

Imperial College London; Adaptive communications and resource management for very large scale/very low cost space systems

Project Summary

An exciting new class of flight hardware has emerged allowing very low cost science, educational and commercial activities to be undertaken with large redundant arrays of inexpensive and disposable (RAID) thin-film, printed circuit board and CubeSat spacecraft.

Relying on efficient energy harvesting, these systems are very resource constrained, and require self optimizing algorithms to optimally manage low power peer-to-peer communications and to maximize the amount of data captured and reliably returned by an extensive and customizable range of sensors hosted by these spacecraft swarms.

We propose applying and extending the techniques we have developed for low power meshes of terrestrial wireless sensor networks to these RAID space systems, specifically:

- a) Reducing the power required to perform peer-to-peer spacecraft transfers at a range of 3km or greater, space-to-earth transfers at 350km or greater, and generally extending range while remaining within existing power budgets,
- b) Increasing and prioritizing sensing bit rates while staying within existing power budgets,
- c) Achieving reliable data collection from a swarm of individually unreliable spacecraft

Proofs-of-concept will be developed using off the shelf spacecraft development kits. All outputs will be placed in the public domain for use without restriction by members of the UK space community.

