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# Achieving Lights-Out Operation of SMAP using Ground Data System Automation

**GSAW 2013: Doing More With Less**  
**Session 10: Automation**

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# Agenda

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# Introduction

The Soil Moisture Active Passive (SMAP) mission is a first tier mission in NASA's Earth Science Decadal Survey. NASA's Jet Propulsion Laboratory (JPL) has been selected as the lead center for the development and operation of SMAP.

JPL has an extensive history of successful deep space exploration. JPL missions have typically been large scale missions with significant budget. SMAP represents a new area of JPL focus towards low cost Earth science missions. The operation of SMAP requires more routine operations and support for higher data rates and volumes than have been achieved in the past. These challenges must be addressed by a reduced operations team and support staff.

To meet these challenges, the SMAP ground data system (GDS) provides automation that will perform unattended operations. SMAP represents the first JPL mission that will utilize a lights-out approach for routine operations.



# SMAP GDS Automation Strategy

The SMAP GDS team is applying the following strategy to achieve reliable lights-out operations of the SMAP mission

- Leveraging of core JPL multi-mission GDS capabilities
- Leveraging of architecture from prior JPL Earth Science missions
- Application of test-as-you-fly principles throughout the GDS lifecycle
- Automation 'hooks' for manual operations processes
- GDS system monitoring



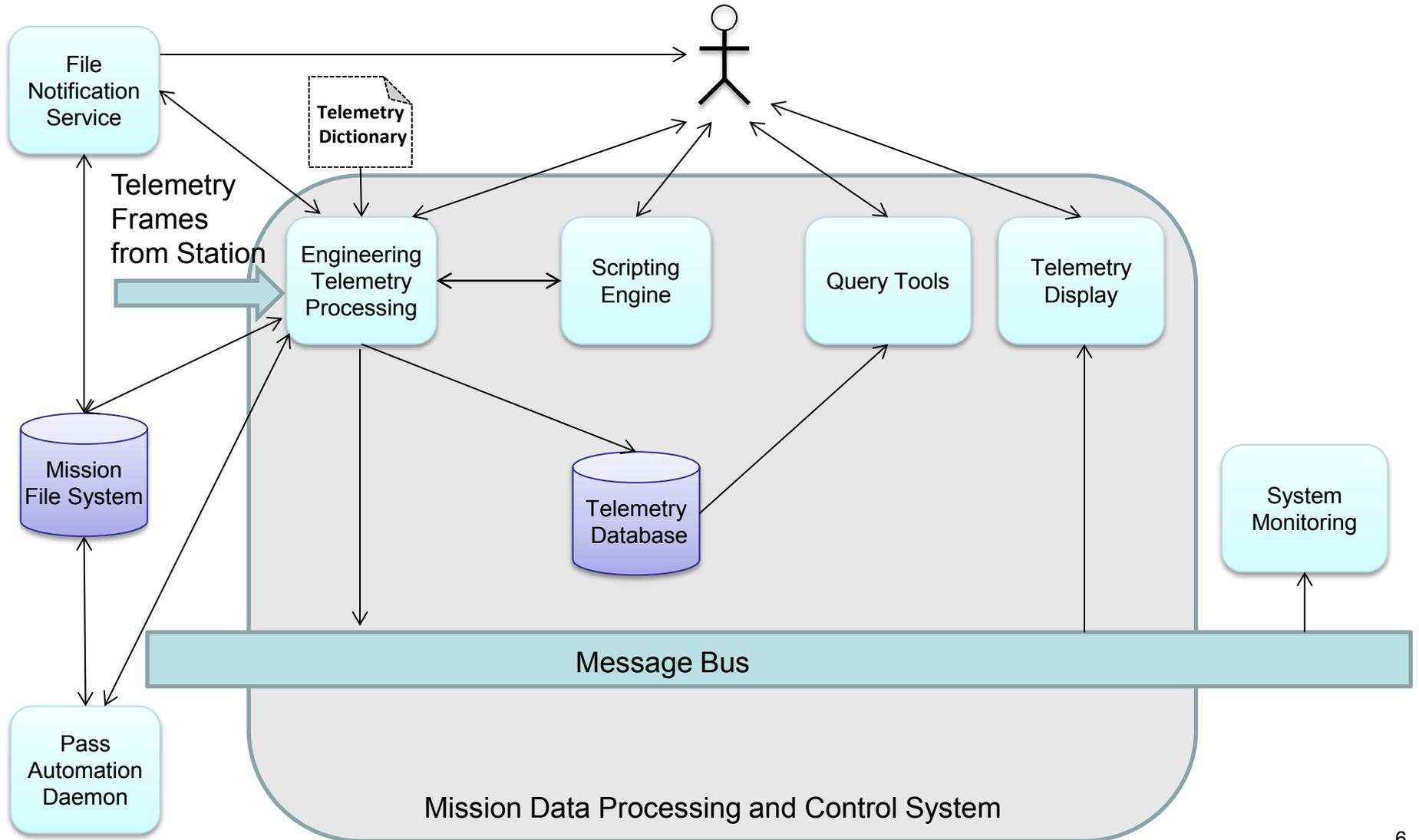
# SMAP GDS Automation Patterns

The SMAP GDS team has identified the following automation patterns that are sufficient to address the SMAP automated operations use cases:

