

Amateur Radio and the CubeSat Community

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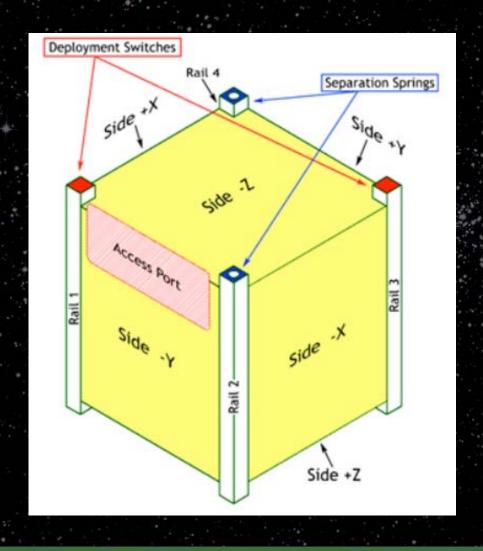
Outline



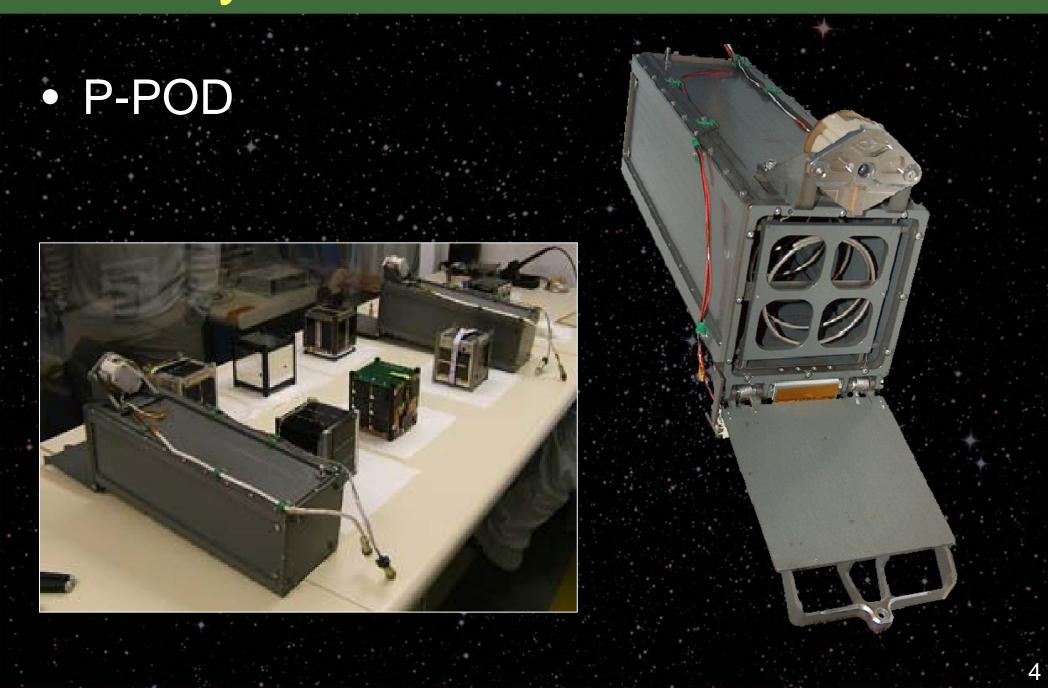
- Cal Poly Satellite Activities
- Collaboration
- Education
- Tracking new satellites
- Ground Station Network



CubeSat Standard









- Conferences
 - Summer Workshop in August
 - Weekend before SmallSat in Logan, UT
 - Developers Workshop in April
 - April 19-21, 2007
 - Boeing's Huntington Beach Conference Center



Earth Station





Building Satellites





- Cal Poly University of Tokyo
- Download pictures from XI-IV (CO-56)
 - Training new students
 - 1 picture every 1-2 days







- CubeSat Launches
 - Dnepr 1
 - 28 July 2006 launch failure
 - 14 CubeSats
 - 4 other secondary
 - Dnepr 2
 - December 2006
 - 7 CubeSats





- CubeSat Launches not through Cal Poly
 - University of Toronto with Mark I P-POD on Eurockot in June 2003
 - 4 CubeSats
 - Japanese M-V-8 in February 2006
 - CUTE-1.7+APD
 - Indian Antrix Polar Satellite Launch Vehicle with XPOD
 - 6 CubeSats
 - June 2007

Collaboration



- Both communities collaborate on
 - Education
 - Tracking of new satellites
 - Frequencies

Education



- New hams:
 - 70% of students in the lab have their license
 - 50% have talked with XI-IV
 - 25% have talked on other Amateur birds
- These new hams are not just operators but satellite designers and builders
- These students are already interested in satellites and communication

Education



- Example: SSETI Express
 - 100 students
 - 14 universities
 - Launched 27 October 2006
 - -3 CubeSats ejected
 - Amateur radio operators provided crucial data packets when satellite was not in view of primary earth station
 - 100 Million (estimated) people watched on ESA TV and national news

Tracking new Satellites



- The CubeSat community depends on other Amateurs to track the new satellites when out of range of the primary earth station
 - SSETI Express
 - -XI-IV
 - HI-SAT
 - Future launches.....

Ground Station Network



- A way to link earth stations together using the internet for increased control of satellites
- Amateur radio operators can connect to the network (SETI@home)
- Japanese Universities were the first to build a fully functional network to help combat high QRM
- Project picked up by ESA/ISEB last week

Ground Station Network



- Implementation Plan:
 - 1st year core development
 - 2nd year testing and advanced development
- Organizations involved:
 - ESA Educational Department
 - SSETI and European Universities
 - AMSAT-UK
 - University of Tokyo
 - Cal Poly

Ground Station Network



Ground Station Network:

- Using internet, not private lines
- Open architecture
- Everyone can join and participate
- Most operating systems supported

Benefits:

- Students involved in Amateur Radio
- Increased link time
- Redundant earth stations for uplink and downlink



Questions?

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