

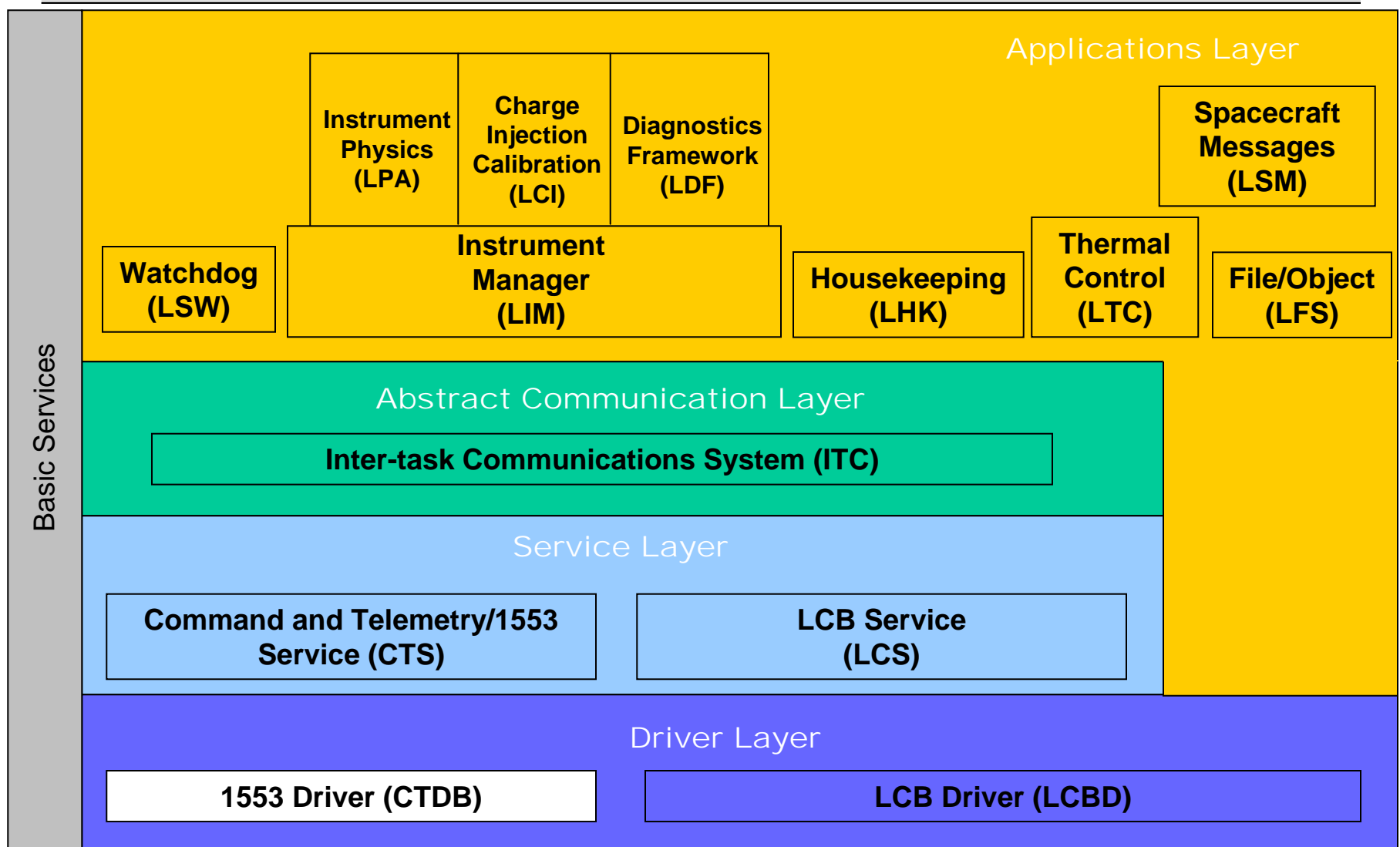
GLAST Large Area Telescope

Instrument Flight Software
Flight Unit Peer Review
16 September 2004

1553 Communications Driver

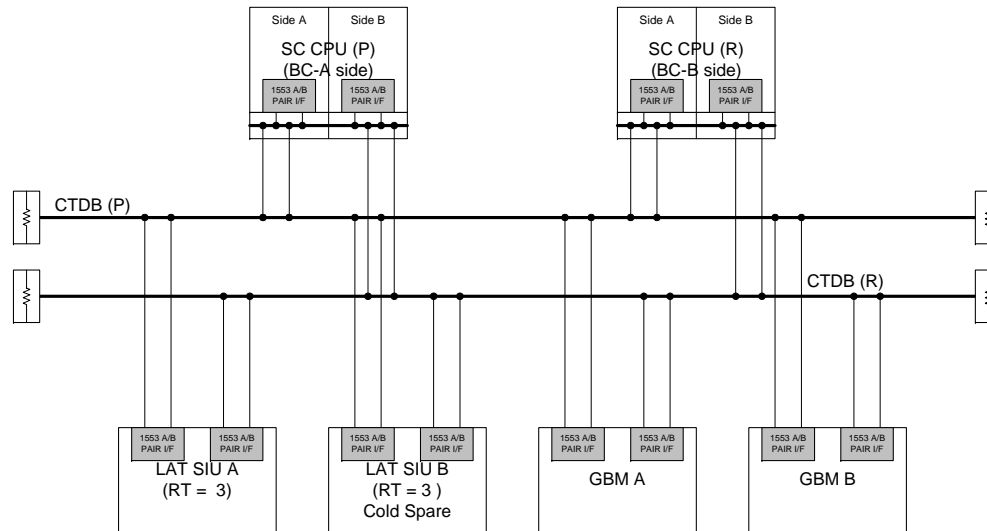


FSW Layer Architecture





LAT 1553 Interface



- **MIL_STD_1553B (1553) bus is primary interface for exchanging information between LAT, SC, and GBM**
 - **Telecommands from SC and GBM**
 - **Telecommands to SC and GBM**
 - **Telemetry to SC (housekeeping, diagnostic, alert)**
- **SC will act as bus controller (BC) node**
- **Each SIU can act as remote terminal (RT) node**
- **Bus protocol and schedule under control of SC**
 - **GLAST 1553 Bus Protocol Interface Control Document**
- **All traffic will consist of CCSDS packets (CP_PDU).**



1553 RT Driver Requirements (1)

- **Requirements derived from GLAST 1553 ICD**
 - **Support data wraparound**
 - **Support Notice II mode codes**
 - **Receive up to 20 CCSDS telecommands / second and deliver to consumer applications**
 - **Collect and send up to 5 CCSDS telecommands / second from producer applications (application driver only)**
 - **Collect and send CCSDS telemetry packets from producer applications**
 - **Insert telemetry packets into telemetry message blocks (4 / second)**
 - **Allow for one real-time housekeeping telemetry packet for each telemetry block**



1553 RT Driver Requirements (2)

- **Internal requirements from LAT FSW**
 - **De-couple bus schedule activity from application processing**
 - **One exception is real-time housekeeping packet, which should be delivered synchronous to the bus schedule**
 - **Guarantee that the HKP packet is always delivered at head of telemetry blocks**
 - **Log 1553 bus errors as detected by the Summit controller**
 - **Keep communications diagnostics counters (application only)**
 - **Perform timeout on telemetry and telecommand send polling by BC (application only)**
 - **Provide priority levels for outgoing telemetry packets (application only)**

