**Notes:**

* OSPRE external message protocol will have to change to match the spacecraft
  + OSPRE will have one Builder / Parser for internal messages and a different one for external messages
* Each internal message will have a common header so Parser can figure out what message type it needs to create

Example Message:

Header:

char Message Identifier

int length

Body:

int timestamp

char data[]

**Message Protocol Definition:**

**External Protocol:**

**S/C Comms to S/C:**

OSPRE Status:

* Health of All Processes
* State of All Processes
* State (Sleep / Awake)
* Time Stamp

Data Request:

* Time Stamp of Request
* Time for Data Requested
* Request ID

Pointing Request:

* Time Stamp
* Object to Point At (Earth / Moon)

Solution Message:

* Position
* Velocity
* Position Error
* Velocity Error
* S/C Earth Moon Angle
* Solution Validation
* Time Stamp

**S/C to S/C Comms:**

Spacecraft Data Message:

* Quaternion
* Sun Angle
* Ephemeris
* Timestamp for Data
* Request ID
* Time Stamp of Message

Spacecraft Status:

* Time Stamp
* Turn On or Off
* Pointing Status (Earth/ Moon / Sun / Nothing)
* Angular Rate

ASSUMPTION:

S/C will send a Data Message for every Data Request message sent by OSPRE with corresponding Request ID.

S/C will send Spacecraft Status messages at a predefined interval (i.e.. 0.5 seconds)

**Internal Protocol:**

**All Modules to Watch Dog:**

Process Health and Status Response:

* Time Stamp
* Process Health
* Process State

**Watch Dog to all Modules:**

Process Health and Status Request:

* Time Stamp

**Watch Dog to S/C Comms:**

OSPRE Status

SEE ABOVE

**S/C Comms to GNC:**

Spacecraft Data Message:

SEE ABOVE

**GNC to S/C Comms:**

Solution Message:

SEE ABOVE

Pointing Request:

SEE ABOVE

**S/C Comms to Camera Control Module:**

Spacecraft Status Message:

SEE ABOVE

**Camera Control To S/C Comms:**

Data Request Message:

SEE ABOVE

**Camera Controller to Image Processing:**

Image Message: Picture

* Time Stamp
* Request ID
* Object in Picture

**Image Processing to Camera Controller:**

Image Adjustment Message

* Time Stamp
* Image Setting Adjustments

**Image Processing to GNC:**

Processed Image Message:

* Angular Diameter
* Alpha and Beta Angles
* Pixel Error
* Request ID
* Time Stamp

**GNC to Camera Controller:**

Capture Image Request:

* Time Stamp