https://ntrs.nasa.gov/search.jsp?R=20170008150 2019-08-29T23:23:51+00:00Z

Remote Advanced Payload Test Rig (RAPTR)
Portable Payload Test System for the International Space Station (ISS)

BOEING

Background

The RAPTR was developed to test ISS payloads for NASA. RAPTR is a simulation of the Command and Data Handling (C&DH) interfaces of the ISS (MIL-STD 1553B, Ethernet and TAXI) and is designed to facilitate rapid testing and deployment of payload experiments to the ISS.

The ISS Program's goal is to reduce the amount of time it takes a payload developer to build, test and fly a payload, including payload software. The RAPTR meets this need with its user oriented, visually rich interface. Additionally, the Analog and Discrete (A&D) signals of the following payload types may be tested with RAPTR:

1) EXPRESS Sub Rack Payloads;
2) ELC payloads;
3) External Columbus payloads;
4) External Japanese Experiment Module (JEM) payloads.

The automated payload configuration setup and payload data inspection infrastructure is found nowhere else in ISS payload test systems. Testing can be done with minimal human intervention and setup, as the RAPTR automatically monitors parameters in the data headers that are sent to, and come from the experiment under test.

Payload Types Tested

High Fidelity Simulations

The RAPTR leverages upon existing flight software systems within ISS and encapsulates these software systems as simulations that provide a high fidelity environment to test payloads. Payload developers are provided the following for payload development and testing:

- Integration with ISS flight software
- ISS A&D interface emulation
- Integration with KU IP and DTN
- LRT / MRT / HRT data capture and analysis

Visual Methodology

The RAPTR automatically provides trend plots on the Visual Status GUI of the packet flow rates to and from the RAPTR ISS simulations and the Payload experiment systems attached to it.

Help Desk connectivity setup support

Active data flows are shown as green color, no data as red color

Real-time A&D signal measurement plots

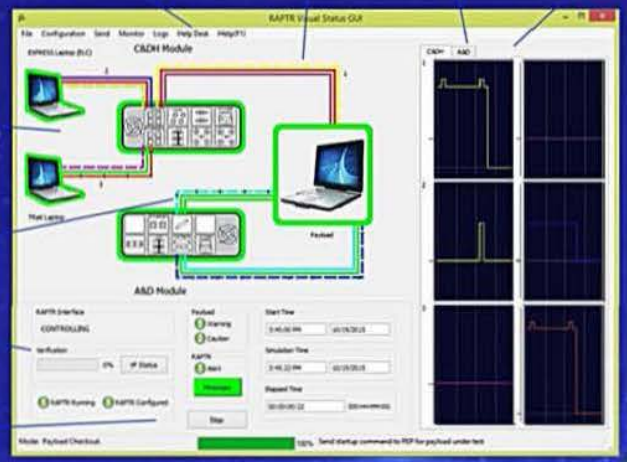
Dynamic Real-Time Trend plots

Payload, RAPTR and other elements show connectivity status

Positive data flow with directional arrows

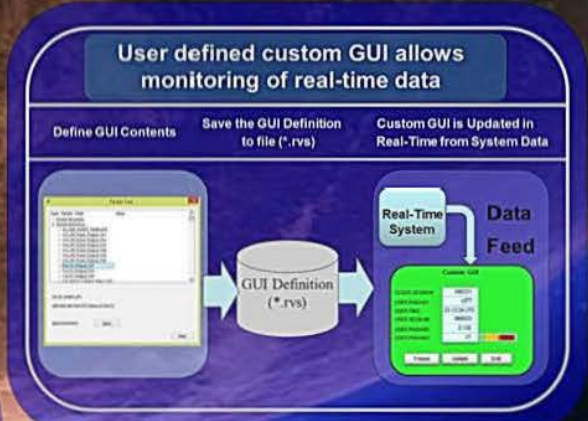
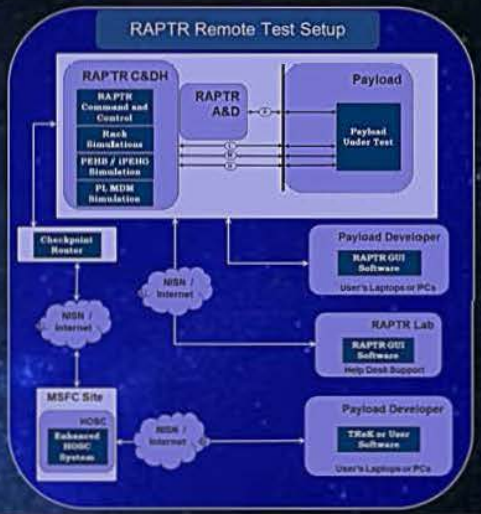
Verification functions status

Control buttons and status area



Monitoring Test Results

The RAPTR includes features that allow customization of the display of the results of payload testing. An example of this is called Custom GUI, that is defined from user packet definitions of the Telemetry data.



End to End HOSC Testing