

BLE Temperature Sensor Hub

Server Communication Protocol

Integration Guide For Server-Side Developers

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1. Introduction

1.1 What Is This Device?

This device is a BLE (Bluetooth Low Energy) Hub that pairs with up to 4 wireless Temperature/Humidity Sensors and relays their readings, together with its own status and configuration data, to a remote server over a standard telematics data connection (StarLink-compatible transport).

The Hub is the only party the server ever communicates with directly. The individual BLE sensors are never addressed by the server directly — every sensor-related command is routed through the Hub, identified by that sensor's own Bluetooth MAC address.

1.2 What This Document Covers

This document describes the complete application-layer message protocol between the server and the Hub: every command the server may send, every event and response the Hub may send back, and the exact byte/field layout of each.

This document does not describe the Bluetooth-level protocol between the Hub and its paired sensors — that link is internal to the Hub and is not exposed to, or configurable by, the server.

1.3 Intended Audience

This document is intended for developers implementing the server side of this protocol — parsing incoming Hub messages and constructing outgoing commands.

2. Transport Layer — How Messages Reach The Device

Every message described in this document is carried as the payload of a standard StarLink telematics transport frame. The server does not open a raw socket directly to the Hub — messages are relayed through the existing StarLink transport/gateway layer.

A command sent from the server-side application is wrapped as follows before transport:

```
153,<Device ID>,"<Device ID>,<Command ID>,<Parameter 1>,<Parameter 2>,... "
```

Field	Type	Size	Description
153	Fixed Value	—	[object Object]
Device ID	u8 (ASCII)	—	The target Hub's configured Device ID (see Section 8). Default: 64. Appears twice — once as the transport-layer routing address, once again as the first field inside the quoted application payload.
Quoted Payload	ASCII Text	—	The actual application-layer message delivered to the Hub, exactly as described from Section 3 onward in this document.

This outer transport wrapper is provided here for completeness. The remainder of this document describes only the quoted application-layer payload — this is the part a server integration actually needs to construct and parse.

3. Message Envelope Format

3.1 Server → Device Messages

Every command sent to the device follows this exact structure:

```
<Device ID>,<Command ID>[,<Parameter 1>[,<Parameter 2>[, ... ]]]
```

Field	Type	Size	Description
Device ID	u8 (ASCII decimal)	1-3 chars	Must match the Hub's currently configured Device ID, or be sent as 0 (accepted as a wildcard by the Hub).
Command ID	u8 (ASCII decimal)	1-3 chars	Identifies which command this is. See Section 5 for the complete list of values.
Parameters	ASCII, comma-separated	varies	Zero or more command-specific parameters, in a fixed order defined per-command in Section 6.

All fields are comma-separated ASCII text — there is no binary encoding at this layer. Numeric fields are sent as plain decimal ASCII digits unless otherwise noted. MAC addresses are always sent as six colon-separated upper-case hexadecimal byte pairs, e.g. DD:66:3E:F1:20:BD.

3.2 Device → Server Messages

Every message the Hub sends to the server — whether a direct response to a command, or a spontaneous event — follows this structure:

```
\xF1<Device ID><Device ID (ASCII)><Message Type>,<Field 1>[,<Field 2>[, ... ]]
```

Field	Type	Size	Description
Header Byte	Fixed Byte	1 byte	Fixed value 0xF1, identifying this as an application-layer message from the Hub.
Device ID (raw)	u8 (raw byte)	1 byte	The Hub's own Device ID, as a single raw byte.
Device ID (ASCII)	u8 (ASCII decimal)	1-3 chars	The same Device ID, immediately repeated as ASCII decimal digits.
Message Type	u8 (ASCII decimal)	1-3 chars	Identifies which event/response this is. See Section 5 for the complete list of values.
Fields	ASCII, comma-separated	varies	Zero or more message-specific fields, in a fixed order defined per-message in Section 7.

Every message from the device — whether it is a genuine reply to a command or an unprompted event — is preceded by a single acknowledgement byte, 0xFF, sent immediately upon receipt of any valid message from the server. This ACK confirms only that a message was received; it does not indicate that the command succeeded (each command's own explicit response, described in Section 6, carries the actual result).

