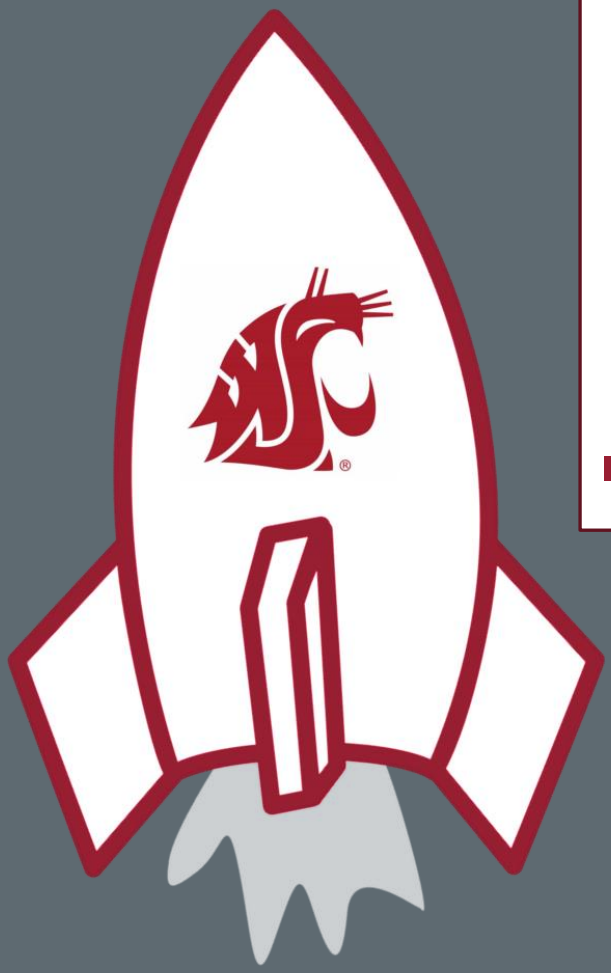
This document explains how the IFJR and the IHU are communication down to the byte by byte level.

IFJR Interface

Detailed Description of the IFJR and IHU Interface

Revision: 1.0.2



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1 Hardware Layer

The hardware interface between the IFJR and the IHU is I^2C. It is a standard implementation of I^2C with a clock wire and a data wire. See Wikipedia's I^2C article for details on how it works.

2 Software Layer

The In-Flight JTAG Reprogramming system, located at 8b address 0x1F, is a slave board to the IHU. The IFJR oversees the updating of select boards.

2.1 Temperature Data Request

2.1.1 Request

Byte Offset	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
0x00	0x00: Request IFJR Temperature 0x01: Request IFJR Storage Temperature							

2.1.2 Response

The IFJR responds with an 8b signed integer with 1°C/LSB.

Byte Offset	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
0x00	Respective Temperature							

2.2 Storage Capacity Data Request

This command is used to determine the total capacity used for the IFJR SD card.

2.2.1 Request

Byte Offset	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
0x00	0x02: Request Storage Used							

2.2.2 Response

The IFJR responds with a 64b unsigned integer representing the total bytes used. The integer received is total capacity in bytes.

Byte Offset	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
0x00	Bytes Used							

2.3 Reprogram Select Processor

This command assumes the processor binary has already been sent and exists in the IFJR's SD card.

2.3.1 Command

This command requires ground control to specify a target processor, done by using an 8b unsigned integer. It also requires a binary version number to be specified.

Byte Offset	0x00	0x01	0x02	0x03	0x04
0x00	0x03: Reprogram Command	0x00: ADCS 0x01: IFJR 0x02: IHU 0x03: PMIC 0x04: Comms 0x05: Payload 1 0x06: Payload 2 0x07: Payload 3	Major	Minor	Patch

2.3.2 Response

The IFJR responds with a CISError code, an 8b unsigned integer, which is defined in the CubeSat1-Resources/Standard Operating Procedures/Code in section 6.4.

Byte Offset	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
0x00	Return Code							

3 Example Communication

3.1 Simple Data Request

IHU: [0x1F] 0x00 [IFJR write] IFJR Processor Temperature Request
IFJR collects the processor's temperature
IHU: [0x20] [IFJR read]
IFJR: 0xBFEC 120°C

3.2 Simple Repeater Data Request

IHU: [0x1F] 0x01 [IFJR write] IFJR SD Card Temperature Request

IFJR collects SD Card temperature
IHU: [0x1F] 0x00 [IFJR write] IFJR Processor Temperature Request
IFJR collects the processor's temperature
IHU: [0x20] [IFJR read]
IFJR: 0xBFEC 120°C