

OnFlight Hub UDP Broadcast Description

Firmware v1.0, and v2.0

Document Revision 1.0

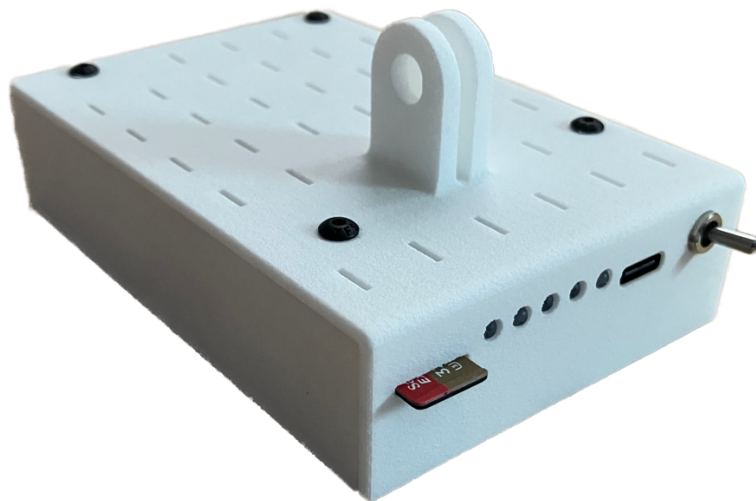


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1 Technical Documentation

The following documentation and support software are included with OnFlight and available from our [website](#):

- **User Manual:** describes the OnFlight Hub, specifications, and operations.
- **CSV Data Log Description:** describes the fields available in the CSV formatted data logs.
- **Binary Data Log Description:** describes the binary data log format that OnFlight Hub uses to write data. This is useful for application developers who would like to natively read and use these data logs.
- **UDP Broadcast Description (this document):** describes the real-time UDP broadcast packet format that is sent by OnFlight Hub.
- **External Air Data Interface:** describes the interface to send OnFlight Hub data from an external air data system.
- **External AGL Altimeter Interface:** describes the interface to send OnFlight Hub data from an external Above Ground Level (AGL) altimeter.
- **Data Converter:** application for Windows or MacOS, which converts the data from OnFlight to CSV format.

2 Support

If you have technical problems or cannot find the information you need in the provided documents, please contact our technical support team by email at: support@bolderflight.com. Our team is committed to providing the support necessary to ensure that you are successful using our products.

3 Introduction

OnFlight Hub broadcasts real-time data using UDP over port 2000. This message is sent at a rate of 50 Hz. The message structure is described below. Data is formatted as little endian.

Byte Offset	Type	Name	Scale	Unit	Description
0	U1	version	-	-	Version number, currently 0.
1	U1[6]	status	-	-	Status, see Section 4 for bit field description.
7	I1	cpu_die_temp_c	1	C	CPU die temperature.
8	I1	imu_die_temp_c	1	C	IMU die temperature.
9	I1	mag_die_temp_c	1	C	Magnetometer die temperature.
10	I1	pres_die_temp_c	1	C	Static pressure die temperature.
11	I1	airdata_die_temp_c	1	C	External airdata module die temperature.
12	I1	agl_alt_die_temp_c	1	C	External AGL altimeter module die temperature.
13	U1	horz_pos_acc_ft	1 / 10	ft	Horizontal position accuracy estimate from the GNSS receiver.
14	U1	vert_pos_acc_ft	1 / 10	ft	Vertical position accuracy estimate from the GNSS receiver.
15	U1	vel_acc_kts	1 / 10	kts	Velocity accuracy estimate from the GNSS receiver.
16	U1	gnss_fix_num_sv	-	-	The lower 3 bits encode the GNSS fix (0 = no fix, 2 = 2D fix, 3 = 3D fix, 4 = differential GNSS fix). The upper 5 bits encode the number of satellite vehicles used in the GNSS solution.
17	U1	utc_year	-	-	UTC year from the GNSS receiver from 1970 (i.e. year = utc_year + 1970).

