Title: **APEX Deep and APF-11 Binary Data Layout**

Revision: 0.2

Date: 11/18/2014

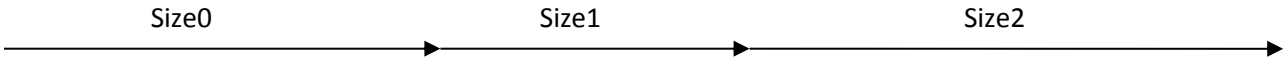
DRAFT

Revision History

Revision	Description	Author	Approval	Date
0.1	Initial Draft	Bovie	"Draft"	4/18/2014
0.2	Corrected inconsistent formatting	Bovie	"Draft"	11/18/14

Table of Contents

While the APEX DEEP and APF-11 store system log information in text format, they store there vital measurements and science measurements in binary formatted files named vitals_log.bin and science_log.bin, respectively. Each is composed of series of entries of different sizes per type packed end to end. The headers for each item begin with a byte-wide value indicating the total number of bytes of the entry:



Size0		Size1		Size3	

Each item is composed of a size, data type, timestamp and payload. The size of the payload depends on the data type:

totalBytes: uint08_t	dataType: uint08_t	timestamp: uint32_t	payload: uint08_t[totalBytes-6]

`totalBytes`: total number of bytes for entry, including header and payload.

`dataType`: identifier for the payload included in the entry.

- `LOG_VITALS_PERIODIC: 0`
- `LOG_VITALS_IRIDIUM_CSQ: 1`
- `LOG_SCIENCE_GPS: 2`
- `LOG_SCIENCE_PRESSURE: 3`
- `LOG_SCIENCE_CTD: 5`
- `LOG_SCIENCE_BINAVERAGE_16: 6`
- `LOG_SCIENCE_BINDATA: 7`
- `LOG_SCIENCE_MESSAGE: 8`
- `LOG_SCIENCE_BINAVERAGE: 15`

`timestamp`: 32-bit Unix timestamp.

`payload`: data type dependent value(s).

```
#pragma pack(1)
struct log_hdr
 {
      uint08_t totBytes;
      uint08_t dataType;
      uint32_t timestamp;
};
```

1.1 GPS Payload:

```
dataType: 2
struct gps_payload
{
      float latitude;
      float longitude;
};
```

1.2 Pressure Payload:

```
dataType: 3
struct pressure_payload
{
      float pressure;
}
```

1.3 CTD Payload:

```
dataType: 5
struct ctd_payload
{
      float pressure;
      float temperature;
      float salinity;
 };
```

1.4 BinAverage Payload:

```
dataType: 6 (obsolete)
struct ctdbins16_payload
{
      uint16_t nsamples;
      uint16_t nbins;
      float max_pressure;
};

dataType: 15 (current)
struct ctdbins_payload
{
      uint32_t nsamples;
      uint32_t nbins;
      float max_pressure;
};
```

1.5 BinData Payload:

```
dataType: 7

struct bindata_payload
{
      float pressure;
      float temperature;
      float salinity;
      uint16_t samples;
};
```

1.6 Message Payload:

```
dataType: 8
stuct msg_payload
{
      char msg[totBytes-6];
};
```

1.7 Vitals Payload:

```
dataType: 0
struct vitals_payload
{
      float air_bladder;
      float battery;
      float humidity;
      float leak_detector;
      float vacuum;
      float coul_counter;
};
```

1.8 Iridium CSQ Payload:

```
dataType: 1
struct  csq_payload
{
      uint08_t csq;
};
```