



SAMS Briefing for POIC

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Hardware Overview

- **ICU Drawer in Express Rack 4, Drawer 2**
 - Powered on continuously as resources and priorities permit
 - Uses AAA
 - Nominal power: 40 W
- **Two RTS Drawers in Express Rack 1**
 - RTS Drawers should not be in ARIS Racks
 - Use AAA
 - Nominal power: 18 W each
- **ARIS Express Racks**
 - Electronics Enclosure (EE) embedded in each ARIS rack
 - Lower Connector Panel has connectors for the Sensor Enclosures (SE)
 - SAMS-J1 and SAMS-J2
- **MSG**
 - EE and SE installed and powered as needed to support Investigators

Sensor Enclosure

- Sensor enclosure (SE)
 - Each SE contains 3 allied signal QA3000 accelerometers
 - Frequency of each SE can be configured real-time
 - Receives power from EE via cable
 - Either direct connection or through EXPRESS Rack control panel
 - Physical characteristics
 - Dimensions: 4.13" x 5.87" x 3.41"
 - Weight: 2.46 lbs.

Note: RTS system is an EE and 1 or 2 SEs

Electronics Enclosure

- Electronics enclosure (EE)
 - Collects acceleration data from SEs
 - Capacity is 2 SEs per 1 EE
 - Each SE is connected by a cable to an EE
 - Performs low level processing
 - Temperature correction and axial misalignment
 - Communicates with ICU via RIC ethernet
 - EE downloads its operating system from the ICU ('remote booting')
 - No other connection needed between EE and ICU
 - Physical characteristics
 - Dimensions: 9.06" x 9.33" x 4.70"
 - Weight: 11 lbs.
 - Power: 12 W

Note: RTS system is an EE and 1 or 2 SEs

Interim Control Unit

- Interim control unit (ICU)
 - Dedicated SAMS II ThinkPad 760XD computer
 - Controls telemetry and data management
 - Requires connection to ethernet
 - Configured with 2 hard drives
 - One loaded with NETBSD 1.33, a UNIX based operating system
 - One used for temporary data storage
 - Spare hard drives will be flown
 - Member of the ISS PCS Spare Pool
 - SAMS has contributed to the spares pool
 - On-orbit replacements covered under system training

ICU Laptop

- Battery
 - Allows for graceful shutdown of the unix-based OS
 - ICU Laptop detects loss of rack power
 - After 20 minutes, ICU Laptop shuts itself off
 - Main drawer power switch remains in 'on' position
 - Level of charge is monitored and downlinked in APID 898
 - ICU Laptop will shut itself off if charge falls below predefined value

On-orbit Replacement Units

- Dedicated spares
 - ICU Drawer/ICU Laptop:
 - Power conversion box (PCB)
 - Fan assembly (1)
 - Temperature sensors (2)
 - System hard drive and Data hard drive for ICU Laptop
 - ISS PCS Spares
 - Laptop, ethernet card, battery, hard drives
 - RTS Drawers:
 - Fan assembly (1)
- Interchangeable hardware
 - If necessary, EEs and SEs in the drawers can be used until replacements are manifested
 - An ISS PCS and ICU are interoperable contingent on the correct operating system being in place