4. Data Encoding Conventions

Type	Encoding	Example
Unsigned Integer	Plain ASCII decimal digits, no leading zeros unless explicitly padded per-field.	300
Signed Integer	A leading '-' character for negative values, otherwise as unsigned.	-45
Float	ASCII decimal with a fixed number of digits after the decimal point (specified per-field).	24.7
MAC Address	Six upper-case hex byte pairs, colon-separated.	DD:66:3E:F1:20:BD
Boolean / Result Flag	"1" for success/true, "0" for failure/false.	1
Timestamp	Unsigned 32-bit integer, seconds since 2010-01-01 00:00:00 UTC, sent as ASCII decimal.	489213345

Every field in every message in this protocol is comma-separated ASCII text — there is no binary/hex encoding at the application layer. Underlying sensor values are stored as scaled integers internally on the device but are always converted to the encodings above before being placed in a message.

5. Message Type Reference Table

5.1 Server → Device Commands

Command ID	Command Name	Response ID
10	Read Device Version	40
11	Read Device Settings	41 (or 41-style full settings dump)
12	Read Connected Device Status	43
13	Save Device Settings (Full)	42
14	Save Specific Sensor Settings	46
15	Set All Settings To Default Values	— (no explicit response)
16	Start Bluetooth Scan	44
17	Start Automatic Sensor Study	45
18	Perform Reset To Device	— (device resets)
19	Send Logger ACK (relayed to sensor over BLE)	— (no direct response)
20	Calibrate Sensor / Reset Calibration	47
21	Turn Off Sensor	48
22	Read Sensor Calibration Values	49 (ack) + event 80 (data)
23	Blink Sensor LED	50
24	Delete Sensor Logger	51

5.2 Device → Server Events And Responses

Message ID	Message Name	Trigger
40	Device Version Response	Reply to Command 10
41	Device Settings Response	Reply to Command 11, or spontaneously after a settings-changing command
42	Save Device Settings Response	Reply to Command 13
43	Connected Device Status Response	Reply to Command 12
44	Start Bluetooth Scan Response	Reply to Command 16
45	Start Automatic Sensor Study Response	Reply to Command 17
46	Save Specific Sensor Settings Response	Reply to Command 14
47	Calibrate Sensor Response	Reply to Command 20
48	Turn Off Sensor Response	Reply to Command 21
49	Read Sensor Calibration Values Response	Reply to Command 22
50	Blink Sensor LED Response	Reply to Command 23
51	Delete Sensor Logger Response	Reply to Command 24
70	Advertising Data Event	A nearby, not-yet-paired BLE sensor is detected during a scan
71	Sensor Connected Event	A paired sensor successfully connects

Message ID	Message Name	Trigger
		over BLE
72	Sensor Disconnected Event	A paired sensor disconnects and does not reconnect within the configured retry budget (Section 8)
73	Sensor Values Periodic Report	Sent periodically for every currently active sensor
74	Sensor Logger Data Event	A stored logger reading is received from a sensor
75	Successfully Update Settings In Sensor	A sensor confirms it applied new settings pushed to it
76	Error Update Settings In Sensor	A sensor fails to confirm new settings
77	Successfully Update Calibration Sample In Sensor	A sensor confirms a calibration point was saved
78	Error Update Calibration Sample In Sensor	A sensor fails to confirm a calibration point
79	Finish Sensors Automatic Study Event	An automatic sensor-discovery session (Command 17) completes
80	Sensor Calibration Values Data Event	A sensor reports its full calibration data set, following Command 22
81	Successfully Start Blinking Sensor LED	A sensor confirms it received the blink command
82	Successfully Delete Sensor Logger	A sensor confirms its logger was cleared
83	Successfully Turn Off Sensor	A sensor confirms it is powering off
84	Sensor Low Battery Event	A sensor's reported battery voltage drops below the configured minimum (Section 8)

6. Server → Device Commands

6.1 Read Device Version

Command ID: 10 | Response ID: 40

Request syntax:

<Device ID>,10

Response syntax:

<Device ID>,40,<SW Major>,<SW Minor>,<HW Major>,<HW Minor>,<Connected Sensors Bitmask>

Field	Type	Size	Description
SW Major / Minor	u8	1 byte each	Hub firmware software version.
HW Major / Minor	u8	1 byte each	Hub hardware version.
Connected Sensors Bitmask	u8	1 byte	Bit N set (N = 0-3) means sensor slot N is currently connected.

