

Communications Subteam

Weekly Updates, Spring 2025

Week 1

Team Progress:

- Defined current progress and milestones for the first few weeks of Spring 2025
- Filed subsystem issues on GitHub for FSW, GS hardware, and GS SW / infrastructure
 - <https://github.com/cmu-argus-2/FSW-mainboard/issues>
 - <https://github.com/cmu-argus-2/Comms-GS-Hardware/issues>
 - <https://github.com/cmu-argus-2/GSW-backend/issues>
 - <https://github.com/cmu-argus-2/Comms-GS-Database-Interface/issues>

Individual Progress:

- Akshat Sahay:
 - Merged FSW updates for the v2 mainboards to main branch
 - <https://github.com/cmu-argus-2/FSW-mainboard/pull/61>
 - Contained HAL changes, driver changes and improved modularity within the comms task
 - Issues in other subsystems blocked merge and required some bug fixes, issue has been created to address these bugs
 - Started comms + CDH integration
 - Planned [GS commands for CDH](#) added in [comms message database](#)
 - Met with CDH FSW people (Ibrahima and Alexis) to discuss interfacing
- Adrian Walker:
 - Got GPS code onto FSW repo
 - Need to still create PR and merge
 - Mounted the GPS module to a current main board
 - Still need to test
 - Started trying to understand the licensing needed for the cubesat launch
 - Started reviewing board designs
 - Reviewed Battery Board V3

Week 2

Team Progress:

- More progress on FSW integration for the GPS subsystem
- Integrated FSW and GSW for processing new CDH commands (more details in FSW report)

Individual Progress:

- Adrian Walker:
 - FSW - GPS Integration
 - Initial HIL test completed

- Need to get data as ints rather than strings for logging and latency
- Avionics - Battery Board reviewed
- Avionics - XY Board reviewed
- Akshat Sahay:
 - Integrated CDH with comms through the CommandQueue and ResponseQueue made by Alexis, with redesigned (better) comms state management
 - <https://github.com/cmu-argus-2/FSW-mainboard/pull/109>
 - https://github.com/cmu-argus-2/GSW-backend/tree/cdh_integration
 - GS code is pretty far from a PR right now, currently very hacked together
 - Added significant error handling into the comms application to discard faulty packets
 - Fixed telemetry frame on the SC and updated unpacking on the GS
 - Helped Ankita a little with MAX17205 hardware bring-up and FSW integration

Week 3

Team Progress:

- Even more progress on FSW integration for the GPS subsystem

Individual Progress:

- Adrian Walker:
 - FSW - GPS Integration
 - Made GPS driver changes
 - HIL testing?
 - Testing failed due to data formats
 - Resolved
 - Testing failed due to memory limitations
 - Ongoing
 - Reviewed XY Board
 - Reviewed Z+ Board
- Swati Anshu:
 - Onboarded
 - Read through GSW-backend repository
 - Read through FSW-mainboard state machine protocol
 - Created preliminary state machine for GS
 - Coding in progress for the GS state machine
 - Brainstormed ways to increase data transmission rate with Akshat
- Akshat Sahay:
 - Organization
 - Centralized all GS issues (hardware and software) into the GS software repo: <https://github.com/cmu-argus-2/GSW-backend/issues>
 - Onboarded Swati, full system and comms overview, initial TODOs assigned
 - Started integrating file transfers into the new comms FSW state machine

- Brainstormed ways to increase data transmission rate with Swati
 - Current protocol has robust error detection but poor data rate
 - If packets are dropped in the middle of a pass, the SC defaults to heartbeat mode and the full cycle of a ground pass needs to repeat
 - Still no good solution for increasing data rate reliably with missed packets

Week 4

Team Progress:

- GS software in a significantly better state:
 - Centralized state machine for all operation modes
 - Integration with database / CMD interface to execute most commands
 - Minor bug fixes
- GPS FSW integrated into FSW build for v2 mainboards
- Started looking into FCC licensing:
 - Need to figure out how Form 312 is filed under
 - Need to start writing other documentation required for the submission

Individual Progress:

- Akshat Sahay:
 - Finished integrating new file transfer system (comms FSW SM and new packet structure), can now downlink files again
 - Helped in GPS integration into the FSW
 - Helped a little in mainboard debugging for ADCS FSW development
- Adrian Walker
 - GPS integration into FSW:
 - Solved data format issues with the data logger
 - Solved memory use issues with the driver
 - HIL Testing conducted and successful
 - Final PR to be created
 - GPS Spoofing:
 - Got HackRF One
 - Installed GNU Radio
 - Begun familiarizing myself with the tools so that I can implement the GPS spoofing for testing
 - Ordered external stable clock
 - HAM License:
 - Begun reviewing for the test
 - Z- Board review:
 - TODO
- Swati Anshu
 - Finished planning out and implementing the GS State Machine
 - Tested file downlink
 - Finished integration with db and ci. Tested functionality

- Working on crc error bug
- Begun review for HAM license test
- Looking into FCC licensing

