GLAST Large Area Telescope

Instrument Flight Software Development Team

Functional Demonstration June 2004 (actual date, 12 July 2004)

Stanford Linear Accelerator Center

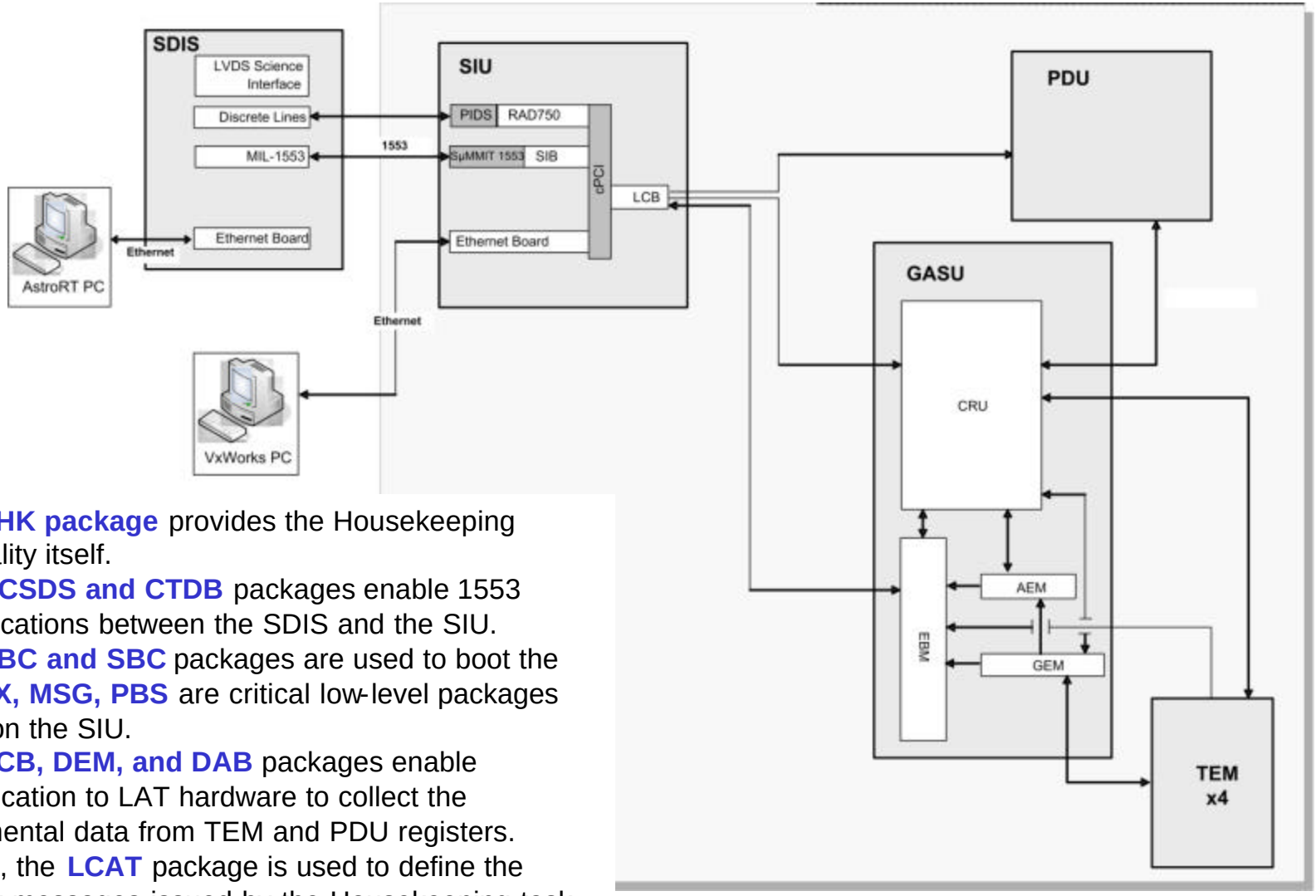
Demonstration Agenda

Demo Agenda Item	Presenter
1. Overview of the Demonstration	Sergio Maldonado
2. Housekeeping Telemetry Demo	Sergio Maldonado
3. Questions from Attendees	NA

