CubeSat Communications

SRI large dish capabilities & experiences

Currently available facilities that support sat-com

150-ft dish
  Az/El Large size, 1 deg/sec, <1.6 GHz, USGovt, $$$

60-ft dish
  Az/El Modest size, 5+ deg/sec, <2.5 GHz, SRI, ¢

Past experiences: automated data collection Hilat, Polar Bear S/C
  10’ dishes and helix arrays, Az/El & X/Y mounts, VHF-UHF-Lband
    Sondrestromfjord, Tromso, Churchill

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SRI 150-ft dish at Stanford University

Easily changed feeds, multi-frequency possible

Mesh surface limits upper frequency

Wheel & Track – 1 deg/sec

High Power UHF capability
SRI 150-ft dish at Stanford University

Features high gain with limited track rate OK for low elevation LEO tracks
Used mainly for satellite calibration (uplink) and monitoring (downlink) GPS etc
Useful up to approximately 1.6 GHz due to mesh surface, very good at UHF
Unique high power UHF transmit capability
Often used as a diagnostic tool when problems arise
US Government property, shared use OK usually
Costly to operate

Has been used for tiny satellite tracking with up/down link communication
Allows minimal power on spacecraft
Beneficial for short duration campaign experiments
  e.g. Mars Global Surveyor, Aerospace Picosats, OPAL, etc
Feed easily changed
Multi-frequency & switchable
Fine mesh to 45-ft < 2.5 GHz OK, coarse mesh to 60-ft < 1.6 GHz

SRI 60-ft dish at Stanford University
Tower & Gun-mount Drive > 5 deg/sec

150’ dish – 1Km
HF Backscatter radar antennas

Ops bldg

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Features medium gain and high track rate OK for many LEO orbits + ISS

Used for small satellite support mainly due to speed and cost

Aerocubes, GeneSat, PharmaSat (430 MHz, 900 MHz, 2.4 GHz)

SCU projects use Microhard 2.4 GHz radio

Useful to approximately 2.5 GHz at 45-ft diameter and 1.6 GHz at 60-ft diameter, 2 mesh sizes

Plans moving forward toward remote and automatic operation to enable simple use for the most common communication tasks of commanding and data collection

Transmitting capability set by user equipment, generally low power

SRI property, modest operating and maintenance costs

Multi-user configuration, bring your own radio approach plus common configuration controlled equipment -- future software defined radio utility feasible

Network connected via 802.11a radio link to SU fiber at 150-ft dish