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MO Services and CFDP in Action on OPS-SAT

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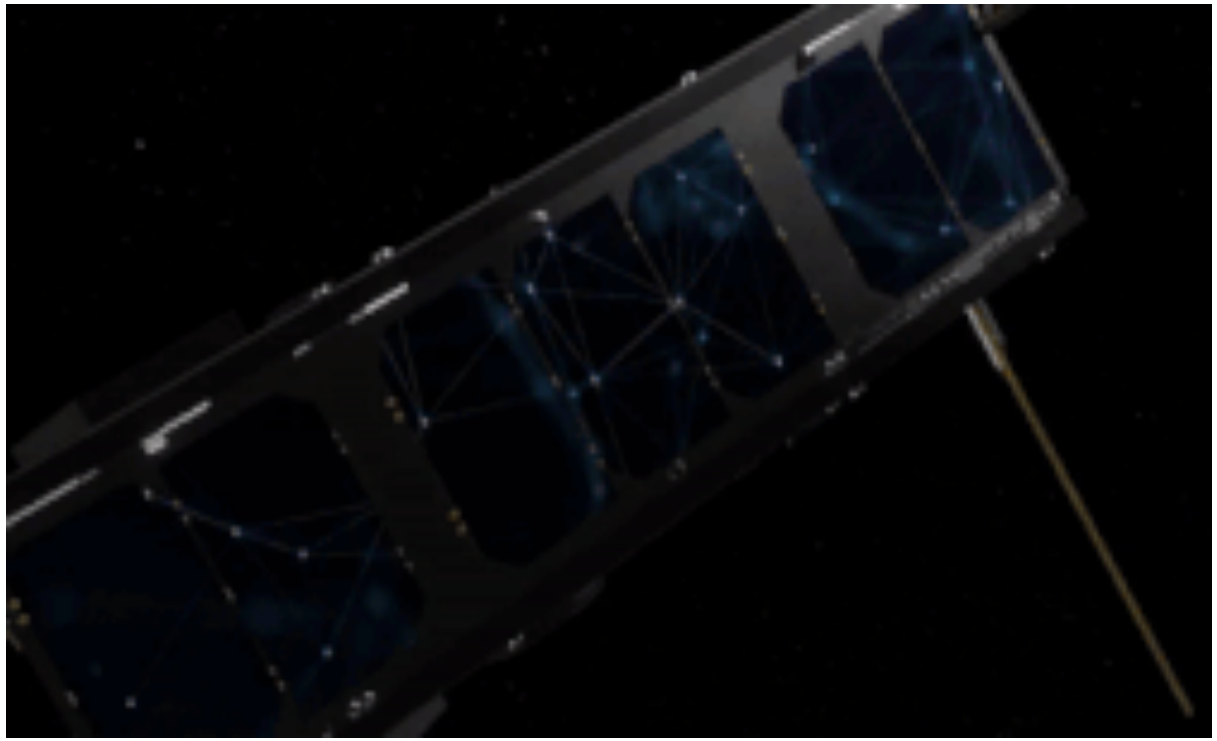
Background – OPS-SAT

- 3U CubeSat launched by the European Space Agency (ESA).
- Conceived to break the “has not flown, will not fly” cycle.
- Full set of sensors and actuators including a camera, GPS, star tracker, and reaction wheels.
- High speed X-band and S-band.
- Laser receiver (uplink rate up to 2 kbps).
- Software defined radio receiver.
- **Dual-core 800 MHz CPU clock**
- **1 GB DDR3 RAM.**
- FPGA.