Demonstration Overview

- Today's demonstration covers the LAT Housekeeping system:
  - The housekeeping software accumulates, examines, and reports LAT health and status information to the Spacecraft.
  - The Housekeeping task collects voltages, currents, and temperatures of LAT hardware components, as well as low rate science counters, processor metrics, and communications statistics.
  - All major pieces of the Housekeeping system will be demonstrated from startup to shutdown.
- As shown on the next slide, a very significant collection of hardware and flight software is in place to support the demo:
  - The Spacecraft is represented in these demonstrations by the Spacecraft Data Interface Simulator (SDIS), a high-fidelity Spacecraft simulator provided by Spectrum Astro, Inc.
  - The LAT is represented by the Testbed, which currently provides a large collection of flight-like data acquisition hardware including a flight-like SIU (cPCI), a complete GASU, a PDU, and multiple TEMs.
  - A correspondingly large collection of FSW is in place to drive this hardware set.

Demonstration Overview: Hardware and FSW Context



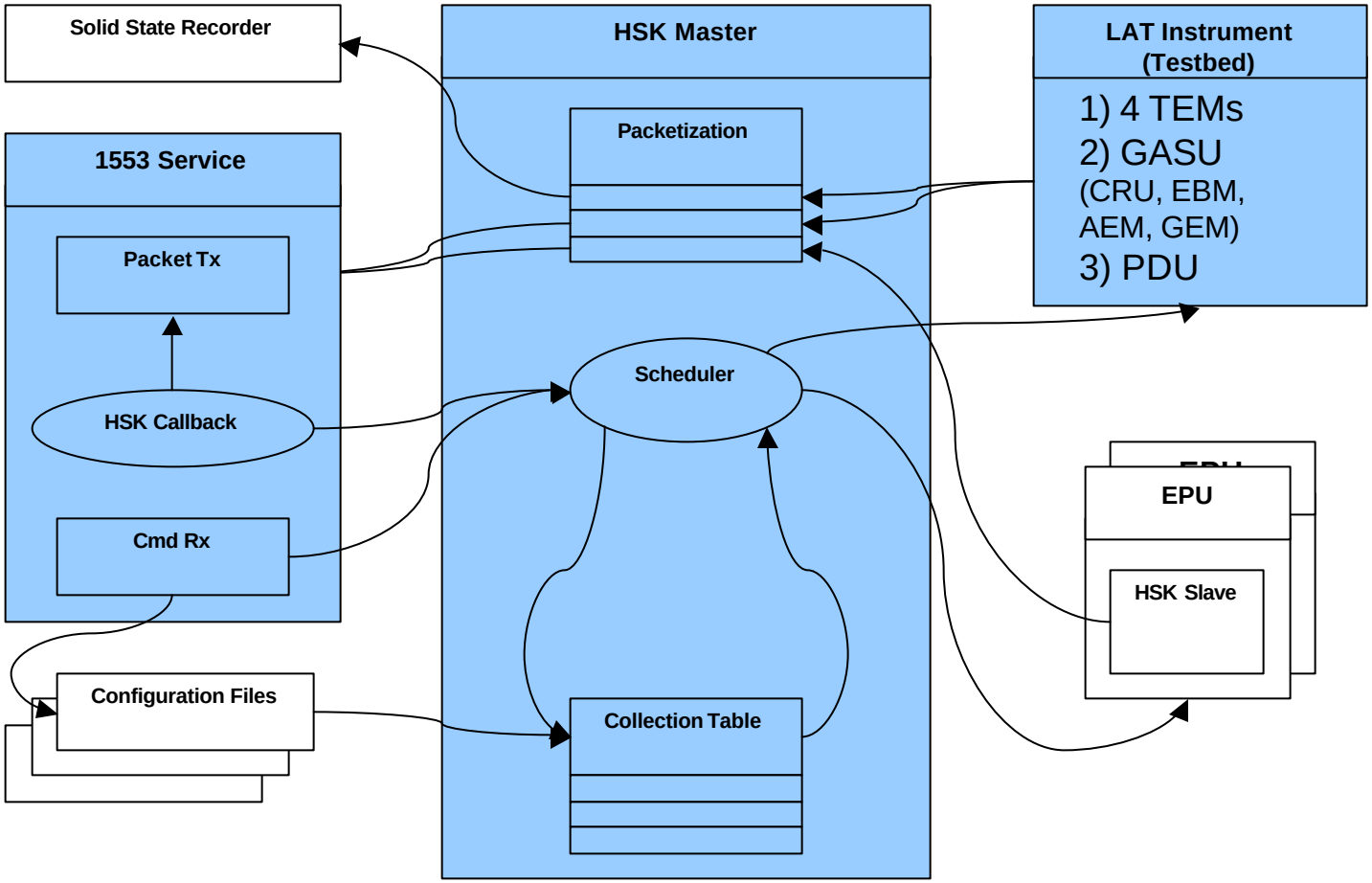
1) The **LHK package** provides the Housekeeping functionality itself.
2) The **CCSDS and CTDB** packages enable 1553 communications between the SDIS and the SIU.
3) The **PBC and SBC** packages are used to boot the SIU. **CMX, MSG, PBS** are critical low-level packages running on the SIU.
4) The **LCB, DEM, and DAB** packages enable communication to LAT hardware to collect the environmental data from TEM and PDU registers.
5) Offline, the **LCAT** package is used to define the telemetry messages issued by the Housekeeping task.

