

CubeSat Communications

SRI large dish capabilities & experiences

Currently available facilities that support sat-com

150-ft dish

Az/EI Large size, 1 deg/sec, <1.6 GHz, USGovt, \$\$\$

60-ft dish

Az/EI 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/EI & X/Y mounts, VHF-UHF-Lband
Sondrestromfjord, Tromso, Churchill**



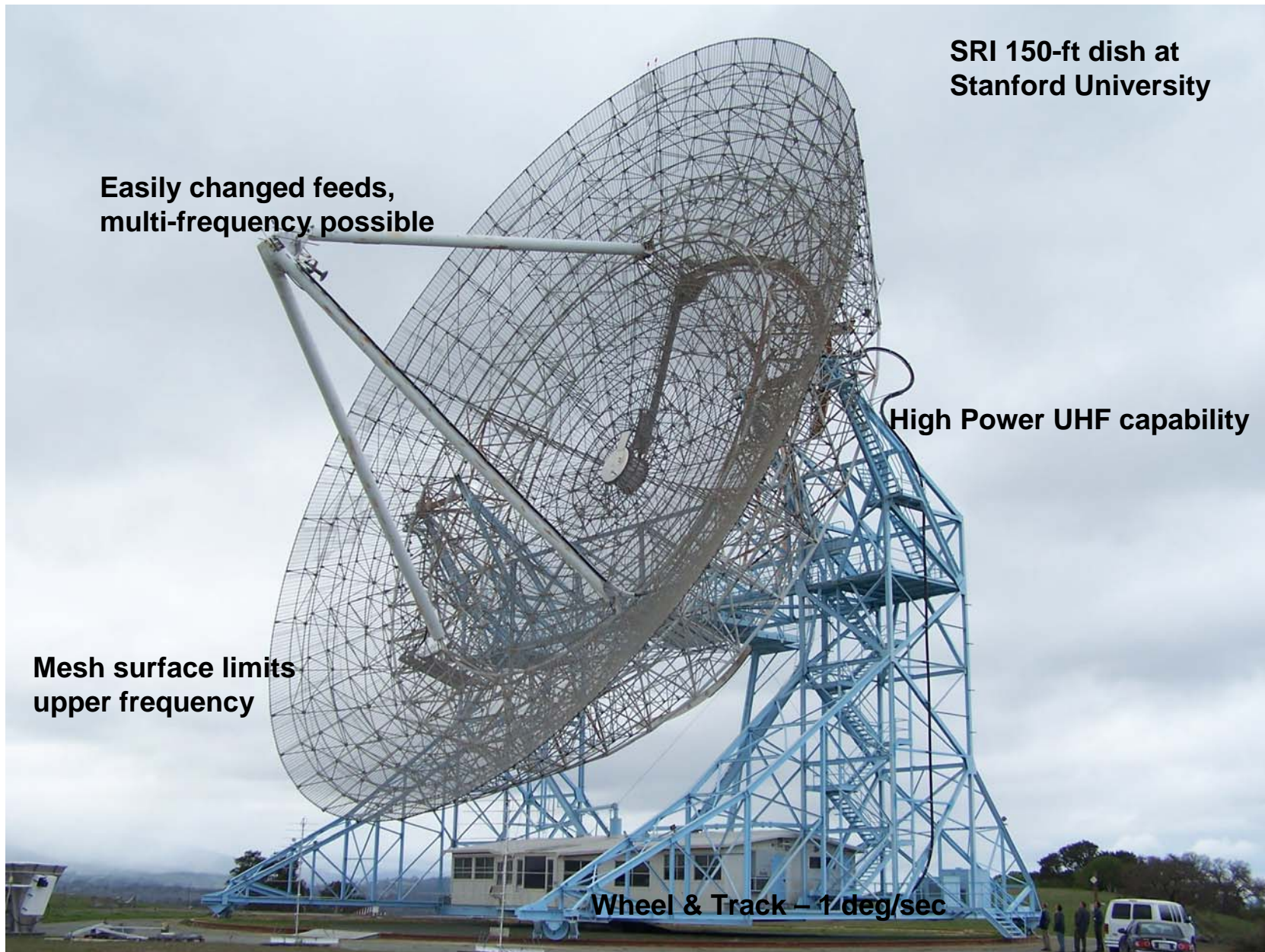
**SRI 150-ft dish at
Stanford University**

