
CSSWE Ground Network



GN Requirements

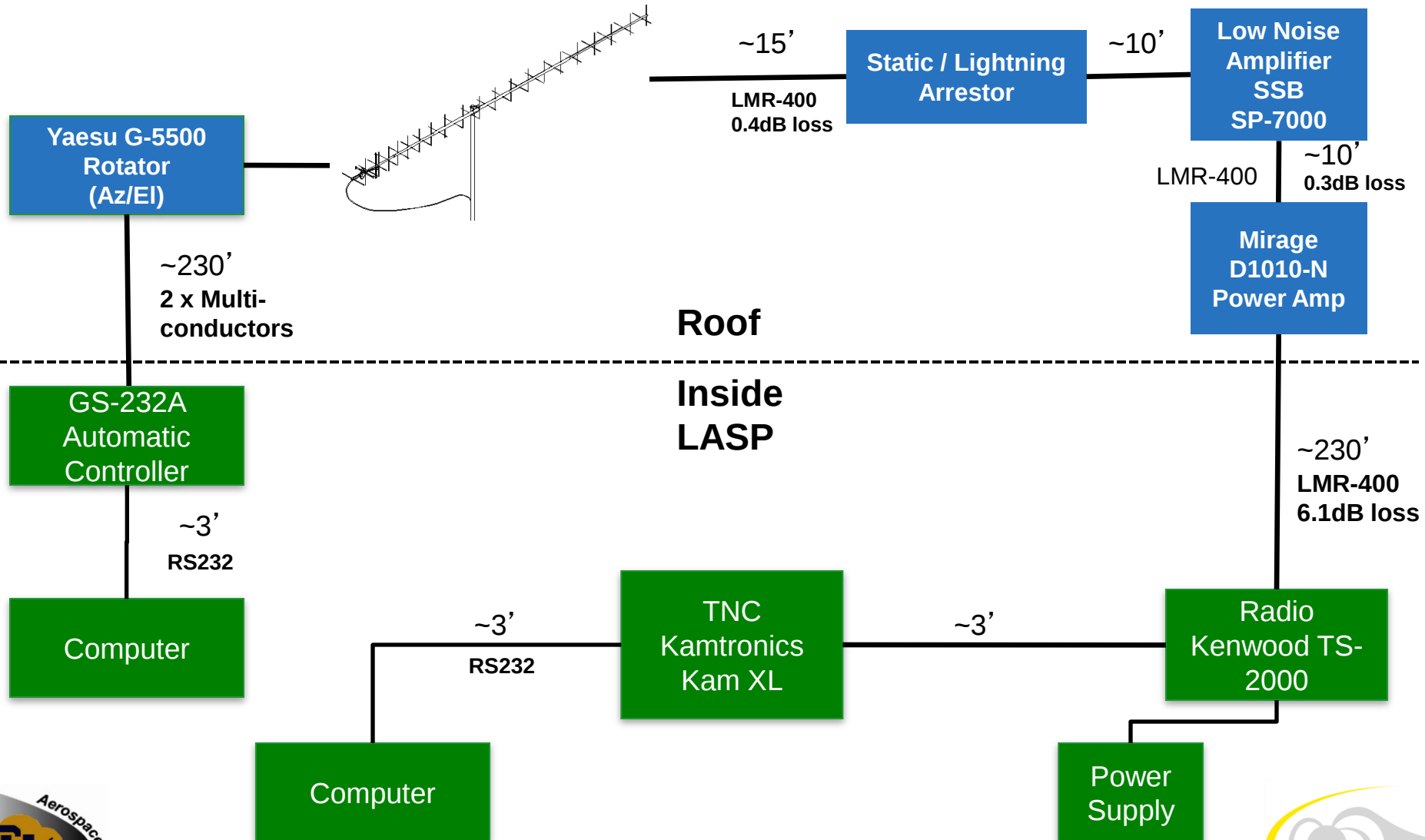
- Send commands and receive data
 - Includes packetizing/depacketizing signals
- Support at least 1 ground contact per day of at least 6 minutes
- Provide and archive engineering and science data

GN Design Drivers

- Communicate at IARU-designated 437 MHz Tx/Rx
 - half duplex operation, circular polarization
- Receive at least 500 kB of science data per day with minimum bit error rate of 10^{-4}
- Close link budget:
 - Frequency: 437.345 MHz
 - Pass time: ~7 min
 - Data rate: 9600 bps
 - Data per pass: 404 kB