Housekeeping Telemetry Demo

- **The housekeeping software accumulates, examines, and reports LAT health and status information to the Spacecraft.**
  - **Voltages, currents, and temperatures of LAT hardware components, as well as low rate science counters, processor metrics, and communications statistics.**
  - **The demo is about the Housekeeping infrastructure rather than the quantity or range of housekeeping data collected.**
- **Concept and organization of the demo:**
  - **The procedure is straightforward:**
    - **The Testbed will be powered up. The SIU will undergo a primary boot, then an AstroRT command will be sent from the SDIS to kick the SIU into secondary boot.**
    - **From the VxWorks terminal, Sergio will execute scripts to load all necessary FSW to the SIU, including the LHK package constituents that form the core the Housekeeping system.**
    - **From VxWorks, Sergio will initialize, then start, the Housekeeping system on the SIU.**
    - **Based on default configuration data stored in the LHK image, the Housekeeping task will collect data on currents, voltages, and temperatures from registers on 4 TEMs and the PDU.**
    - **This housekeeping data will be displayed in different ways in separate AstroRT application windows on the PC controlling the SDIS.**

The Housekeeping System

- **The full Housekeeping system is represented below. The portions exercised today are shown in blue.**



Summary

- **Today's demonstration puts the following FSW components into action:**
  - **The LHK package. LHK provides the infrastructure to schedule collection of housekeeping data, packetize that data, and successfully hand it to the 1553 service.**
  - **All the associated infrastructure that directly supports LHK operation.**
    - **The CTDB and CCSDS packages provide 1553 communications.**
    - **LCB, DAB, and DEM provide communication with LAT hardware**
    - **PBC and SBC provide a boot process for the SIU. PBC also issues boot housekeeping telemetry.**
  - **All the low-level infrastructure that supports functioning of the SIU on the Testbed: PBS, MSG, VXW, and CMX**
  - **The LCAT package. Although not shown today, LCAT was used offline in preparation for the demo to define all telemetry messages that will be displayed**
- **Progress on FSW Requirements:**
  - **The SRS lists 7 Housekeeping-specific requirements. Today's demo shows full progress on 2 of 7, and partial progress on 1 of 7.**