**Easily changed feeds,
multi-frequency possible**

High Power UHF capability

**Mesh surface limits
upper frequency**

Wheel & Track – 1 deg/sec



**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

**SRI 60-ft dish at
Stanford University**

Feed easily changed

**Multi-frequency &
switchable**

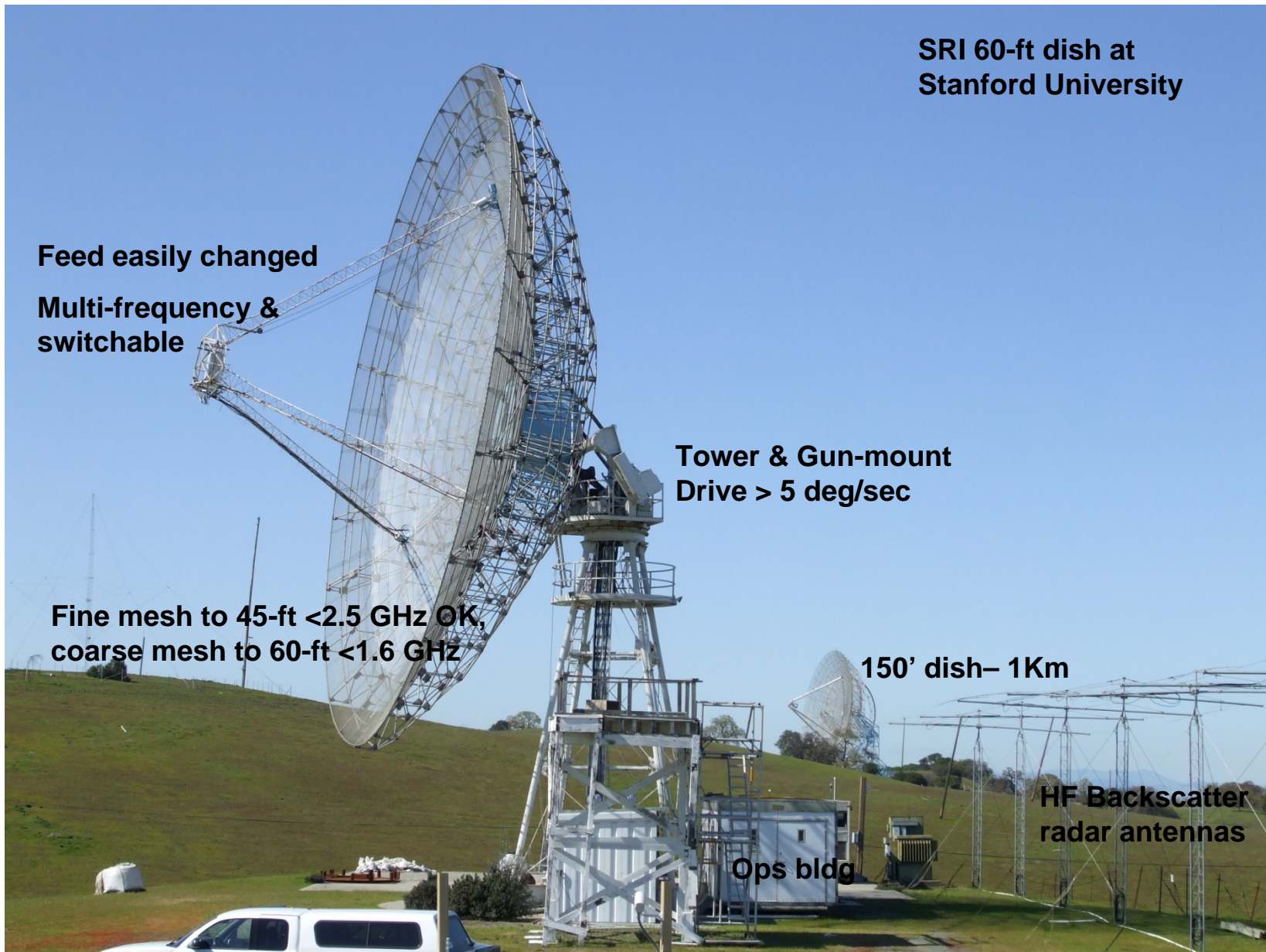
**Tower & Gun-mount
Drive > 5 deg/sec**

**Fine mesh to 45-ft <2.5 GHz OK,
coarse mesh to 60-ft <1.6 GHz**

150' dish- 1Km

**HF Backscatter
radar antennas**

Ops bldg



**SRI 60-ft dish at
Stanford University**

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

