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| **Bot Uplink Msg Data Segment**  **Bit Map** | | **Element Name** | **Range/Format** | **Description/Notes** |
| **Bytes 0-3 (32-bit Integer) for BOTH std amd chg data** | **0-2**  (3 bits) | *segid* | [ 0 - 7 ] | **Segment ID**  (identifies the segment type; 0=reserved, 1=status, 2=data, etc.; higher numbers reserved primarily for upload requests, alarms, etc.; guaranteed to be first field in segment) |
| **3-12**  (10 bits) | *dp\_timestamp* | Unix Epoch Time  ***1 sec resolution*** | **Data Product “Timestamp”**  (time when Data Product collected; delta +/- 511 from Status Message ‘timestamp;’ cloud must anticipate 1-year rollover) |
| **13-18**  (6 bits) | *dp\_node\_type* | [ 0 - 63 ] | **Data Product “Node Type ID”**  (equivalent to the SDK’s “Node Type ID;” integer value from a table lookup matching the 3-character “AAA” type identifier component of the *AAA\_N\_<meta|std|change>.json* Data Product file.) |
| **19-22**  (4 bits) | *dp\_instance* | [ 0 - 15] | **Data Product “Instance”**  (equivalent to the SDK’s “instance;” an integer value matching the N-digit component of the *AAA\_N\_<meta|std|change>.json* Data Product file) |
| **23-29**  (7 bits) | *dp\_index* | [ 0 - 127 ]  ***mod 128*** | **Data Product “Index”**  (a Bot-specific, sequential indexed count, incremented by 1, representing the number of uplink transmissions for this *dp\_type* and *dp\_instance* - both ‘std’ and ‘change’; cloud must anticipate a mod 128 rollover). |
| **30**  (1 bit) | *data\_kind* | [ 0 | 1 ] | **Data “Kind” Flag**  (indicates whether this Data Product segment contains a “Standard” or a “Change’ component; if “0,” then ‘standard’ data info is included; if “1,” then ‘change’ data info is included) |
| **31**  (1 bit) | *data\_change* | [ 0 | 1 ] | **Data “Change” Flag**  (if ‘data\_type’ above is “0,” this field has no meaning and should be ignored; if ‘data\_type’ above is “1,” a “0” in this field indicates “NC,” or “No Change” from previous reading, otherwise, a “1” in this field indicate a “change’ from the previous reading follows. |

Table 1: First 4 bytes (32-bits) for ALL Uplink Message "Data Segments."

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| **Bot Uplink Msg Data Segment**  **Bit Map (std)** | | **Element Name** | **Range/Format** | **Description/Notes** |
| **Bytes 4-11 (64-bit integer)** | **0-15**  (16 bits) | *heading* | [ 0 - 36,000 ]  ***centidegrees*** | **Heading**  (current reading; magnetic north) |
| **16-21**  (6 bits) | *pitch* | [ -31 - 31 ] | **Pitch**  (current pitch angle) |
| **22-27**  (6 bits) | *roll* | [ -31 - 31 ] | **Roll**  (current roll angle) |
| **28-35**  (8 bits) | *samples* | [ 0 - 1023 ] | **Samples** |
| **36-39**  (4 bits) | *channels* | [ 0 - 15 ] | **Channels** |
| **40-51**  (12 bits) | *rows* | [ 0 - 4095 ] | **Rows** |
| **52-63**  (12 bits) | *cols* | [ 0 - 4095 ] | **Columns** |
| **Bytes 12-14 (24 bits)** | **0-11**  (12 bits) | *status\_id* | [ 0 - 4095 ]  ***mod 2\*\*12*** | **Status Record ID**  (the ‘primary key’ or ‘rowid’ that uniquely identifies this Status Record in the ‘status’ Table of the Float’s embedded database; this built-in SQLite field can range from 0 - 264-1 on the Float; must anticipate rollover) |
| **12-13**  (2 bits) | *dt* | [ 0 | 1| 2 | 3 ] | **Data Type**  (0=uint8; 1=int32; 2=float32 ; 3=Reserved) |
| **14-24**  (11 bits) | *size* | [ 0 - 2047 ] | **Data Size**  (the total number of ‘standard’ or ‘change’ data product ***dt*** data types) |
|  | **0 ->n**  **(values repeat ‘size’ times)** | *data* | byte array | **Data**  (a data stream of “***size\*1***” bytes when ***dt=0*** OR “***size\*4***” bytes when ***dt=1|2***; the stream starts at byte 15) |

Table 2: Bit-packed Fields in ‘Data Segment when "std" Data Product Information is included in the Uplink Message.

TOTAL “FIXED” BYTES IN **std** DATA SEGMENT: 14 bytes (112 bits) - 0 bits unused.

TOTAL “DATA” BYTES IN **std** DATA SEGMENT: size\*1 bytes (when dt = 0)

size\*4 bytes (when dt = 1|2)

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| **Bot Uplink Msg Data Segment**  **Bit Map (chg)** | | **Element Name** | **Range/Format** | **Description/Notes** |
| **Bytes 4-7 (64-bit integer)** | **0-15**  (16 bits) | *heading* | [ 0 - 36,000 ]  ***centidegrees*** | **Heading**  (current reading; magnetic north) |
| **16-21**  (6 bits) | *pitch* | [ -31 - 31 ] | **Pitch**  (current pitch angle) |
| **22-27**  (6 bits) | *roll* | [ -31 - 31 ] | **Roll**  (current roll angle) |
| **28-31**  (4 bits) | *channels* | [ 0 - 15 ] | **Channels** |
| **32-35**  (4 bits) | *dt* | [ 0 | 1| 2 | 3 ] | **Data Type**  (0=uint8; 1=int32; 2=float32 ; 3=Reserved) |
| **36-46**  (11 bits) | *size* | byte array | **Data Size**  (the total number of ‘standard’ or ‘change’ data product ***dt*** data types) |
| **47-59**  (12 bits) | *status\_id* | [ 0 - 4095 ]  ***mod 2\*\*12*** | **Status Record ID**  (the ‘primary key’ or ‘rowid’ that uniquely identifies this Status Record in the ‘status’ Table of the Float’s embedded database; this built-in SQLite field can range from 0 - 264-1 on the Float; must anticipate rollover) |
| **60-63**  (4 bits) |  |  | **Reserved** |
| **Bytes 8-11** | **0-7**  (8 bits) | *sample\_id* | [ 0 - 1023 ] | **Sample ID** |
| **8-19**  (12 bits) | *row\_id* | [ 0 - 4095 ] | **Row ID** |
| **20-31**  (12 bits) | *col\_id* | [ 0 - 4095 ] | **Column ID** |
| **Bytes 12+** | **This block of data values repeats *size* times.** | *val\_1* | Based on ***dt*** | **Value 1**  (value of the 1st channel; either a uint8, int32, or float32, based on ***dt*** above) |
| *…* | Based on ***dt*** | **Value ?**  (value of an intermediate channel; either a uint8, int32, or float32, based on ***dt*** above) |
| *val\_n* | Based on ***dt*** | **Value N**  (value of the nth channel, where n is the total number of channels; either a uint8, int32, or float32, based on ***dt*** above) |

Table 3: Bit-packed Fields in ‘Data Segment when "change" Data Product Information is included in the Uplink Message.

TOTAL “FIXED” BYTES IN **chg** DATA SEGMENT: 11 bytes (112 bits) - 0 bits unused.

TOTAL “DATA” BYTES IN **chg** DATA SEGMENT: channels\*size\*1 bytes (when dt = 0)

channels\*size\*4 bytes (when dt = 1|2)