Week 5

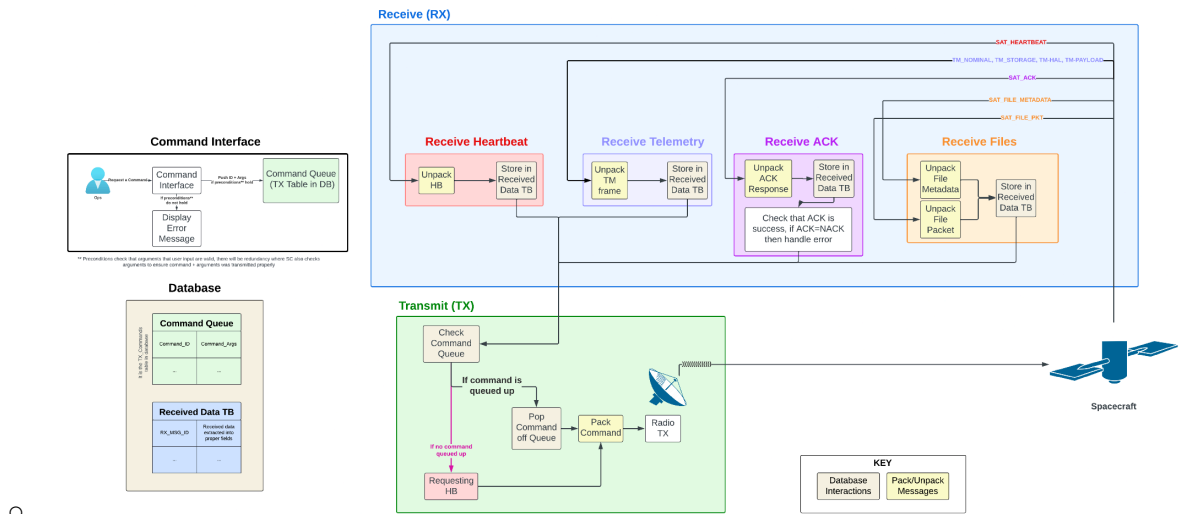
Team Progress:

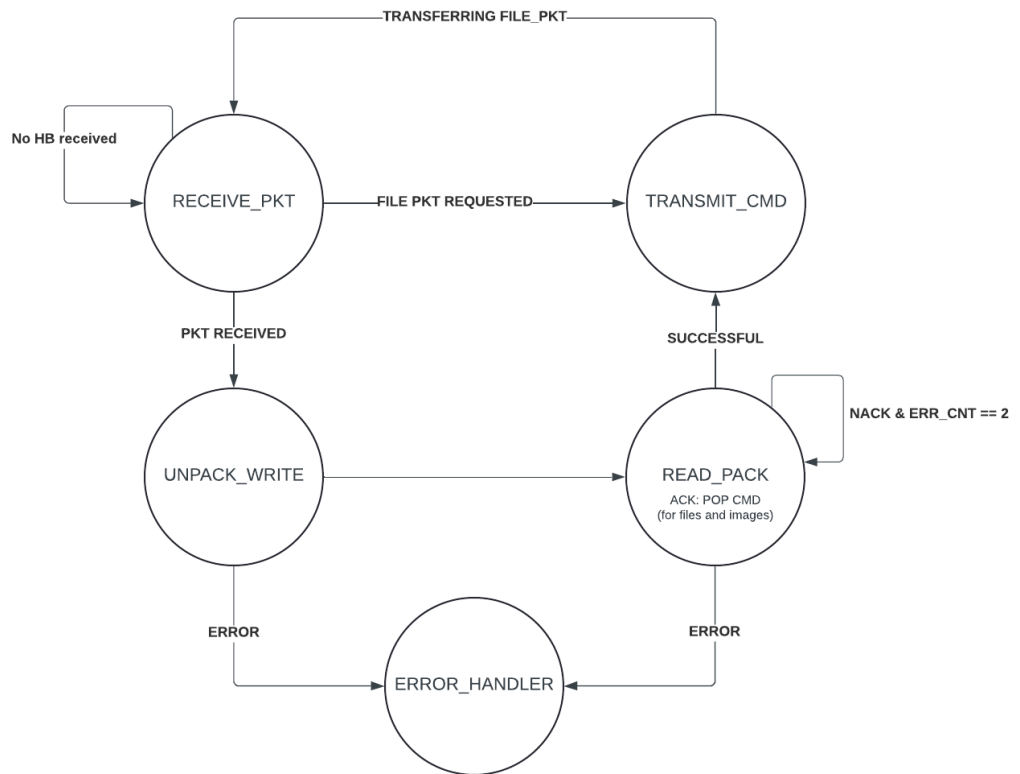
- Significant progress in GS software and database integration
 - Mostly feature complete
 - Working on deployment
- FCC licensing progress
 - Identified Part 5 license
 - Ascertained switch to 433 MHz
- GPS fully integrated and merged into main

Week 6

Team Progress:

- GS Software Redesign:





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- More generic unpacking functionality
- 433 MHz Hardware:
 - Confirmed new radio (E22-400M-30S) works with mainboard v2
 - SC and GS established communication normally at 433 MHz (with 433 HAT on GS)
- FCC Licensing:
 - Corresponded with IARU further - filling up the necessary forms
 - Working with comms + gnc to get pedro the information needed for sims

Week 7 & Spring Break

Team Progress:

- FCC Licensing:
 - Significant progress on Spacecap filing
 - Significant progress on IARU form
- GS Software:
 - Still working on software redesign for more modularity
 - PR shall be published the weekend after Spring break