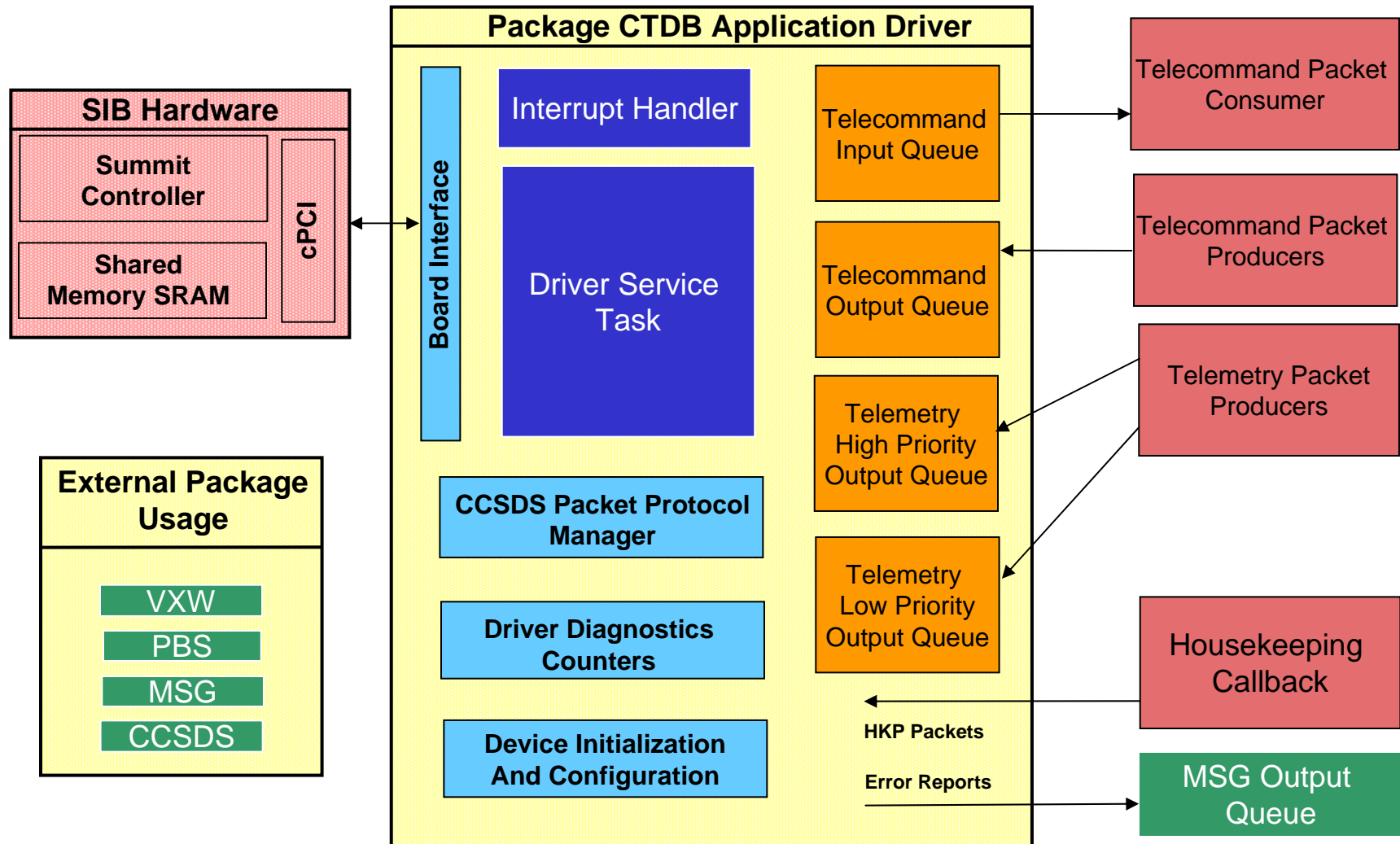


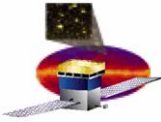
1553 Software Organization

- 1553 drivers and related software contained in package CTDB
 - API for client software is the same among variants
- RT Drivers for SIB board
 - Constituent: `sumt_rt_sib` – application mode driver
 - Constituent: `sumt_rt_poll_sib` – boot mode driver
- RT Drivers for COTS Alphi PMC 1553 board
- BC Drivers for testing and development
- IP/Ethernet Simulator for testing and development
- Unit Test for hardware-independent portions of driver available
- Functional tests for drivers using SIIS/SDIS available
- Documentation for design overview and API available
- 1553 RT software runs on SIU crate only