18	U1	utc_month	-	-	UTC month from the GNSS receiver.
19	U1	utc_day	-	-	UTC day from the GNSS receiver.
20	U1	utc_hour	-	-	UTC hour from the GNSS receiver.
21	U1	utc_min	-	-	UTC minute from the GNSS receiver.
22	U1	utc_sec	-	-	UTC second from the GNSS receiver.
23	I2	pitch_deg	1 / 100	deg	Pitch angle (+up).
25	I2	roll_deg	1 / 100	deg	Roll angle (+right).
27	I2	mag_var_deg	1 / 100	deg	Magnetic variation (+east).
29	U2	true_heading_deg	1 / 100	deg	Heading angle, true, 0 – 360.
31	U2	gnd_spd_kts	1 / 100	kts	Ground speed.
33	U2	gnd_track_deg	1 / 100	kts	Ground track, true, 0 – 360.
35	I2	flt_path_deg	1 / 100	kts	Flight path angle.
37	I2	climb_rate_ftpm	1	ft/min	Climb rate.
39	I2	load_factor	1 / 1000	G	Load factor.
41	I2	pitch_rate_dps	1 / 10	deg/s	Pitch rate (+pitch up).
43	I2	roll_rate_dps	1 / 10	deg/s	Roll rate (+roll right).
45	I2	yaw_rate_dps	1 / 10	deg/s	Yaw rate (+yaw right).
47	I2	accel_x_g	1 / 1000	G	Acceleration (+forward out the nose).
49	I2	accel_y_g	1 / 1000	G	Acceleration (+right).
51	I2	accel_z_g	1 / 1000	G	Acceleration (+down).
53	U2	alt_wgs84_ft	-	ft	Altitude above the WGS84 ellipsoid, biased by +10,000 ft (i.e. alt = alt_wgs84_ft - 10000).
55	U2	alt_msl_ft	-	ft	Altitude above Mean Sea Level (MSL), biased by +10,000 ft (i.e. alt = alt_msl_ft - 10000).
57	U2	cabin_pres_alt_ft	-	ft	Cabin pressure altitude, biased by +10,000 ft (i.e. pres_alt = cabin_pres_alt_ft - 10000).
59	U2	cabin_pres_pa	2	Pa	Cabin pressure.
61	U2	airdata_static_pres_pa	2	Pa	External airdata module static pressure.
63	U2	airdata_diff_pres_pa	1	Pa	External airdata module differential pressure.
65	U2	airdata_oat_c	1 / 100	C	External airdata module Outside Air Temperature (OAT).
67	U2	airdata_ias_kts	1 / 100	kts	External airdata module Indicated Air Speed (IAS).
69	U2	airdata_tas_kts	1 / 100	kts	External airdata module True Air Speed (TAS).
71	U2	airdata_pres_alt_ft	-	ft	External airdata pressure altitude, biased by +10,000 ft (pres_alt = airdata_pres_alt_ft - 10000).
73	U2	airdata_density_alt_ft	-	ft	External airdata density altitude, biased by +10,000 ft (density_alt = airdata_density_alt_ft - 10000).
75	I2	airdata_aoa	1 / 100	-	External airdata angle of attack, either in degrees or a pressure ratio depending on the status bit set, described in Section 4.

77	I2	agl_alt_in	1	in	External AGL altimeter altitude.
79	I4	lat_deg	1e-7	deg	Latitude.
83	I4	lon_deg	1e-7	deg	Longitude.
87	U4	sys_time_ms	-	ms	Time since boot.

4 Status Bit Field

Status bytes are used to efficiently encode data, below is the description and bit masking of these bytes. The description describes the case if a bit occupies that position.

Byte	Mask	Description
0	0x01	Filtered input voltage between configured low and warning voltages.
0	0x02	Filtered input voltage below configured low voltage.
0	0x04	System die temperatures (CPU, IMU, magnetometer, and static pressure sensor) all reporting ok.
0	0x08	CPU die temperature between -30C and +70C.
0	0x10	INS initialized.
0	0x20	INS healthy.
1	0x01	New IMU data received.
1	0x02	IMU healthy.
1	0x04	IMU die temperature between -30C and +70C.
1	0x08	New magnetometer data received.
1	0x10	Magnetometer healthy.
1	0x20	Magnetometer die temperature between -30C and +70C.
1	0x40	New GNSS data received.
1	0x80	GNSS healthy.
2	0x01	New static pressure data received.
2	0x02	Static pressure healthy.
2	0x04	Static pressure die temperature between -30C and +70C.
3	0x01	New external airdata message received.
3	0x02	External airdata module connected.
3	0x04	External airdata battery status warning.
3	0x08	External airdata battery status critically low.
3	0x10	External airdata board die temperature ok.
3	0x20	External airdata OAT measurement available.
3	0x40	External airdata AOA measurement available.
3	0x80	External airdata new static pressure data received.
4	0x01	External airdata static pressure healthy.
4	0x02	External airdata new differential pressure data received.
4	0x04	External airdata differential pressure healthy.
4	0x08	External airdata new OAT data received.
4	0x10	External airdata OAT healthy.
4	0x20	External airdata new AOA data received.
4	0x40	External airdata AOA healthy.
4	0x80	External airdata AOA data type is angle in degrees, otherwise data type is pressure ratio.
5	0x01	New external AGL altimeter message received.
5	0x02	External AGL altimeter module connected.
5	0x04	External AGL altimeter battery status warning.

5	0x08	External AGL altimeter battery status critically low.
5	0x10	External AGL altimeter board die temperature ok.
5	0x20	External AGL altimeter new sensor data received.
5	0x40	External AGL altimeter sensor healthy.
5	0x80	External AGL altimeter sensor in range.