 0x45A: Inverter responds with frame ID 0x425 (see bellow).
- ID 0x460: Request flags - enables battery charging/discharging. Not decoded yet.

Table 2 - Data received from inverter

ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x420	0x47	0x57	0x42	0x41	0x54	0x54	0x48	0x56
0x425	Vbat [0.1V]		Ibat [0.1A]		0x00	0x00	0x01	0x00

- ID 0x425: Vbat, Ibat – battery voltage and current measured by inverter. Negative values of Ibat means a charge current. The remaining four bytes (4-7), not decoded yet.

Table 3 – BMS alarm bits

Bit position	Name
0	Charging over-voltage2
1	Discharging under-voltage2
2	Cell high temperature2
3	Cell low temperature2
4	Charging overcurrent2
5	Discharging overcurrent2
6	Precharge fault
7	DC bus fault
8	Battery break
9	Battery Lock
10	Discharge circuit Fault
11	Charging circuit Failure
12	Communication failure2
13	Cell high temperature3
14	Discharging under-voltage3
15	Charging over-voltage3

Table 4 – BMS warning bits

Bit position	Name
0	Charging over-voltage1
1	Discharging under-voltage1
2	Cell high temperature1
3	Cell low temperature1
4	Charging over-current1
5	Discharging overcurrent1
6	Communication failure1
7	System Reboot
8	Cell- imbalance
9	System low temperature1
10	System low temperature2
11	System high temperature

- The bit description is from: https://github.com/OpenEMS/openems/tree/develop/io.openems.edge.goodwe

An example of the CAN bus communication:

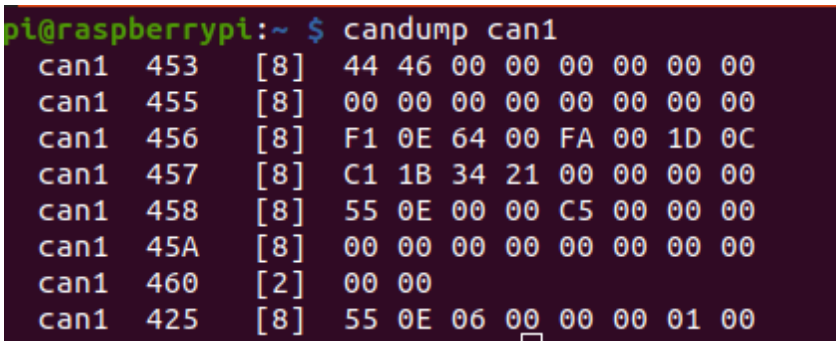

Fig. 1

- Charge Voltage = 382.5V
- Charge current = 10.0A
- Max discharge current = 25.0A
- Min discharge voltage = 310.1V
- SOC = 71.05%
- SOH = 85.00%
- Battery voltage = 366.9V
- Battery temperature = 19.7 °C