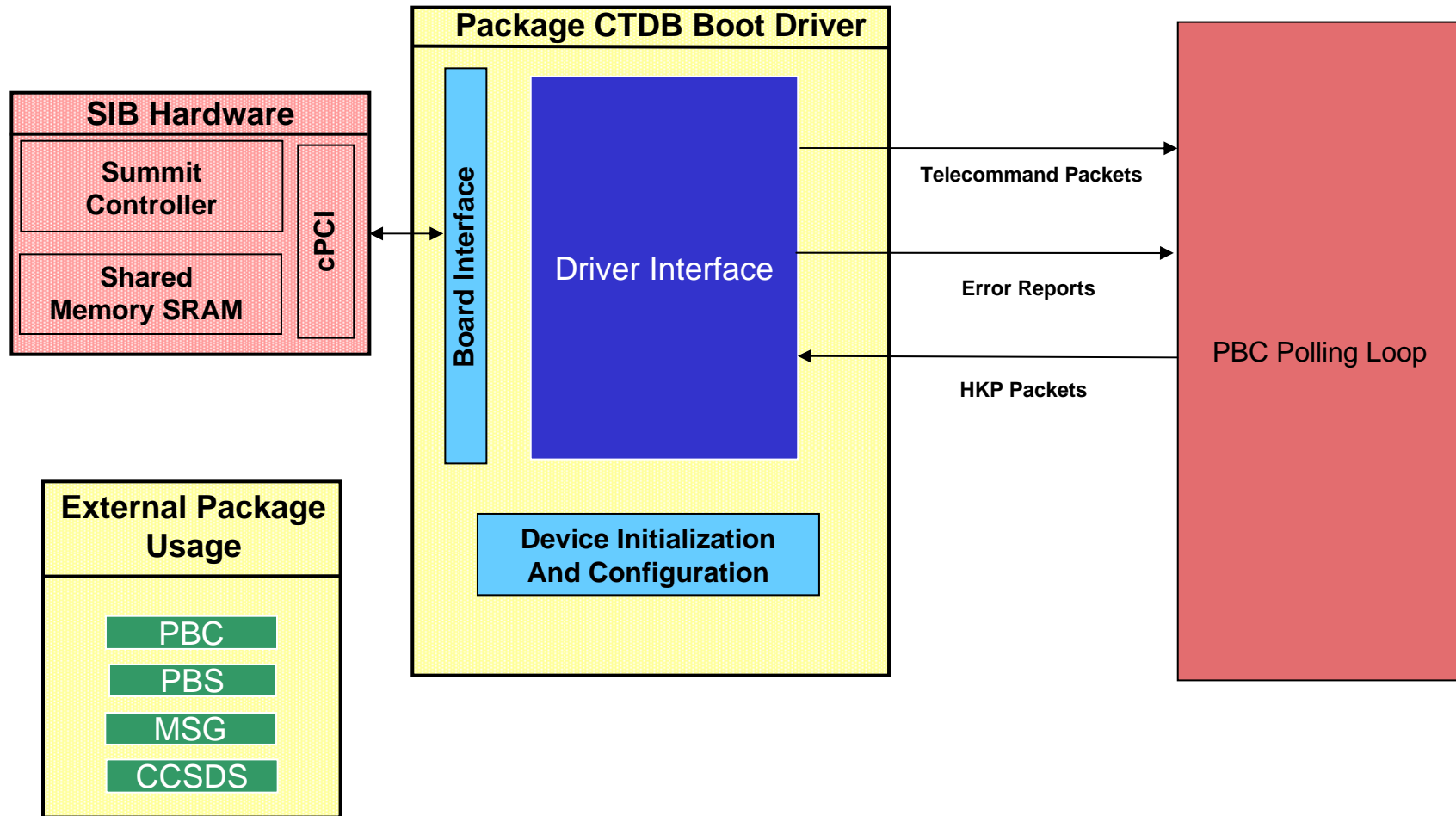


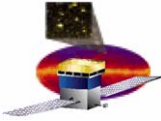
1553 RT Driver (Application) Architecture





1553 RT Driver (Boot) Architecture





1553 Driver Inputs/Outputs

- **Inputs**
 - **Driver configuration, input at initialization**
 - 1553 addressing
 - Queue sizes
 - **Outgoing telecommand packets to SC or GBM**
 - **Outgoing telemetry packets to SC**
- **Outputs**
 - **Incoming telecommand packets from SC or GBM**
 - **Error reports for API calls (out of range parameter, etc ...)**
 - **Error reports for 1553 bus illegal activity**
 - **Diagnostics counters (application driver only)**
 - Packet counts
 - Byte counts
 - Error counts