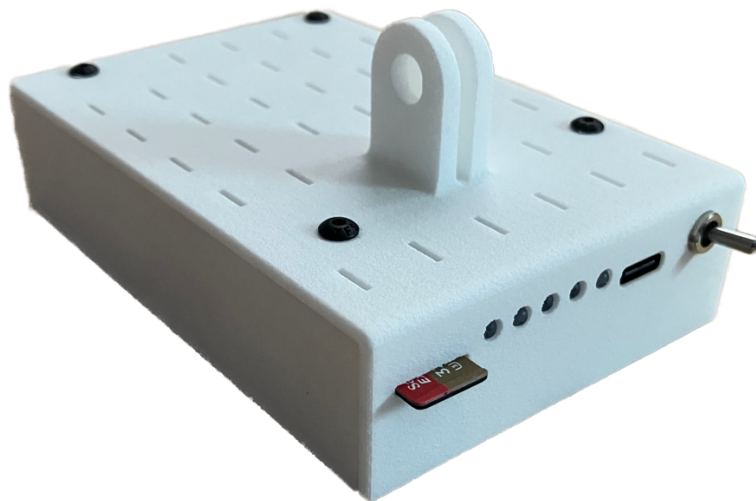


# OnFlight Hub UDP Broadcast Description

Firmware v3.0

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](mailto: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[8]	status	-	-	Status, see Section 4 for bit field description.
9	I1	cpu_die_temp_c	1	C	CPU die temperature.
10	I1	imu_die_temp_c	1	C	IMU die temperature.
11	I1	mag_die_temp_c	1	C	Magnetometer die temperature.
12	I1	pres_die_temp_c	1	C	Static pressure die temperature.
13	I1	airdata_die_temp_c	1	C	External airdata module die temperature.
14	I1	agl_alt_die_temp_c	1	C	External AGL altimeter module die temperature.
15	U1	horz_pos_acc_ft	1 / 10	ft	Horizontal position accuracy estimate from the GNSS receiver.
16	U1	vert_pos_acc_ft	1 / 10	ft	Vertical position accuracy estimate from the GNSS receiver.
17	U1	vel_acc_kts	1 / 10	kts	Velocity accuracy estimate from the GNSS receiver.
18	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.

19	U1	utc_year	-	-	UTC year from the GNSS receiver from 1970 (i.e. year = utc_year + 1970).
20	U1	utc_month	-	-	UTC month from the GNSS receiver.
21	U1	utc_day	-	-	UTC day from the GNSS receiver.
22	U1	utc_hour	-	-	UTC hour from the GNSS receiver.
23	U1	utc_min	-	-	UTC minute from the GNSS receiver.
24	U1	utc_sec	-	-	UTC second from the GNSS receiver.
25	I2	pitch_deg	1 / 100	deg	Pitch angle (+up).
27	I2	roll_deg	1 / 100	deg	Roll angle (+right).
29	I2	mag_var_deg	1 / 100	deg	Magnetic variation (+east).
31	U2	true_heading_deg	1 / 100	deg	Heading angle, true, 0 – 360.
33	U2	gnd_spd_kts	1 / 100	kts	Ground speed.
35	U2	gnd_track_deg	1 / 100	kts	Ground track, true, 0 – 360.
37	I2	flt_path_deg	1 / 100	kts	Flight path angle.
39	I2	climb_rate_ftpm	1	ft/min	Climb rate.
41	I2	load_factor	1 / 1000	G	Load factor.
43	I2	pitch_rate_dps	1 / 10	deg/s	Pitch rate (+pitch up).
45	I2	roll_rate_dps	1 / 10	deg/s	Roll rate (+roll right).
47	I2	yaw_rate_dps	1 / 10	deg/s	Yaw rate (+yaw right).
49	I2	accel_x_g	1 / 1000	G	Acceleration (+forward out the nose).
51	I2	accel_y_g	1 / 1000	G	Acceleration (+right).
53	I2	accel_z_g	1 / 1000	G	Acceleration (+down).
55	U2	alt_wgs84_ft	-	ft	Altitude above the WGS84 ellipsoid, biased by +10,000 ft (i.e. alt = alt_wgs84_ft - 10000).
57	U2	alt_msl_ft	-	ft	Altitude above Mean Sea Level (MSL), biased by +10,000 ft (i.e. alt = alt_msl_ft - 10000).
59	U2	cabin_pres_alt_ft	-	ft	Cabin pressure altitude, biased by +10,000 ft (i.e. pres_alt = cabin_pres_alt_ft - 10000).
61	U2	cabin_pres_pa	2	Pa	Cabin pressure.
63	U2	airdata_static_pres_pa	2	Pa	External airdata module static pressure.
65	U2	airdata_diff_pres_pa	1	Pa	External airdata module differential pressure.
67	U2	airdata_oat_c	1 / 100	C	External airdata module Outside Air Temperature (OAT).
69	U2	airdata_ias_kts	1 / 100	kts	External airdata module Indicated Air Speed (IAS).
71	U2	airdata_cas_kts	1 / 100	kts	External airdata module Calibrated Air Speed (CAS).
73	U2	airdata_tas_kts	1 / 100	kts	External airdata module True Air Speed (TAS).
75	U2	airdata_pres_alt_ft	-	ft	External airdata pressure altitude, biased by +10,000 ft (pres_alt = airdata_pres_alt_ft - 10000).

77	U2	airdata_density_alt_ft	-	ft	External airdata density altitude, biased by +10,000 ft (density_alt = airdata_density_alt_ft - 10000).
79	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.
81	U2	airdata_wind_spd_kts	1 / 100	kts	External airdata module estimated wind speed, kts.
83	U2	airdata_wind_dir_true_deg	1 / 100	deg	External airdata module estimated wind direction, true, deg.
85	I2	agl_alt_in	1	in	External AGL altimeter altitude.
87	I4	lat_deg	1e-7	deg	Latitude.
91	I4	lon_deg	1e-7	deg	Longitude.
95	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	External airdata KCAS available.
5	0x02	External airdata wind estimate available.
6	0x01	New external AGL altimeter message received.
6	0x02	External AGL altimeter module connected.
6	0x04	External AGL altimeter battery status warning.
6	0x08	External AGL altimeter battery status critically low.
6	0x10	External AGL altimeter board die temperature ok.
6	0x20	External AGL altimeter new sensor data received.
6	0x40	External AGL altimeter sensor healthy.
6	0x80	External AGL altimeter sensor in range.
7	0x01	External AGL altimeter is a Skeeter Enterprises LLC Stadia sensor.