Space Uplink Protocol Specification

The Space Uplink Protocol is designed to allow earth-based controllers to monitor and manage remote satellites. Due to the low bandwidth and high latency environments, connections are slow and sometimes delayed.

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Each message to or from the remote device must consist of 4 bytes. All 4 bytes in the Space Uplink Protocol have unique bit signatures for easy detection. The format is as follows:

00xxxxxx 01xxxxxx 10xxxxxx 11xxxxxx

Packets which don't follow this format will trigger the abort signal with the error code of 0o00001.

Channels

The channel (7bits) indicates what type of data is being communicated. Depending on the size of the data being returned, more than one Uplink packet will be sent. Packets will be padded with zeros in the least significant bits if needed.

Channel (Octal)	Data Type	Description
0o000	TLE Data	The TLE for the satellite
0o001	Name	The name of the satellite
0o002	Mass	The mass of the satellite (kg)
0x003	Time	Current time
0o004-0o007	UNUSED	UNUSED
0o010	Velocity	Current Velocity
0o011	Altitude	Current Altitude
0o020	????	????
0o100	Heartbeat	Heartbeat message channel (Usually \x7FFF)
0o101	Abort	Sending any data to this channel will trigger an immediate abort.

Abort Signals

Abort signals are sent whenever the satellite detects any sort of anomaly. Abort signals can be sent for many different reasons, but they put the remote satellite in an unknown state. Abort messages are sent on the same channel that triggered the abort. Often the device is in read only mode. The abort bit is a single bit (a) that indicates the status.

00axxxxx 01xxxxxx 10xxxxxx 11xxxxxx

The abort bit is set to 0 at all other times. Normally a reconnection is required before the abort status will be cleared. An abort can be manually triggered by sending any data to the Abort Channel.

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NOT RECORDED
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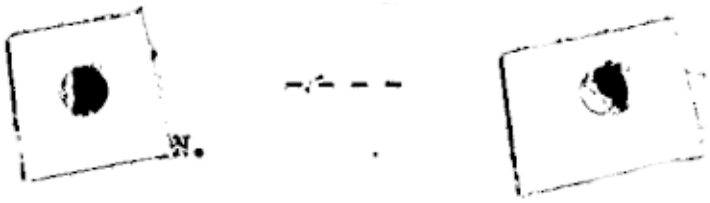
0x0001



Abort Code	Title	Description
0o00000	SYSTEM ABORTED	Operation will not complete, abort mode is set.
0o00001	INVALID SIGNATURE	The byte signature is incorrect.
0o00002	INVALID SIZE	The packet size is incorrect.
0o00003	READ ONLY VALUE	This value cannot be changed
0o00004	CLIENT TIMEOUT	The client did not send data for too long
0o00005	UNRESPONSIVE CLIENT	The client did not respond to information requests.
0o00006	UNKNOWN I/O CHANNEL	Querying Unknown I/O Channel

Memory

I/O channels directly map to the segment of memory that holds the value. You can get and set this memory by toggling the query bit when sending data to the remote device. The query bit (q) is a single bit that indicates whether the sender is requesting the memory or trying to set the memory on the given channel.

00xqxxxx 01xxxxxx 10xxxxxx 11xxxxxx

The Q bit is set to 1 for queries and set to 0 for write attempts.

Note: The system will abort if the write fails or if the memory is read only.

Data Types

Type	Size
TLE Data	TEXT (???)
Name	TEXT (???)
Mass	FLOAT [kg]
Time	INT (4 bytes)
Velocity	FLOAT [km/s]
Altitude	FLOAT [km]