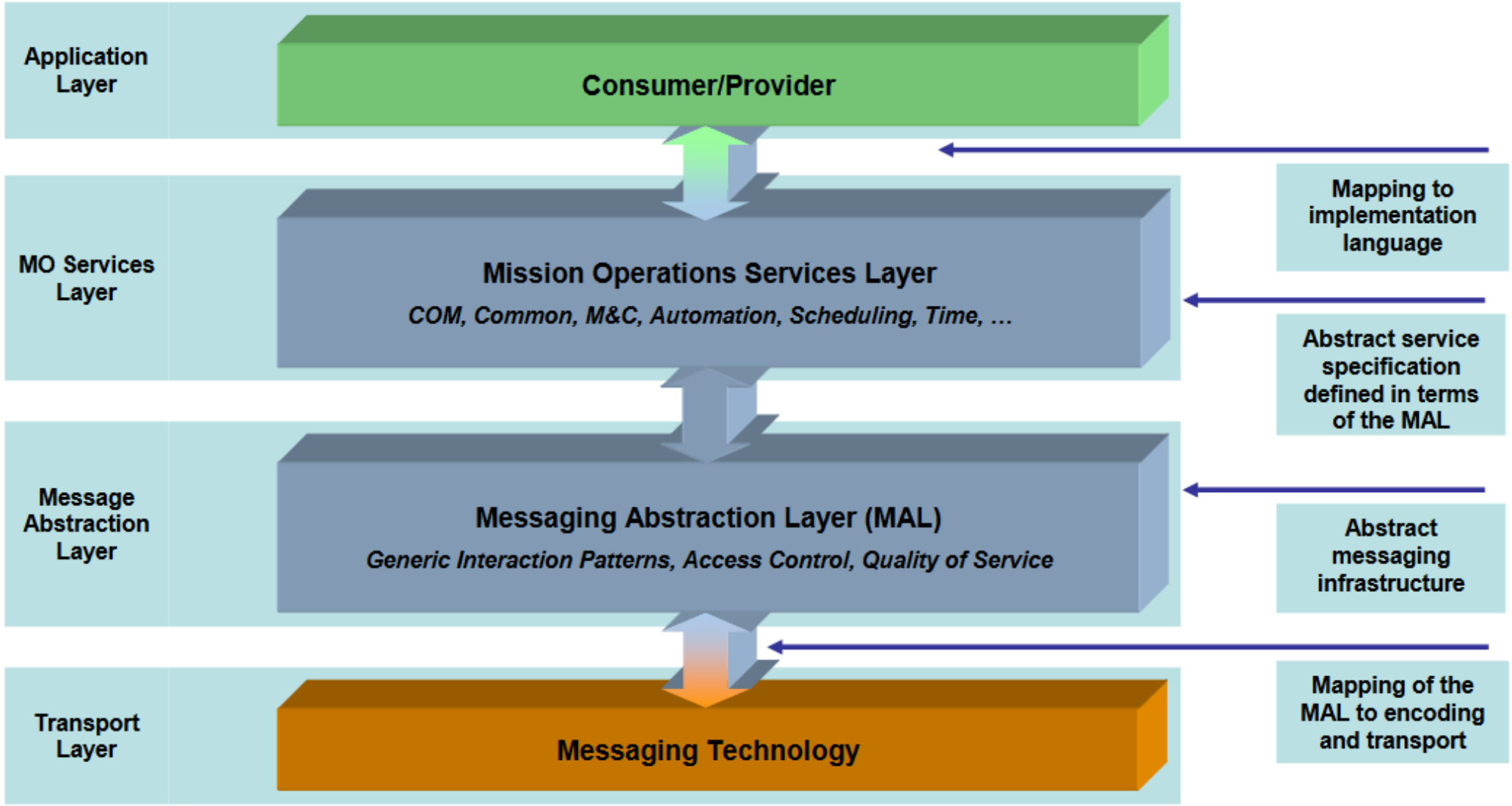


Background – OPS-SAT – Apps

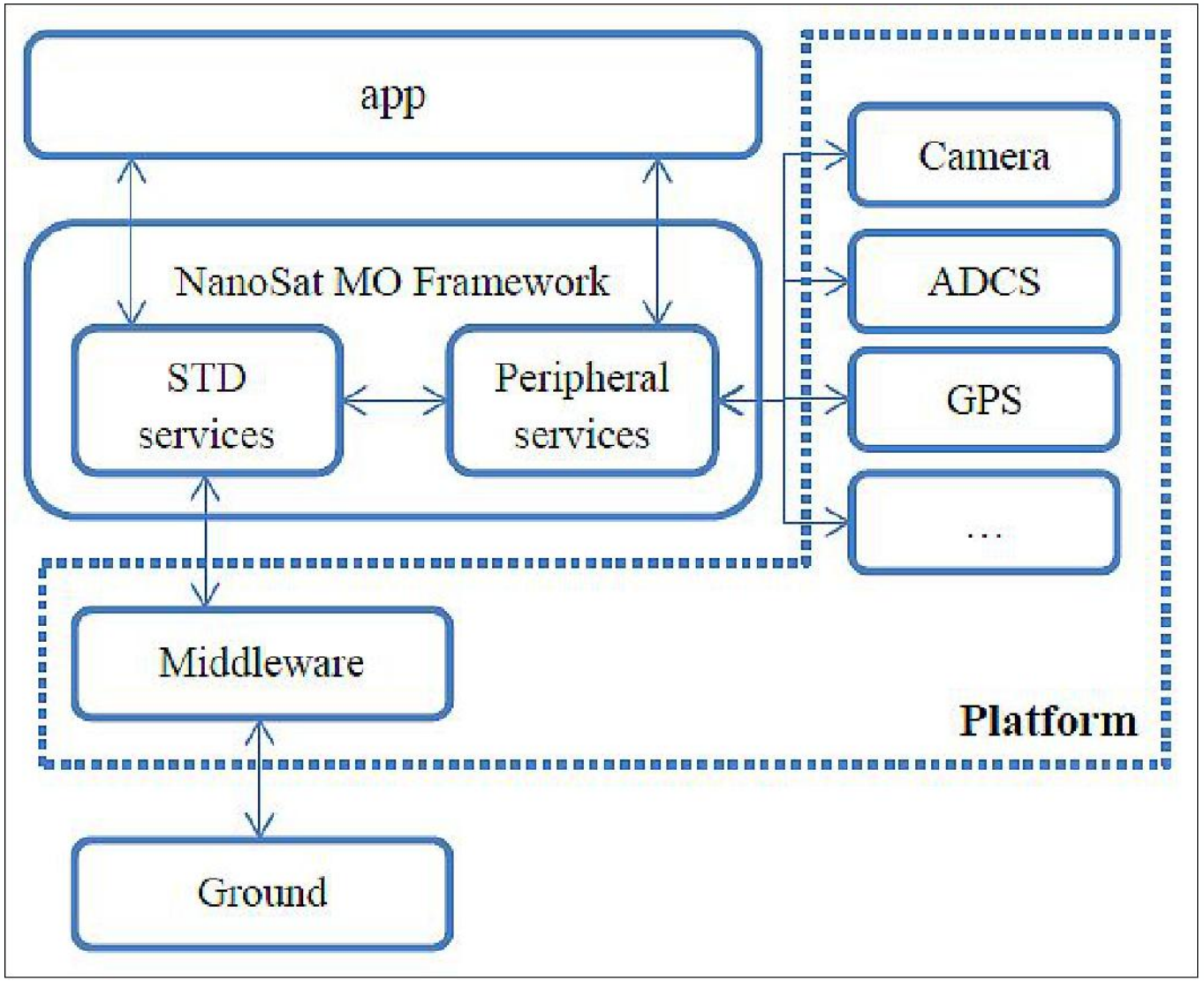
- A new paradigm to on-board software by introducing “**apps**” in space.
- Apps run on an Ångström distribution of Linux on top of the **Satellite Experimental Processing Platform (SEPP).**
- An app can be easily developed, debugged, tested, deployed, and updated at any time without causing any major problem to the spacecraft.