6.2 Read Device Settings

Command ID: 11 | Response ID: 41

Request syntax:

<Device ID>,11

Response syntax:

See Section 7.1 (Device Settings Response) – identical field layout is used for both the command reply and the settings-changed notification.

6.3 Read Connected Device Status

Command ID: 12 | Response ID: 43

Request syntax:

<Device ID>,12

Response syntax:

<Device ID>,43,<Connected Sensors Bitmask>

Field	Type	Size	Description
Connected Sensors Bitmask	u8	1 byte	Bit N set (N = 0-3) means sensor slot N is currently connected.

6.4 Save Device Settings (Full)

Command ID: 13 | Response ID: 42

Request syntax:

<Device ID>,13,<Adv Time Interval>,<Adv TX Power>,<Device ID>,<Settings Version>,<Periodic Report Interval>,<Total Reconnection Retries>,<Battery Min Value>,<Sensor 1..4 Settings>

Field	Type	Size	Description
Adv Time Interval	u16	ms	Hub's own BLE advertising interval.
Adv TX Power	u8	enum	Hub's own BLE advertising TX power setting.
Device ID	u8	—	New Device ID for this Hub. Default: 65.
Settings Version	u8	—	Free-form settings version tag.
Periodic Report Interval	u16	seconds	How often the Hub sends the Sensors Periodic Report (Message 73). 0 disables periodic reporting.
Total Reconnection Retries	u8	—	Number of consecutive failed reconnect attempts allowed for a previously-connected sensor before a Sensor Disconnected Event (72) is reported. Default: 3.
Battery Min Value	u8	×10, Volts	Battery voltage threshold below which a Low Battery Event (84) is triggered per sensor. Sent as the real voltage × 10 (e.g. 29 = 2.9V).
Sensor N Settings	Repeated x4	—	Four repetitions of: <MAC>,<Periodic Report Interval>,<ADV Interval>,<ADV TX Power> — see Section 9 for field meanings. Sensor slots are matched/assigned by MAC address; a slot with an all-zero MAC is treated as unpaired.

Response syntax:

<Device ID>,42,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = settings saved successfully.

If any sensor's MAC address changes as part of this command, the Hub performs a full Bluetooth re-initialization, briefly disconnecting all currently-connected sensors.

6.5 Save Specific Sensor Settings

Command ID: 14 | Response ID: 46

Request syntax:

<Device ID>,14,<Sensor MAC>,<Periodic Report Interval>,<ADV Interval>,<ADV TX Power>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor being configured. If this MAC does not already occupy one of the 4 sensor slots, it is added to the first free slot.
Periodic Report Interval	u16	seconds	How often this sensor reports its logger/periodic data. Default: 300.
ADV Interval	u16	ms	This sensor's own BLE advertising interval. Default: 1000.
ADV TX Power	u8	enum	This sensor's own BLE advertising TX power. Default: 1.

Response syntax:

<Device ID>,46,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = saved successfully, 0 = failed (e.g. no free sensor slot available for a new MAC).

6.6 Set All Settings To Default Values

Command ID: 15 | Response ID: —

Request syntax:

<Device ID>,15

This command has no explicit response message. Follow it with a Read Device Settings (Command 11) to confirm the reset.

6.7 Start Bluetooth Scan

Command ID: 16 | Response ID: 44

Request syntax:

<Device ID>,16

Response syntax:

<Device ID>,44,1

Starting a scan disconnects all currently-connected sensors for the duration of the scan. Nearby, unpaired sensors detected during the scan are reported via Advertising Data Events (Message 70).

6.8 Start Automatic Sensor Study

Command ID: 17 | Response ID: 45

Request syntax:

<Device ID>,17,<Total Time>,<Total Sensors>

Field	Type	Size	Description
Total Time	u16	seconds	Maximum duration of the study session.
Total Sensors	u8	—	Number of sensors the study should attempt to discover and pair before ending early.

Response syntax:

<Device ID>,45,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = study session started successfully.

Completion is reported separately via the Finish Sensors Automatic Study Event (Message 79), which includes the actual number of sensors found.

6.9 Perform Reset To Device

Command ID: 18 | Response ID: —

Request syntax:

<Device ID>,18

The Hub performs a full reset immediately upon receiving this command. No response is sent beforehand.

