Housekeeping And Low Rate Physics Data

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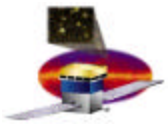
Housekeeping Function

- The Process Of Monitoring The Health Of The LAT
- Performed Independently Of Physics Data Acquisition
  - Housekeeping data solicited by and returned to the SIU
  - Housekeeping data path not shared with event data path
  - Housekeeping stored (on SSR) separately from event data
- Active From The Moment The SIU Is Powered And Booted
- When LAT Completely Powered, Monitors:
  - Using the DAQ provided command and data return path
    - Power Distribution Box
    - Each TEM (sixteen packets)
    - The operational AEM
    - The operational GLT
  - Using CPU to CPU communications
    - Internal (software) EPU metrics
  - SIU internal metrics



Housekeeping Content

- **Varies By Target, But Typically:**
  - **Electronics Modules (TEMs, AEM, GLT, Power Distribution)**
    - **Currents**
    - **Voltages**
    - **Temperatures**
  - **Processor Modules**
    - **Memory usage**
    - **Processor idle time**
    - **Status of I/O channels**
    - **Other resource information**

Housekeeping Analysis

- SIU Collects Housekeeping Data At 1 Hz (TBD)
- SIU Does First Pass Analysis Of Housekeeping Data
- For Simple Variables (Voltages, Currents, …)
  - Build histograms and trend graphs
  - Compare values against limits
    - If outside warning limits for several housekeeping cycles or …
    - If outside error limits …
    - … initiate real time contact with the ground
    - … (possibly) implement autonomous remedial action
- Processor Modules
  - Similar principles though the algorithms may be more involved
    - For instance memory usage would have to be conditioned against the current processor activity

Disposal Of Housekeeping Data

- **Driven By Volume Of Housekeeping Data**
  - **Currently envisioned volume is small**
    - **<5% of available downlink bandwidth**
  - **Current model is to**
    - **Store all housekeeping data to SSR**
      - **Possibly using loss-less compression techniques**
    - **Transmit complete housekeeping data to ground**

Low Rate Physics (LRP) Data

- Discrete Set Of Scalers In The Electronics Modules
- Each Scaler Can Be Multiplexed Against A Variety Of Sources
- LRP Readout Scheme Similar To Housekeeping
  - LRP data solicited by and returned to the SIU
  - LRP data paths are not shared with event data path
  - LRP data is stored (on SSR) separately from event data
  - LRP and housekeeping *do* share the same data path
- But LRP Data Is Not Housekeeping Data
  - LRP scalers start and stop in synchronized fashion across the whole LAT
  - LRP scalers are read at a different frequency (TBD but in the range 0.1 – 100 Hz)

LRP Analysis

- **Primary LRP Analysis Resembles Housekeeping Analysis**
  - **Multiplex scalers around a list of test points**
  - **Check rates against limits**
    - **If outside warning limits for several cycles or …**
    - **If outside error limits …**
    - **… initiate real time contact with the ground**
    - **… (possibly) implement autonomous remedial action**
- **LRP Data Can Also Be Used Diagnostically**
  - **Set up specific tests of rate correlations**

Disposal Of LRP Data

- **Driven By Volume Of LRP Data**
  - **Currently envisioned volume is small**
    - **… but beware volume multipliers like running at 100 Hz**
  - **Current model is to**
    - **Store all LRP data to SSR**
      - **Possibly using loss-less compression techniques**
    - **Transmit complete LRP data to ground**