- Apply to fly your experiment: https://opssat1.esoc.esa.int/

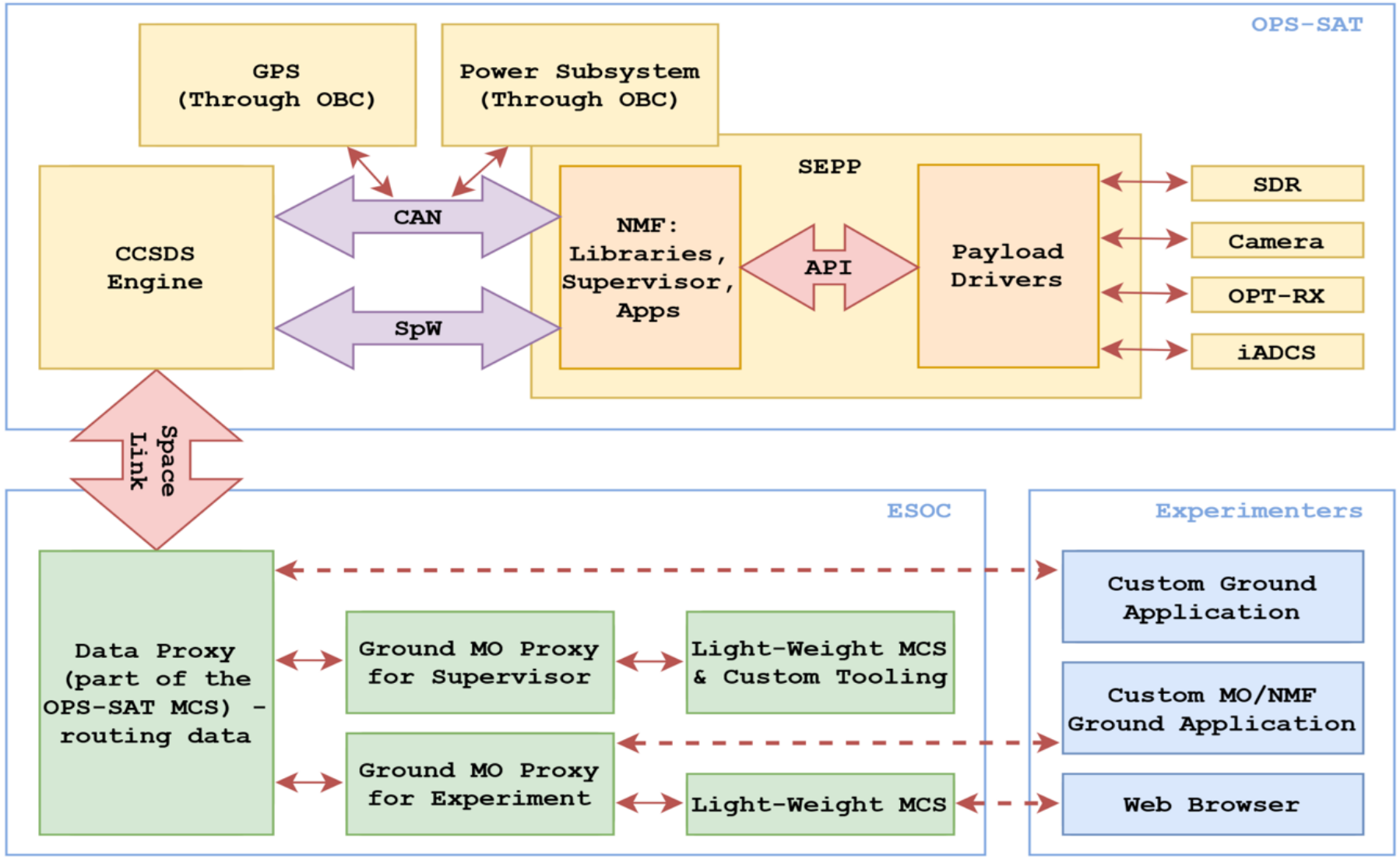
CCSDS MO Framework



NanoSat MO Framework diagram



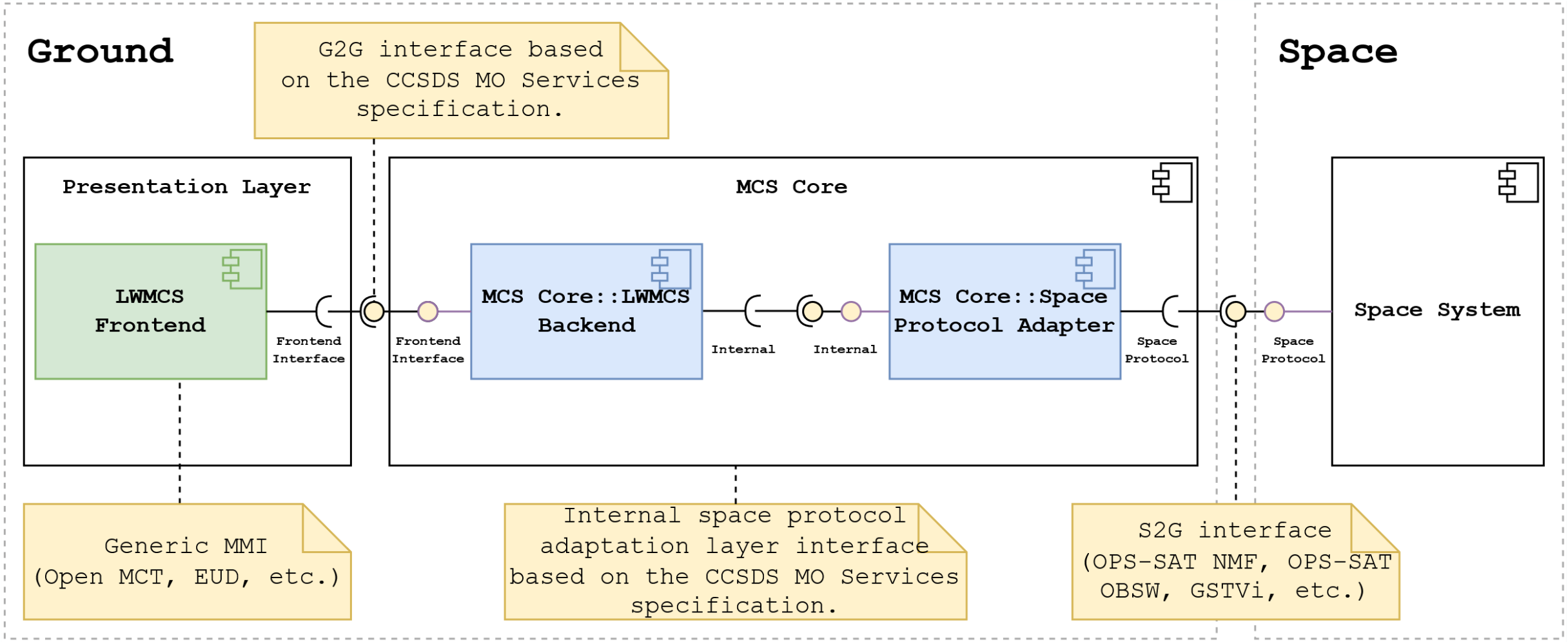
Reference Application Stack



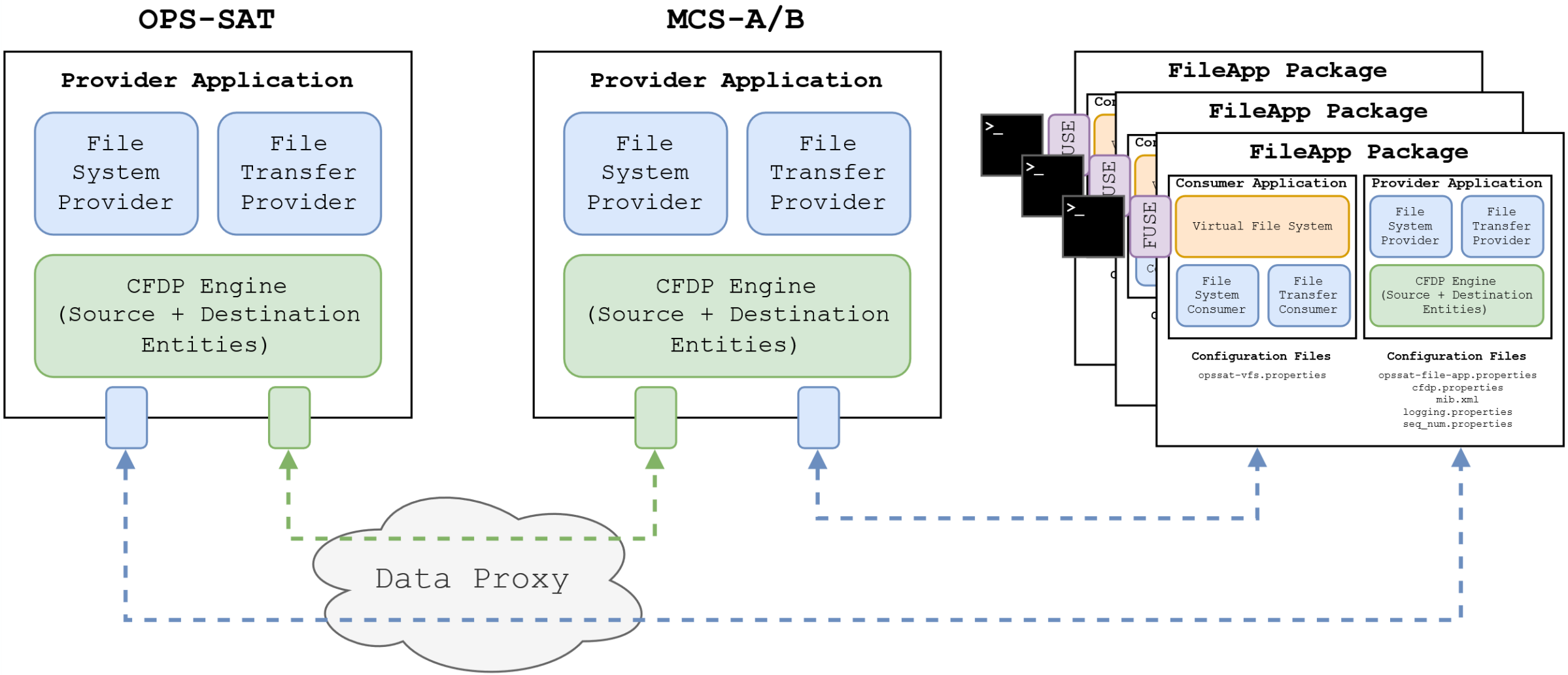
MO Services and CFDP

1. ~~CCSDS Mission Operations Services (MO Services)~~
2. ~~CCSDS File Delivery Protocol (CFDP)~~
3. ~~NanoSat MO Framework (NMF)~~
4. File Management Services
5. Deployment on OPS-SAT
6. Ground Data Systems