6.10 Send Logger ACK (Relayed To Sensor)

Command ID: 19 | **Response ID: —**

Request syntax:

<Device ID>,19,<Sensor MAC>,<Reference Number>,<TimeStamp>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose logger entry is being acknowledged.
Reference Number	u16	—	The logger entry's own reference number, as received in that sensor's Sensor Logger Data Event (Message 74).
TimeStamp	u32	seconds since 2010	The timestamp of the logger entry being acknowledged.

This command has no direct response on the server-facing protocol. It is relayed by the Hub to the sensor over its own internal Bluetooth link, allowing the sensor to remove the acknowledged entry from its own on-device logger.

6.11 Calibrate Sensor / Reset Calibration

Command ID: 20 | **Response ID: 47**

Request syntax:

<Device ID>,20,<Sensor MAC>,<Sample ID>,<Sample Value>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor being calibrated.
Sample ID	u8	0-3	0 = reset/clear all calibration data for this sensor. 1, 2, or 3 = save this value as calibration point 1, 2, or 3 respectively.
Sample Value	s16	×10, °C	Reference temperature for this calibration point, as an integer representing the value × 10 (e.g. 245 = 24.5°C). Valid range: -40.0°C to 85.0°C. Ignored when Sample ID is 0.

Response syntax:

<Device ID>,47,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = accepted and relayed to the sensor, 0 = rejected (sensor not connected, or value out of range).

A successful save on the sensor's own side is confirmed separately via Message 77 (or 78 on failure). The full, current calibration data set can subsequently be read back via Command 22.

6.12 Turn Off Sensor

Command ID: 21 | Response ID: 48

Request syntax:

<Device ID>,21,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor to power off.

Response syntax:

<Device ID>,48,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = command accepted and relayed to the sensor.

Confirmed separately via Message 83 once the sensor acknowledges.

6.13 Read Sensor Calibration Values

Command ID: 22 | Response ID: 49

Request syntax:

<Device ID>,22,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose calibration data is being requested.

Response syntax:

<Device ID>,49,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = request accepted and relayed to the sensor.

The actual calibration data set is delivered separately via the Sensor Calibration Values Data Event (Message 80), described in Section 7.

6.14 Blink Sensor LED

Command ID: 23 | Response ID: 50

Request syntax:

<Device ID>,23,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose LED should blink (useful for physically locating a specific sensor).

Response syntax:

<Device ID>,50,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = command accepted and relayed to the sensor.

Confirmed separately via Message 81 once the sensor acknowledges.

6.15 Delete Sensor Logger

Command ID: 24 | Response ID: 51

Request syntax:

<Device ID>,24,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose on-device logger should be cleared.

Response syntax:

<Device ID>,51,<Result>

Field	Type	Size	Description
Result	u8	1 char	1 = command accepted and relayed to the sensor.

Confirmed separately via Message 82 once the sensor acknowledges.

7. Device → Server Events And Responses

7.1 Device Settings Response

Message ID: 41

Syntax:

<Device ID>,41,<Adv Time Interval>,<Adv TX Power>,<Device ID>,<Settings Version>,<Periodic Report Interval>,<Total Reconnection Retries>,<Battery Min Value>,<Sensor 1..4 Settings>

Field	Type	Size	Description
Adv Time Interval	u16	ms	See Section 8.
Adv TX Power	u8	enum	See Section 8.
Device ID	u8	—	This Hub's currently configured Device ID.
Settings Version	u8	—	Free-form settings version tag.
Periodic Report Interval	u16	seconds	See Section 8.
Total Reconnection Retries	u8	—	See Section 8.
Battery Min Value	u8	×10, Volts	See Section 8.
Sensor N Settings	Repeated x4	—	Four repetitions of: <MAC>,<Periodic Report Interval>,<ADV Interval>,<ADV TX Power> — see Section 9. An unpaired slot is sent with an all-zero MAC.

Sent both as the direct reply to Command 11, and spontaneously any time the Hub's settings are read back or changed.

7.2 Advertising Data Event

Message ID: 70

Syntax:

<Device ID>,70,<Sensor MAC>,<RSSI>,<Device Name>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The advertising, not-yet-paired sensor's MAC address.
RSSI	s8	dBm	Signal strength of the received advertisement.
Device Name	ASCII text	variable	The advertising sensor's own BLE device name.