- Pass Driven Automation
  - Utilizes a Pass Automation Daemon to provide automation of unattended tracking passes
- File Driven Automation
  - Utilizes a File Notification Service to provides file detection, notification, and workflow automation for files deposited into the SMAP mission file system
- Time Driven Automation
  - Utilizes a generic Automation Scheduler to provide workflow automation driven by user-specified schedules

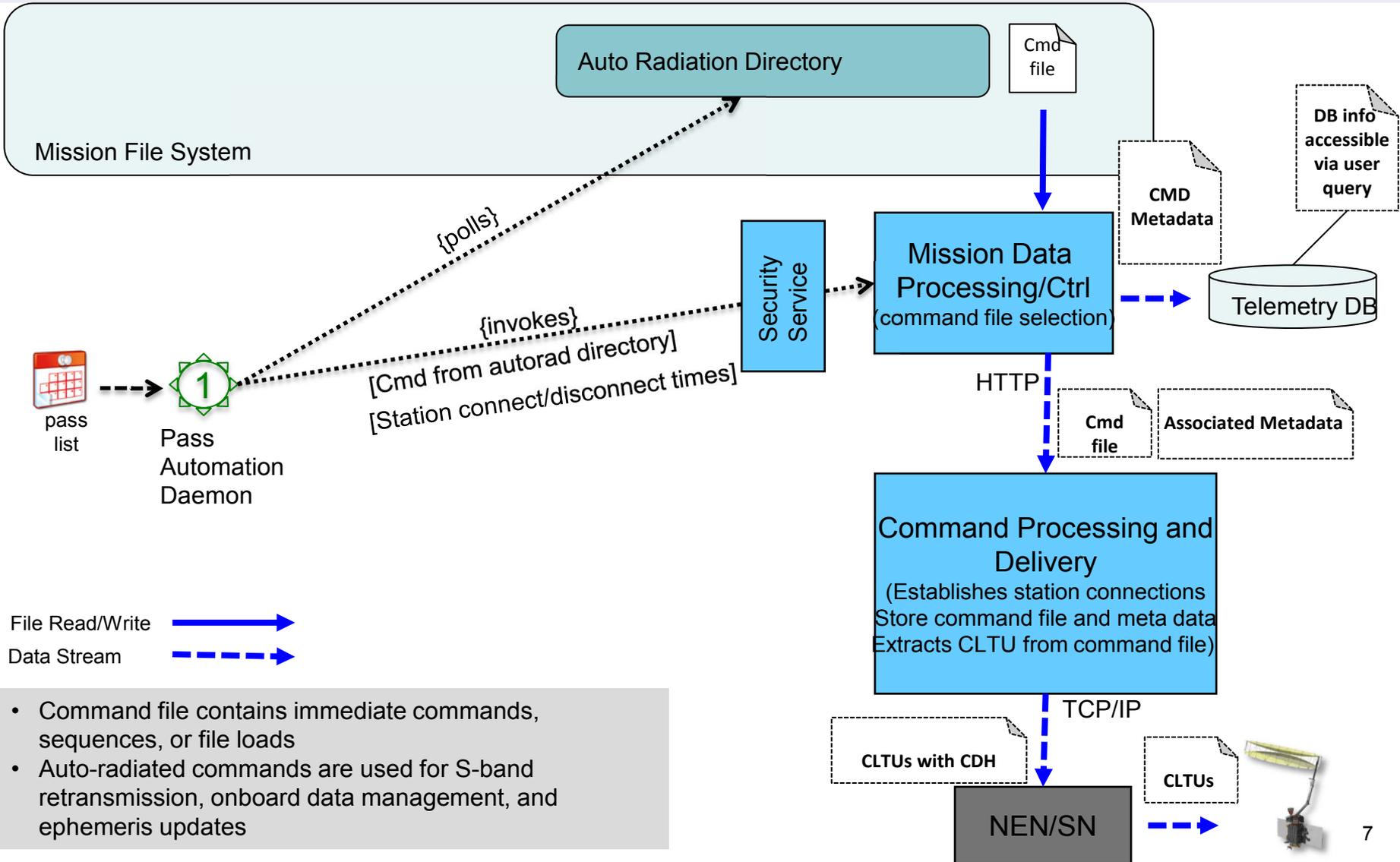


# SMAP GDS Automation Architecture





# SMAP Pass Automation Example

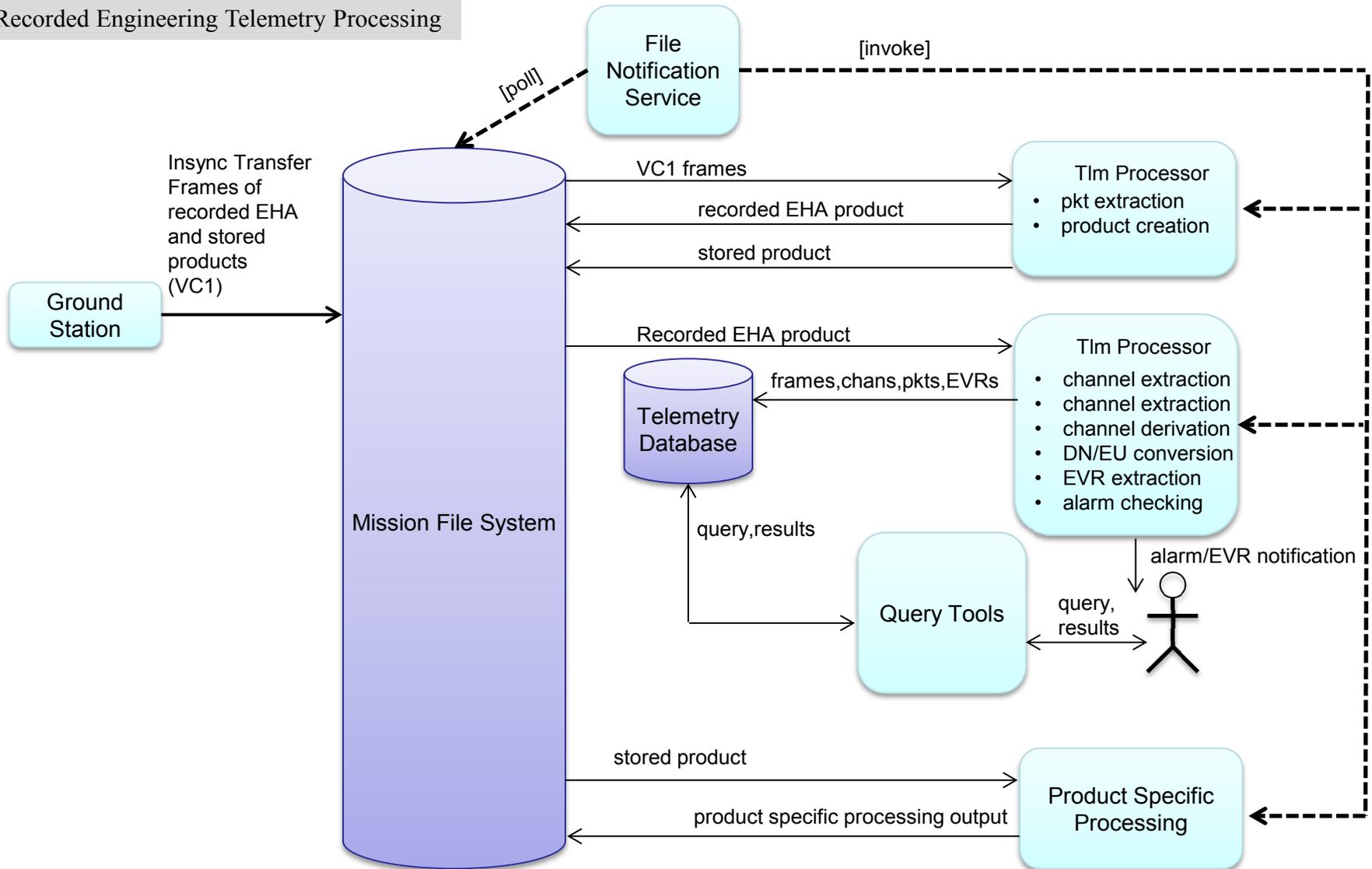


- Command file contains immediate commands, sequences, or file loads
- Auto-radiated commands are used for S-band retransmission, onboard data management, and ephemeris updates



# SMAP File Notification Example

## Recorded Engineering Telemetry Processing





# Summary

The approach used in the SMAP ground data system to provide reliable, automated capabilities to conduct unattended operations has been presented.

The impacts of automation on the ground data system architecture were discussed, including the three major automation patterns identified for SMAP and how these patterns address the operations use cases.

The architecture and approaches used by SMAP will set the baseline for future JPL Earth Science missions.