

Payload Operations Control Center Overview

POCC Operations Concept

- **IMPACT POCC will be at UCB for operations**
 - Possibility of operating from APL for Commissioning & Emergencies
- **IMPACT commands will normally originate or route through the POCC**
 - PLASTIC commands originate from the PLASTIC POCC
 - For I&T we are investigating the possibility of commanding from other institutions. This may be desirable for commissioning and emergencies
 - Little or no routine commanding expected. Only occasional parameter adjustment.
- **POCC will be responsible for IMPACT state of health monitoring**
 - Automated limit checking
 - Trending
 - Based on real-time and playback data
- **After commissioning, POCC will be manned only during business hours as needed.**
 - Log files will be reviewed at least once each business day
- **Clean Level zero files will be downloaded automatically and distributed by the Data Analysis computers (not the POCC)**

POCC Facilities

- **POCC consists of a PC class computer (running Windows 2000)**
 - A second PC will be used for real-time science displays, but is not a key part of the POCC.
- **POCC connects to the MOC via open internet using SSH**
 - As indicated in MOC-POC ICD
- **Space has been reserved in the controlled access UCB Operations facility for the POCC**

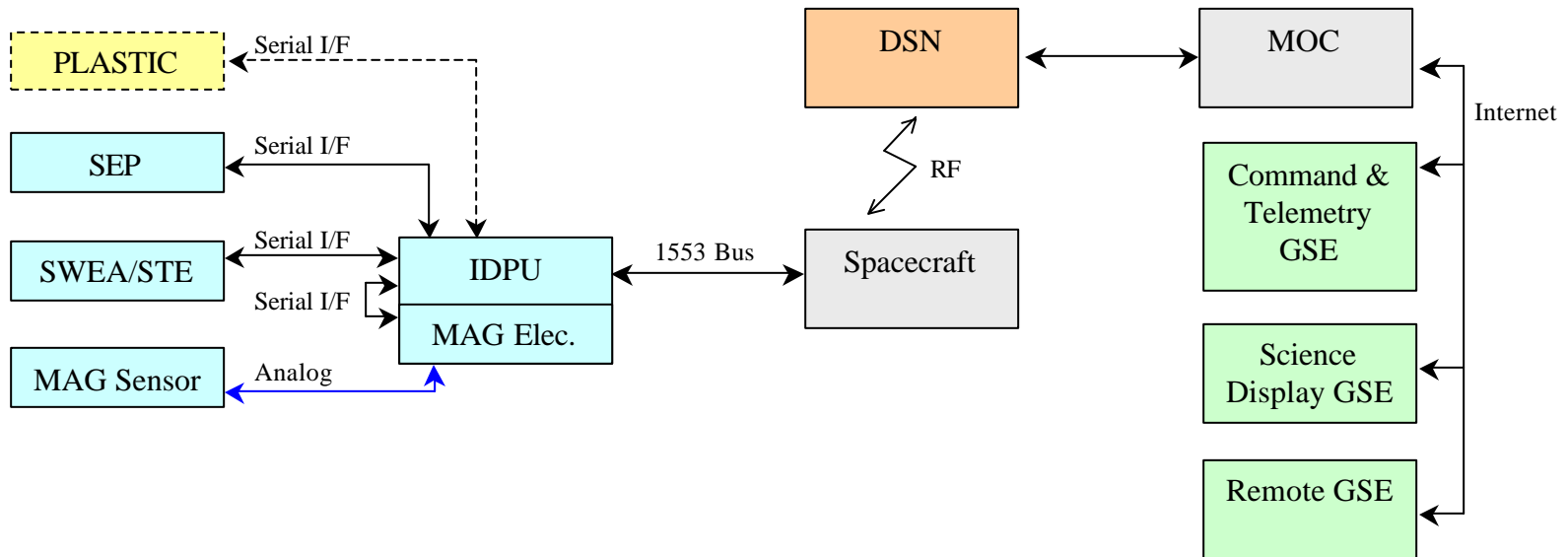
POCC Requirements & Interface Definitions