Only sent while a Bluetooth Scan (Command 16) is active.

7.3 Sensor Connected Event

Message ID: 71

Syntax:

<Device ID>,71,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor that just connected.

7.4 Sensor Disconnected Event

Message ID: 72

Syntax:

<Device ID>,72,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor that is now considered disconnected.

Not sent on every individual disconnect. The Hub actively retries reconnection in the background; this event is only reported once the number of consecutive failed reconnect attempts reaches the configured Total Reconnection Retries setting (Section 8).

7.5 Sensor Values Periodic Report

Message ID: 73

Syntax:

```
<Device ID>,73,<Total Active Sensors>[,<Sensor  
MAC>;<Temperature>;<Humidity>;<Battery>;<TimeStamp>;<Reference Number>;<Version>;<RSSI>]...
```

Field	Type	Size	Description
Total Active Sensors	u8	—	Count of sensor blocks that follow.
Sensor MAC	MAC	17 chars	One block per currently active sensor, comma-prefixed. Fields within a block are semicolon-separated (note: different from the comma separator used elsewhere in this protocol).
Temperature	float	×1, °C	Latest reading.
Humidity	float	×1, %RH	Latest reading.
Battery	float	×3 decimal, Volts	Latest reading.
TimeStamp	u32	seconds since 2010	Timestamp of the latest reading.
Reference Number	u16	—	Sensor's own internal logger reference number for this reading.
Version	u16	—	Sensor's own reported firmware version.
RSSI	s8	dBm	Signal strength at last contact.

Sent periodically at the interval configured in Section 8. If no sensors are currently active, this message is not sent at all.

7.6 Sensor Logger Data Event

Message ID: 74

Syntax:

<Device ID>,74,<Sensor MAC>,<Temperature>,<Humidity>,<Battery>,<TimeStamp>,<Reference Number>,<Version>,<RSSI>,<Calibration Status>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	Reporting sensor.
Temperature	float	×1, °C	Stored logger reading.
Humidity	float	×1, %RH	Stored logger reading.
Battery	float	×3 decimal, Volts	Stored logger reading.
TimeStamp	u32	seconds since 2010	When this reading was originally recorded on the sensor.
Reference Number	u16	—	This entry's own reference number. Must be echoed back in the Logger ACK command (Section 6.10) so the sensor can remove it from its own on-device logger.
Version	u16	—	Sensor's own reported firmware version.
RSSI	s8	dBm	Signal strength at time of receipt.
Calibration Status	u8 (bitmask)	1 byte	Bit 0/1/2 set = calibration point 1/2/3 has been recorded on this sensor.

The server is expected to acknowledge each entry with the Logger ACK command; otherwise the sensor will keep re-sending it.

7.7 Successfully / Error Update Settings In Sensor

Message ID: 75 / 76

Syntax:

<Device ID>,<75 or 76>,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose settings update this event refers to.

Reports whether a per-sensor settings push (following Command 14, or a full settings save affecting that sensor) was confirmed by the sensor itself.

7.8 Successfully / Error Update Calibration Sample In Sensor

Message ID: 77 / 78

Syntax:

<Device ID>,<77 or 78>,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose calibration point this event refers to.

Reports whether a calibration point pushed via Command 20 was confirmed saved by the sensor itself.

7.9 Finish Sensors Automatic Study Event

Message ID: 79

Syntax:

<Device ID>,79,<Total Sensors Studied>

Field	Type	Size	Description
Total Sensors Studied	u8	—	Actual number of sensors discovered and paired during the study session started by Command 17.

7.10 Sensor Calibration Values Data Event

Message ID: 80

Syntax:

<Device ID>,80,<Sensor MAC>,<Calibration Status Bitmask>,<Ref Temp 1>,<Ref Temp 2>,<Ref Temp 3>,<Calibration TimeStamp>,<RSSI>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	Reporting sensor.
Calibration Status Bitmask	u8	1 byte	Bit 0/1/2 set = calibration point 1/2/3 has been recorded.
Ref Temp 1 / 2 / 3	float	×1 decimal, °C	The reference temperature saved for each calibration point. Meaningful only if the corresponding bitmask bit is set.
Calibration TimeStamp	u32	seconds since 2010	When calibration was last updated. 0 if no calibration has ever been recorded.
RSSI	s8	dBm	Signal strength at time of receipt.