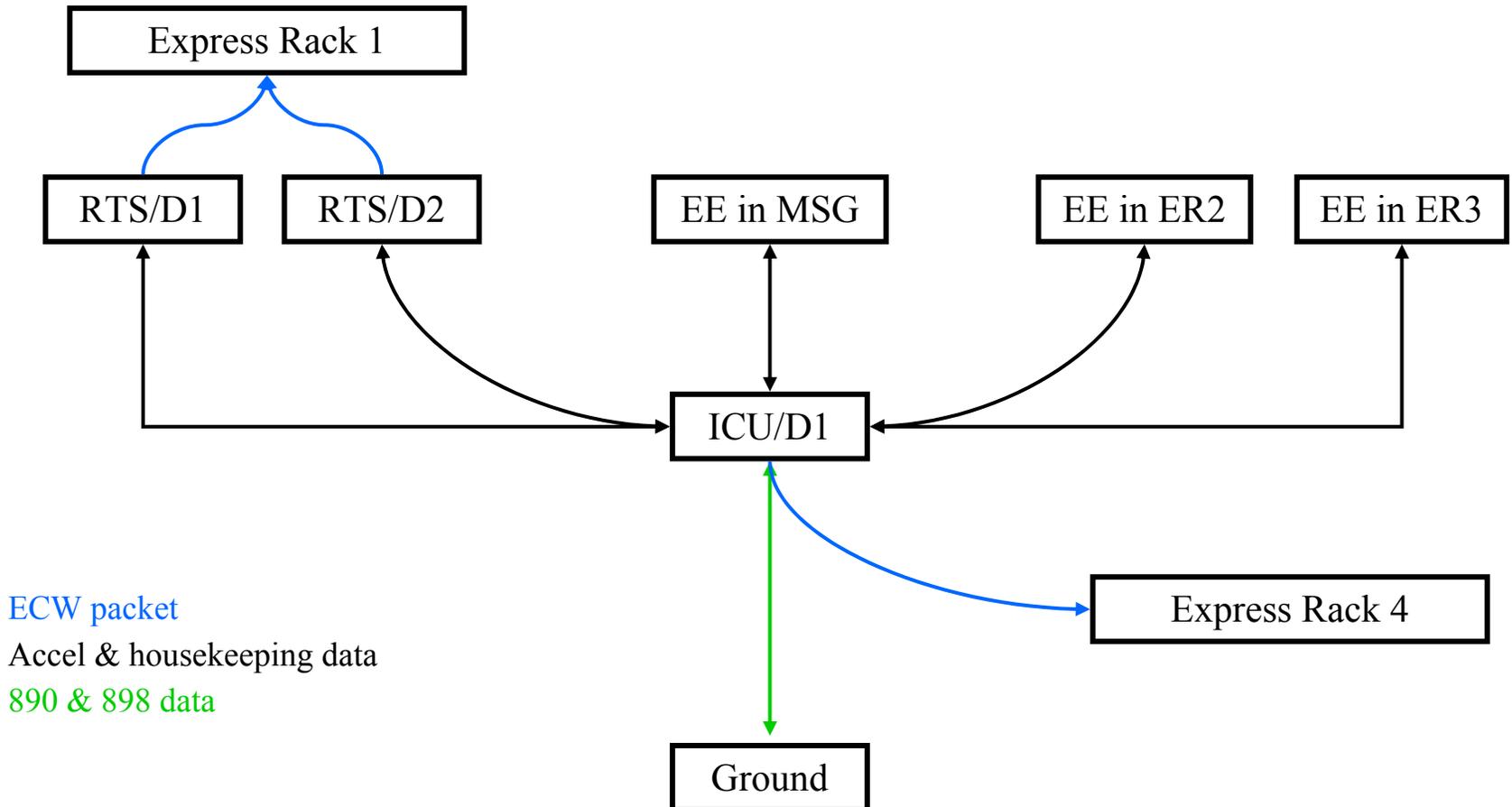
Communications

- Rack to Rack Communication
 - Two way traffic between ICU Laptop and EE
 - Heaviest during boot-up of an EE
 - Nominal ops
 - Continuous data flow to the ICU from the EEs
 - Occasional traffic to an EE from the ICU
 - CAM tables must be configured with the MAC addresses of the ICU and every EE (PRO)
 - Usually on LAN 2
- ICU is communication hub
 - **ALL** data and commands are routed through ICU
 - ICU talks to the ground and each EE

Data

- SAMS data packets
 - ECW – sent to host rack, incorporated into APID 876
 - Acceleration – APID 890
 - Housekeeping – APID 898
- Each EE
 - Sends ECW packet at 1 Hz
 - Currently, only RTS/Drawers are monitored (Express Rack 1)
 - Sends acceleration and housekeeping data to the ICU for downlink
- ICU
 - Sends ECW packet at 1 Hz to its host (Express Rack 4)
 - Combines and downlinks all data from the SAMS system (890, 898)

Data Overview



Payload Regulations

- **Commands Delegated to POIC (SSP 58313 12.1-5)**
 - SAMS_SHUTDOWN_ICU
 - ICU Laptop gracefully powered off; Drawer Power cb turned off
 - SAMS_REBOOT_ICU
 - Reboots ICU Laptop
 - SAMS_START_SE
 - Starts data collection from an individual sensor
 - SAMS_STOP_SE
 - Stops data collection from an individual sensor
- **Sensor Clearance (SSP 58313 12.1-6)**
 - Sensor Enclosures (SE) should have a 1-inch clearance from hard-mounted items. Flexible items, such as straps, should be secured such that they maintain a 1-inch clearance in their full range of motion.

Payload Regulations

- Spontaneous Loss of Comm (SSP 58313 12.1-7)
 - Signature is no ICU H&S data (876), no 890, no 898; comm is lost
 - Action:
 - Turn off all active EEs
 - Have crew reboot laptop and verify H&S returns
 - Wait 10 minutes after ICU H&S returns before starting EEs
 - Wait until H&S from EE verified before starting the next EE
- Parameter Monitoring Delegation (SSP 58313 12.3-4)
 - SAMS does not staff console 24/7
 - POIC monitors the SAMS H&S and web page for off-nominal conditions

Payload Anomaly Reports

- As of 2/2/04
 - Closed/Withdrawn: 27
 - Open: 3
 - See PAR Log for details
- PAR ER4-SW-015 affects SAMS
 - Appears that not all of the packets are being bridged out of the ERs
 - Causes delay in the remote booting of the EEs
 - Nominal boot-up is less than 5 minutes
 - ‘Slow’ boot-up is on the order of hours (anywhere from 10 to 60 hrs)

SAMS Operational Contacts

- Pager 24/7
 - 216-549-1069
 - Pager is rotated among SAMS Ops Team
- Email
 - sams-operations@grc.nasa.gov
 - Automatically distributed to everyone on SAMS Ops Team
- Web pages
 - <http://pims.grc.nasa.gov> (to view acceleration data)
 - <http://sams.grc.nasa.gov>