GN Block Diagram



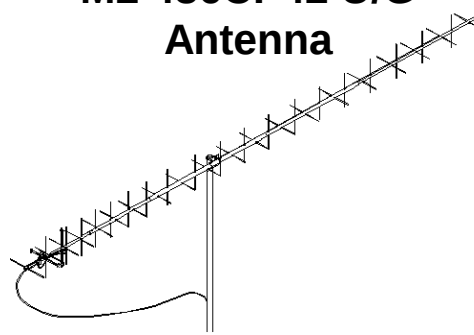
GN Equipment and Cables

Kenwood TS-2000



Frequency Range: 430-450 MHz
RF Output Power: 50 W

**M2 436CP42 U/G
Antenna**



Frequency Range: 430-438 MHz
Gain: 16.8dB DC
Beamwidth: 21°
Length: 18' 10"

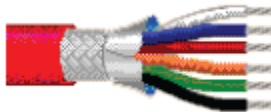
**Mirage D1010-N
Power Amp**



Frequency Range: 430-450 MHz
Input Power: 3-15 W
Output Power: Min 100W with 10W in

Rotor Cable

Multi-Conductor (16 AWG)



Conductor

- stranded tinned copper

Shield

- aluminum/polyester foil
 - tinned copper braid

Yaesu G-5500 Rotator



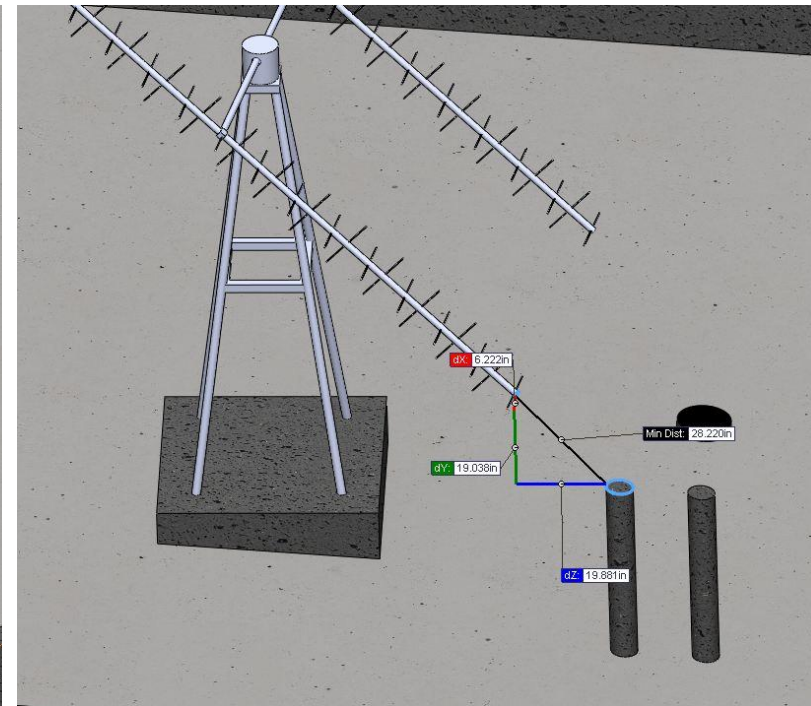
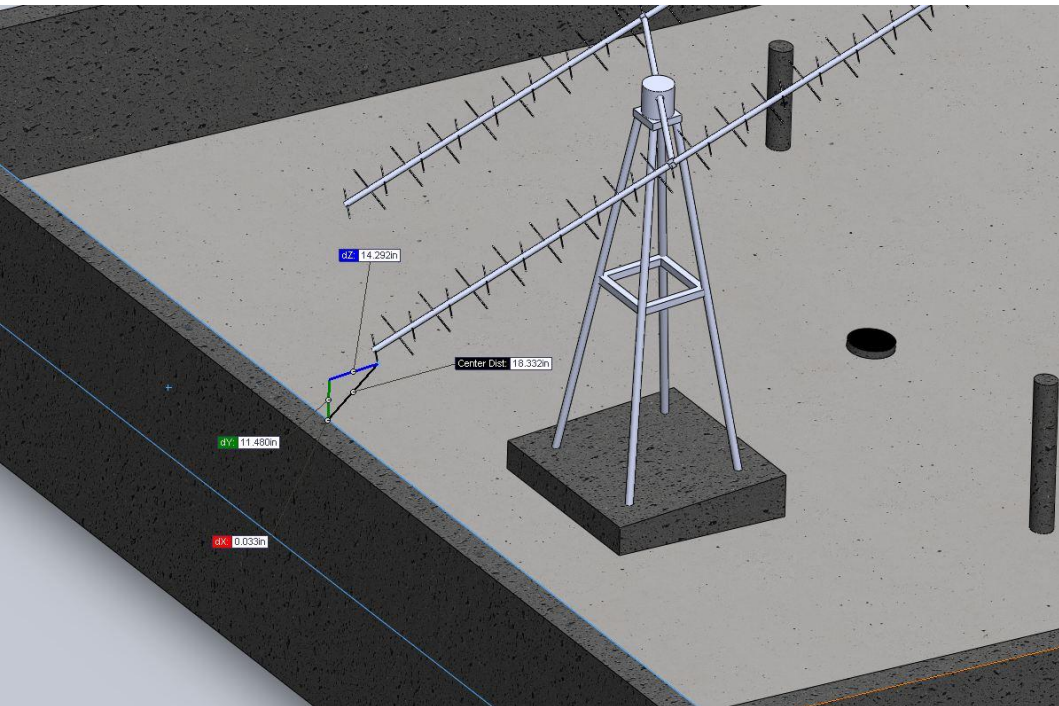
GN Roof Antenna