LWMCS Architectural Diagram



Integration of FMS/CFDP



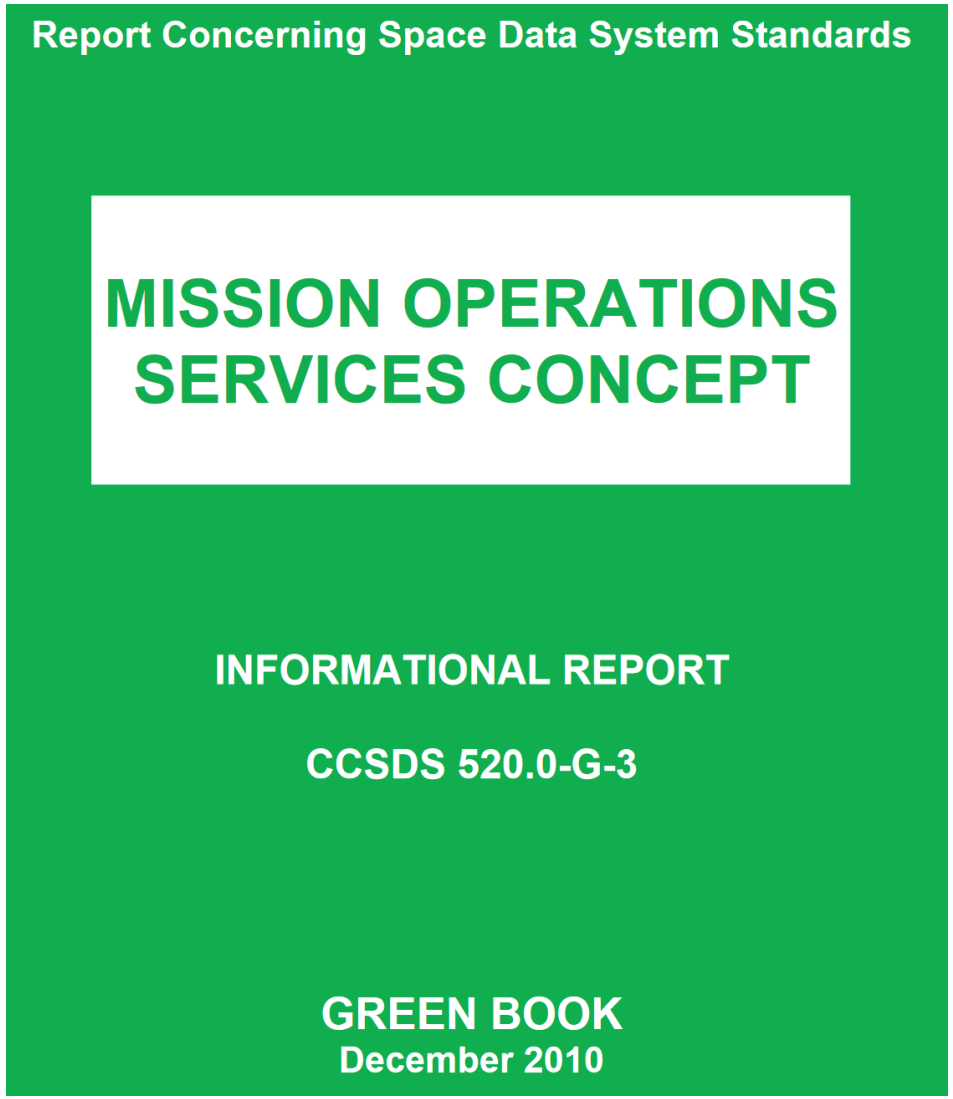
Challenges and Solutions

1. MO Services
2. On-Board Software
3. NanoSat Framework
4. Light-Weight Mission Control System (LWMCS)
5. FMS/CFDP