Sent in reply to Command 22 (Read Sensor Calibration Values).

7.11 Successfully Start Blinking Sensor LED

Message ID: 81

Syntax:

<Device ID>,81,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor that confirmed the blink command.

7.12 Successfully Delete Sensor Logger

Message ID: 82

Syntax:

<Device ID>,82,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor that confirmed its logger was cleared.

7.13 Successfully Turn Off Sensor

Message ID: 83

Syntax:

<Device ID>,83,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor that confirmed it is powering off.

7.14 Sensor Low Battery Event

Message ID: 84

Syntax:

<Device ID>,84,<Sensor MAC>

Field	Type	Size	Description
Sensor MAC	MAC	17 chars	The sensor whose reported battery voltage has dropped below the configured minimum (see Section 8).

8. Global Settings Parameters

These parameters apply to the Hub as a whole. They are read via Command 11 and written via Command 13 (Section 6), and are always sent/received together, in the fixed order shown below.

Parameter	Type	Default	Description
Advertising Time Interval	u16 (ms)	1000	The Hub's own BLE advertising interval.
Advertising TX Power	u8 (enum)	1 (0 dBm)	The Hub's own BLE advertising transmit power level.
Device ID	u8	64	This Hub's identifier, used to address it in every command (Section 3).
Settings Version	u8	1	Free-form settings version tag, not otherwise interpreted by the Hub.
Sensors Periodic Report Time Interval	u16 (seconds)	0 (disabled)	How often the Sensor Values Periodic Report (Message 73) is sent.
Total Reconnection Retries Before Disconnection Event	u8	3	Number of consecutive failed reconnect attempts a previously-connected sensor is allowed before a Sensor Disconnected Event (72) is finally reported. The Hub actively retries in the background the whole time; nothing is reported until this budget is exhausted.
Battery Minimal Value To Send Event	u8 ($\times 10$, Volts)	0	Threshold below which a sensor's reported battery voltage triggers a Low Battery Event (84). Sent as the real voltage $\times 10$ (e.g. 29 = 2.9V). 0 disables this check entirely.

9. Per-Sensor Settings Parameters

The Hub supports up to 4 simultaneously paired sensors. Each sensor slot has its own independent copy of the following parameters, identified by that sensor's Bluetooth MAC address. An unpaired slot is represented with an all-zero MAC address (00:00:00:00:00:00).

Parameter	Type	Default	Description
Sensor MAC Address	MAC	—	Identifies which physical sensor this settings block belongs to, and which of the 4 sensor slots it occupies.
Sensor Periodic Report Time Interval	u16 (seconds)	300	How often this specific sensor reports its data.
Sensor ADV Interval	u16 (ms)	1000	This sensor's own BLE advertising interval, applied when the sensor is not currently connected.
Sensor ADV TX Power	u8 (enum)	1	This sensor's own BLE advertising transmit power level.

10. Worked Command Examples

Every request below is taken verbatim from a real, working command file used against an actual device — not hand-constructed. Device ID 64 (the factory default) is used throughout, matching that file. Each reply shown is built to exactly match how Uart_Communication_Manager.c constructs and sends that response; the specific values used to illustrate the reply (bitmasks, versions, etc.) are representative examples, not captured from a live device.

10.1 Read Device Version

Server Command:

64,10

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
10	Command ID	Read Device Version.

Device Reply:

64,40,1,0,1,2,15

Field	Value	Explanation
64	Device ID	The Hub's own Device ID.
40	Message Type	Device Version Response.
1,0	SW Major, SW Minor	Firmware version 1.0.
1,2	HW Major, HW Minor	Hardware version 1.2.
15	Connected Sensors Bitmask	Binary 1111 — all 4 sensor slots currently connected.

10.2 Read Device Settings

Server Command:

64,11

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
11	Command ID	Read Device Settings.