- **POCC requirements covered by:**
 - MOC/POC ICD
 - STEREO IMPACT GSE Requirements document
- **POCC interface to science GSE and GSE at other institutions uses the same MOC/POC interface**
 - Normally hosted by the POCC, but possibly by the MOC under special circumstances
- **POCC design is based on the HESSI GSE**
 - Labwindows CVI User Interface
 - Database-driven command encoding and telemetry decoding / limit checking
 - STOL-like command scripting
- **POCC will not encode SEP commands**
 - These will normally be provided pre-formatted into MOC/POC interface files (or forwarded real-time over a socket interface)

POCC Design Overview

- **The POCC consists of the Command and Telemetry GSE at Berkeley**
 - Same system used starting with bench testing (now) via the Spacecraft Emulator
 - Used during spacecraft I&T connected to the MOC
 - Becomes the POCC, connected to the MOC remotely
 - Interface based on the APL MOC/POC ICD
- **The POCC sends IMPACT commands**
 - Script-based commanding
 - Formats IDPU & boom suite commands using command database
 - Can also forward commands from Co-I institutions (SEP)
 - Real-time or files
 - Same format as MOC/POC interface
- **The POCC displays and monitors (limit checks) state of health housekeeping data**
- **The POCC forwards science data packets to science display GSEs or data analysis software**
- **PLASTIC has their own POCC, developed at UNH**
 - Can only send PLASTIC commands unless a special enable is sent from IMPACT POCC to allow PLASTIC to send system commands (like memory load)

IMPACT Mission Operations GSE Configuration



STEREO IMPACT COMMAND AND TELEMETRY GSE

PC SOFTWARE WRITTEN WITH NATIONAL INSTRUMENTS CVI .

ANSI C Compiler with GUI and TCP/IP Libraries.
Windows NT4 or 2000.

BASED ON HESSI SPACECRAFT SIMULATOR

STOL-like commanding and scripts.
Archive files for commands and scripts.

USES TCP/IP

Command and verification socket.
Telemetry and directive socket.
Command and Telemetry relay sockets.

EXCEL DATABASE FILES

Command database; space delimited.
Telemetry conversions and limits database; tab delimited.

DISPLAYS

Command buffer.
Telemetry hex.
SCM dialog.
Housekeeping, alarms, conversions, plots.
Housekeeping graph.

ARCHIVE FILES

Commands, directives, alarms.
Verified Commands.
Hex telemetry.

STEREO IMPACT COMMAND AND TELEMETRY GSE

The STEREO IMPACT COMMAND AND TELEMETRY GSE is software written with National Instruments LabWindows CVI which is an ANSI C compiler with GUI and TCP/IP Libraries. It runs on a PC under Windows NT 4.0 or Windows 2000.

The software is largely based on the HESSI Spacecraft Simulator software, inheriting a STOL-like command line and command scripting interface, and housekeeping displays with limit checking and alarms.

Unlike the HESSI GSE, the STEREO C&T GSE uses TCP/IP sockets to connect to the APL Spacecraft Emulator and/or the MOC. Two sockets are used; one for sending commands and receiving Authorization Return Receipts, another for receiving telemetry and sending real-time and playback directive messages. Commands and Directives can be sent either from a command line or from script files. The use of TCP/IP sockets allows remote commanding and display using ssh2 (Secure Shell). The GSE also provides two more TCP/IP sockets for connection to Science Display GSE. Telemetry can be selectively sent to the other GSE, and commands can be received and relayed to the Spacecraft Emulator or MOC.

When the GSE is started, it loads into memory a database of commands and a database of housekeeping parameters including conversion factors and limit values. The command database is an Excel file saved as a space delimited text file, and the telemetry database is an Excel file saved as a tab delimited text file. The SCM (Supplemented Command Message) header information is entered in a dialog box or from the command line. When a command is sent, whether from the command line or from a script, the name of the command is input with any parameters that aren't in the database; these are appended after any parameters retrieved from the database.

The contents of the command database are displayed in a window and double clicking can choose commands and put them into the command line. When a script file is running, the script line buffer is displayed. Sent commands which have been verified by an ARR (Authorization Return Receipt) are stored in a FIFO which can be displayed. Incoming Telemetry is displayed in a window as raw hexadecimal values. Housekeeping data can be displayed converted into units with limit alarms. Up to nine housekeeping data at a time can be plotted on a graph.

Archive files of commands, directives and alarms, verified commands, and raw telemetry received are saved to disk.