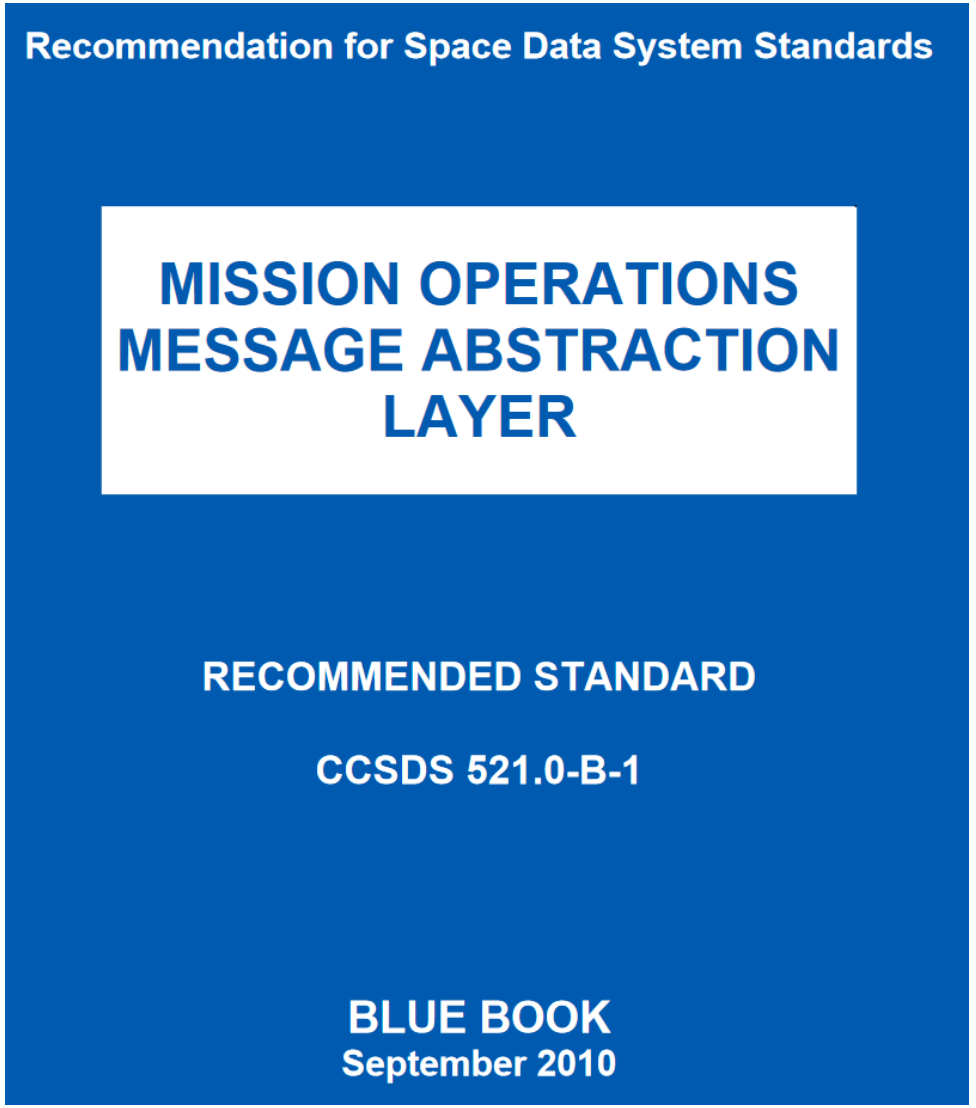
Future Work & Conclusion

1. NanoSat MO Framework (NMF)
2. CFDP FMS
3. OPS-SAT
4. Ground Data Systems
5. Conclusion

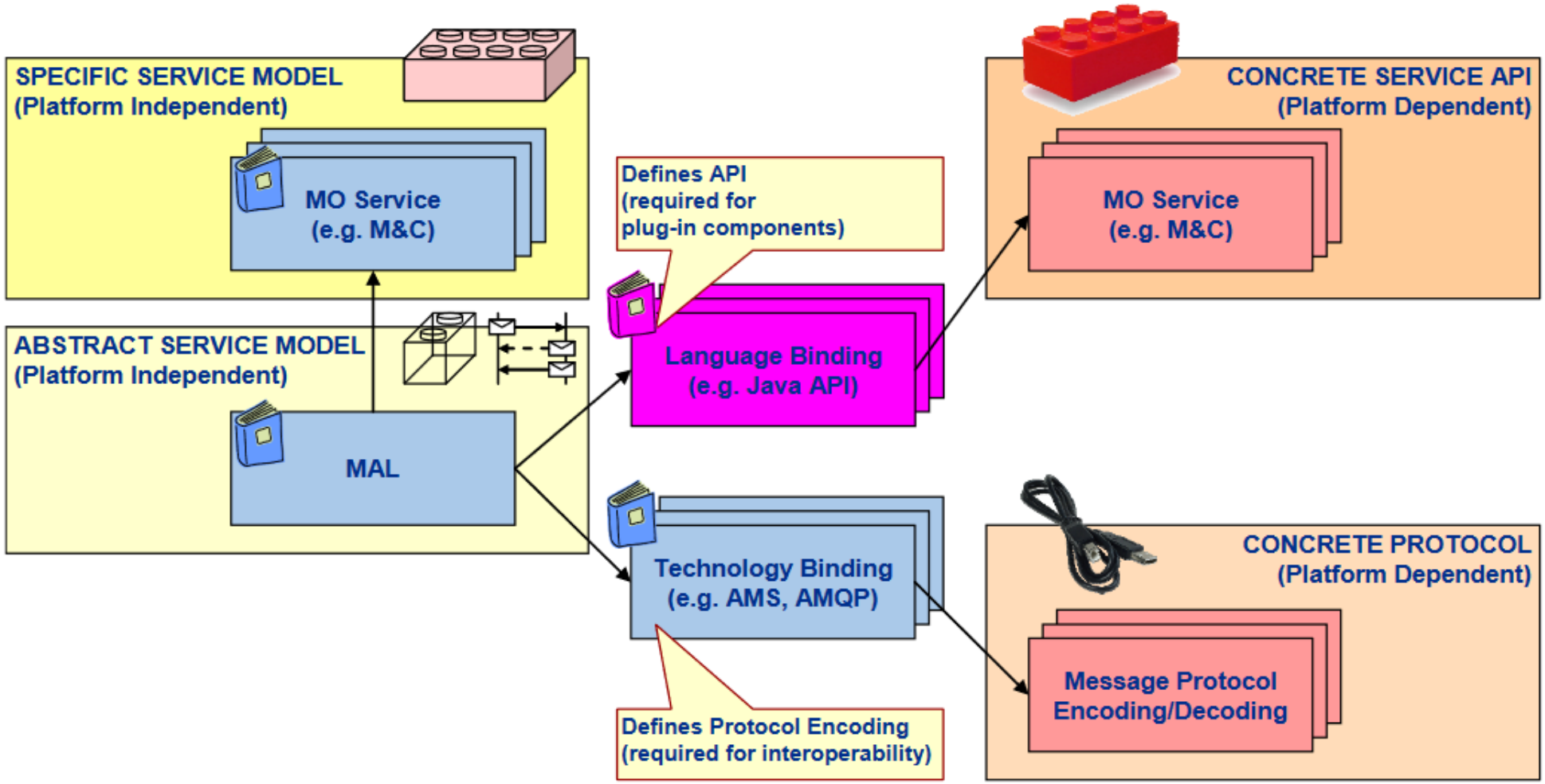
MO Services Concept – Green Book



MO MAL – Blue Book