Device Reply:

64,41,1000,1,64,1,0,3,29,DD:66:3E:F1:20:BD,300,1000,1,CC:49:8E:08:54:08,300,1000,1,D9:6E:4E:72:68:C3,300,1000,1,DD:C0:E2:5E:D7:69,300,1000,1

Field	Value	Explanation
41	Message Type	Device Settings Response — identical layout to Command 13's own request fields (Section 6.4).
1000,1,64,1,0,3,29	Global Settings	Adv Interval 1000ms, Adv TX Power 1, Device ID 64, Settings Version 1, Periodic Report disabled (0), 3 reconnection retries, battery threshold 2.9V (29 ÷ 10).
DD:66:3E:F1:20:BD,300,1000,1 (×4)	Per-Sensor Settings	Four repeated blocks, one per sensor slot — MAC, report interval, ADV interval, ADV TX power (Section 9).

10.3 Read Connected Device Status

Server Command:

64,12

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
12	Command ID	Read Connected Devices Status.

Device Reply:

64,43,15

Field	Value	Explanation
43	Message Type	Connected Device Status Response.
15	Connected Sensors Bitmask	Binary 1111 — all 4 sensor slots currently connected.

10.4 Save Full Device Settings

Server Command:

64,13,1000,1,64,1,0,3,29,DD:66:3E:F1:20:BD,300,1000,1,CC:49:8E:08:54:08,300,1000,1,D9:6E:4E:72:68:C3,300,1000,1,DD:C0:E2:5E:D7:69,300,1000,1

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
13	Command ID	Save Device Settings (Full).
1000	Adv Time Interval	Hub's own BLE advertising interval, ms.
1	Adv TX Power	Hub's own BLE advertising TX power (enum).
64	Device ID (new value)	The Device ID to store — unchanged in this example.
1	Settings Version	Free-form version tag.
0	Periodic Report Interval	0 = periodic reporting disabled.
3	Total Reconnection Retries	Consecutive failed reconnects allowed before a Disconnected Event is reported.
29	Battery Min Value	2.9V threshold ($29 \div 10$) for a Low Battery Event.
DD:66:3E:F1:20:BD,300,1000,1	Sensor 1 Settings	MAC, 300s report interval, 1000ms ADV interval, TX power 1.
CC:49:8E:08:54:08,300,1000,1	Sensor 2 Settings	Same layout, second sensor slot.
D9:6E:4E:72:68:C3,300,1000,1	Sensor 3 Settings	Same layout, third sensor slot.
DD:C0:E2:5E:D7:69,300,1000,1	Sensor 4 Settings	Same layout, fourth sensor slot.

Device Reply:

64,42,1

Field	Value	Explanation
42	Message Type	Save Device Settings Response.
1	Result	1 = saved successfully.

10.5 Set All Settings To Default Values

Server Command:

64,15

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
15	Command ID	Set All Settings To Default Values.

This command has no explicit response message. Follow it with a Read Device Settings command (10.2) to confirm the reset took effect.

10.6 Start Bluetooth Scan

Server Command:

64,16

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
16	Command ID	Start Bluetooth Scan.

Device Reply:

64,44,1

Field	Value	Explanation
44	Message Type	Start Bluetooth Scan Response.
1	Result	Fixed value confirming the scan started.

10.7 Start Automatic Sensor Study

Server Command:

64,17,30,4

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
17	Command ID	Start Automatic Sensor Study.
30	Total Time	Maximum study duration, seconds.
4	Total Sensors	Stop early once this many sensors are discovered.

Device Reply:

64,45,1

Field	Value	Explanation
45	Message Type	Start Automatic Sensor Study Response.
1	Result	1 = study session started successfully.

10.8 Perform Reset To Device

Server Command:

64,18

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
18	Command ID	Perform Reset To Device.

The Hub resets immediately upon receiving this command. No response is sent beforehand.

10.9 Logger ACK (Relayed To Sensor)

Server Command:

64,19,01:02:03:04:05:06,2547,52856479

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
19	Command ID	Send Logger ACK.
01:02:03:04:05:06	Sensor MAC	Example MAC address (placeholder in the source file).
2547	Reference Number	The logger entry's own reference number, as received in that sensor's Logger Data Event (Section 7.6).
52856479	TimeStamp	The timestamp of the logger entry being acknowledged, seconds since 2010.

This command has no response on the server-facing protocol — it is relayed by the Hub to the sensor over Bluetooth, letting the sensor clear this entry from its own on-device logger.

10.10 Reset Sensor Calibration Values

Server Command:

64,20,DD:66:3E:F1:20:BD,0,0

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
20	Command ID	Calibrate Sensor / Reset Calibration.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor being reset.
0	Sample ID	0 = reset/clear all calibration data for this sensor.
0	Sample Value	Ignored when Sample ID is 0.

Device Reply:

64,47,1

Field	Value	Explanation
47	Message Type	Calibrate Sensor Response.
1	Result	1 = accepted and relayed to the sensor.

10.11 Calibrate Sensor Reference Point 1

Server Command:

64,20,DD:66:3E:F1:20:BD,1,245

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
20	Command ID	Calibrate Sensor / Reset Calibration.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor being calibrated.
1	Sample ID	Save this value as calibration point 1.
245	Sample Value	24.5°C (245 ÷ 10).

Device Reply:

64,47,1

Field	Value	Explanation
47	Message Type	Calibrate Sensor Response.
1	Result	1 = accepted and relayed to the sensor. Confirmed on the sensor's own side separately, via Message 77 or 78 (Section 7.8).

10.12 Turn Off Sensor

Server Command:

64,21,DD:66:3E:F1:20:BD

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
21	Command ID	Turn Off Sensor.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor to power off.

Device Reply:

64,48,1

Field	Value	Explanation
48	Message Type	Turn Off Sensor Response.
1	Result	1 = accepted and relayed to the sensor. Confirmed separately via Message 83 once the sensor acknowledges.

10.13 Read Sensor Calibration Values

Server Command:

64,22,DD:66:3E:F1:20:BD

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
22	Command ID	Read Sensor Calibration Values.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor whose calibration data is requested.

Device Reply (immediate):

64,49,1

Field	Value	Explanation
49	Message Type	Read Sensor Calibration Values Response.
1	Result	1 = request accepted and relayed to the sensor.

Followed shortly after by a separate event, once the sensor itself replies:

64,80,DD:66:3E:F1:20:BD,7,24.5,25.1,25.8,52856479,-62

Field	Value	Explanation
80	Message Type	Sensor Calibration Values Data Event.
DD:66:3E:F1:20:BD	Sensor MAC	Reporting sensor.
7	Calibration Status Bitmask	Binary 111 — all three calibration points recorded.
24.5,25.1,25.8	Ref Temp 1, 2, 3	The three saved reference temperatures, °C.
52856479	Calibration TimeStamp	When calibration was last updated, seconds since 2010.
-62	RSSI	Signal strength at time of receipt, dBm.

10.14 Blink Sensor LED

Server Command:

64,23,DD:66:3E:F1:20:BD

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
23	Command ID	Blink Sensor LED.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor whose LED should blink.

Device Reply:

64,50,1

Field	Value	Explanation
50	Message Type	Blink Sensor LED Response.
1	Result	1 = accepted and relayed to the sensor. Confirmed separately via Message 81 once the sensor acknowledges.

10.15 Delete Sensor Logger

Server Command:

64,24,DD:66:3E:F1:20:BD

Field	Value	Explanation
64	Device ID	Target Hub's Device ID.
24	Command ID	Delete Sensor Logger.
DD:66:3E:F1:20:BD	Sensor MAC	The sensor whose on-device logger should be cleared.

Device Reply:

64,51,1

Field	Value	Explanation
51	Message Type	Delete Sensor Logger Response.
1	Result	1 = accepted and relayed to the sensor. Confirmed separately via Message 82 once the sensor acknowledges.

11. Good To Know

The Hub always acknowledges receipt of any valid incoming message with a single 0xFF byte, sent before its own explicit response. This ACK confirms delivery only, not success — always check the explicit Result field in the command's own response for the actual outcome.

Sensor disconnects are not reported immediately. The Hub retries reconnection continuously in the background; a Sensor Disconnected Event is only sent once the configured retry budget (Section 8) is exhausted. In normal field operation this means brief, self-healing disconnects are not reported to the server at all.

Starting a Bluetooth Scan (Command 16) disconnects all currently-connected sensors for its duration — this is a deliberate hardware/scheduling constraint, not a bug.

A settings-changing command that alters any sensor's MAC address triggers a full Bluetooth re-initialization on the Hub, briefly disconnecting every currently-connected sensor, even ones whose own settings did not change.

All timestamps in this protocol use the same epoch: seconds since 2010-01-01 00:00:00 UTC, not the standard Unix epoch (1970).