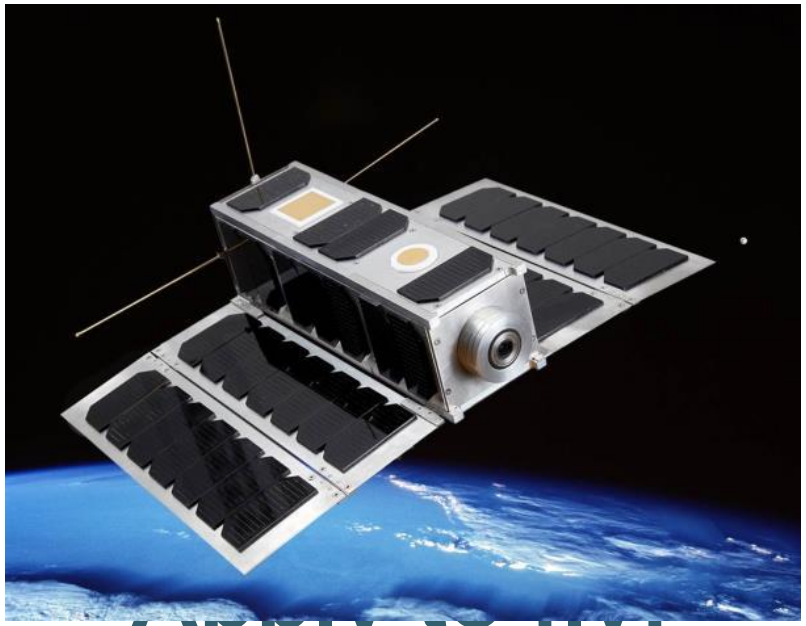


Relationship of MO Books



Have an idea for experiment to run on OPS-SAT?

Great!



https://opssat1.esoc.esa.int/

Thank you and check out the research papers for more!

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