Tower assembled and ready to
install on LASP roof pending
University approval



GN Roof Antenna

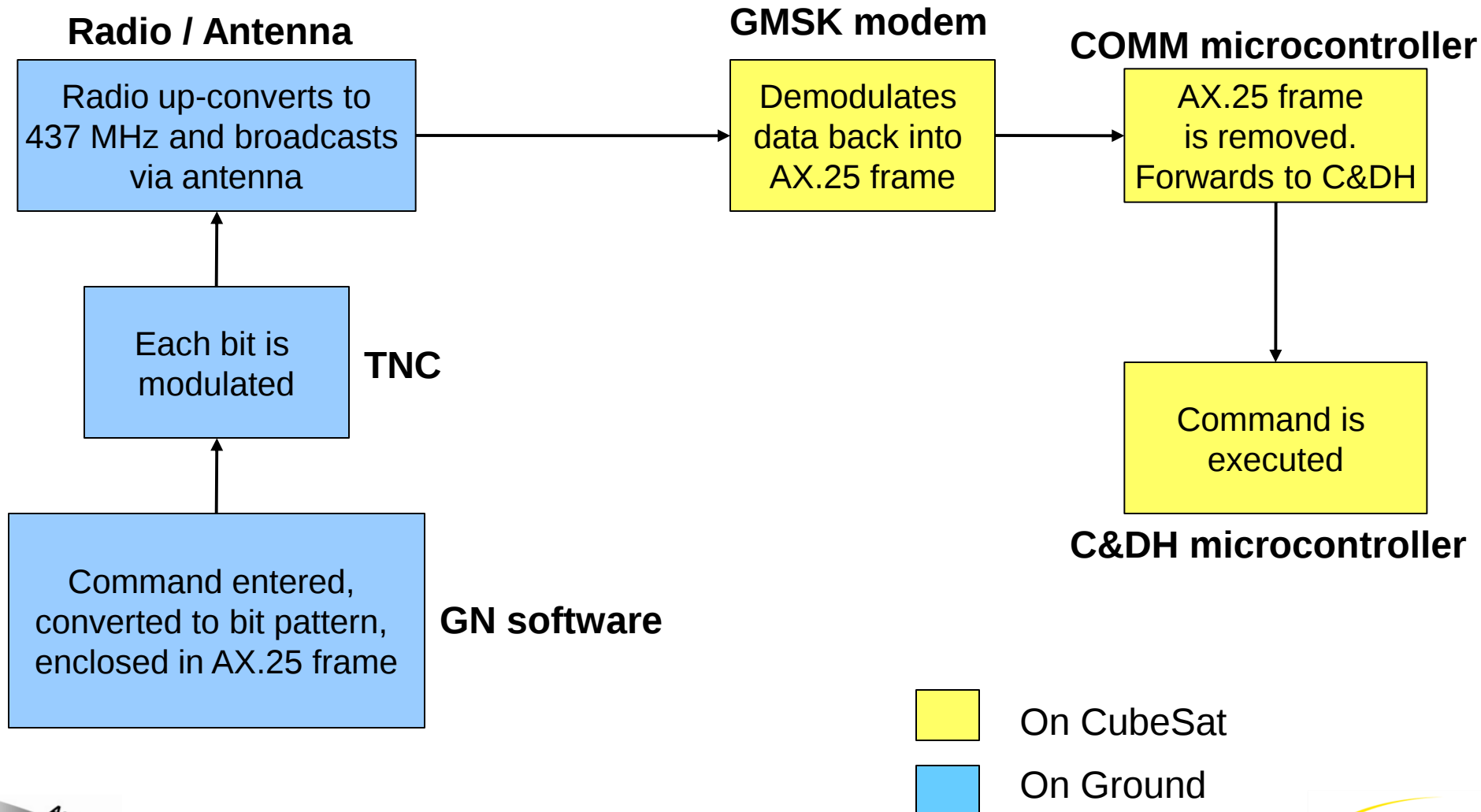


Boom's Minimum Distance from Obstacles

Ground:	22.9 in
Side Wall:	18.3 in
Pipe:	28.2 in
Tower legs:	7.3 in



GN Command Flow



GN Commands & Telemetry

■ Required Features:

- Send commands
- Receive and display telemetry
- Store data in appropriate files (science, HK, etc.)
- CLI (command line interface)

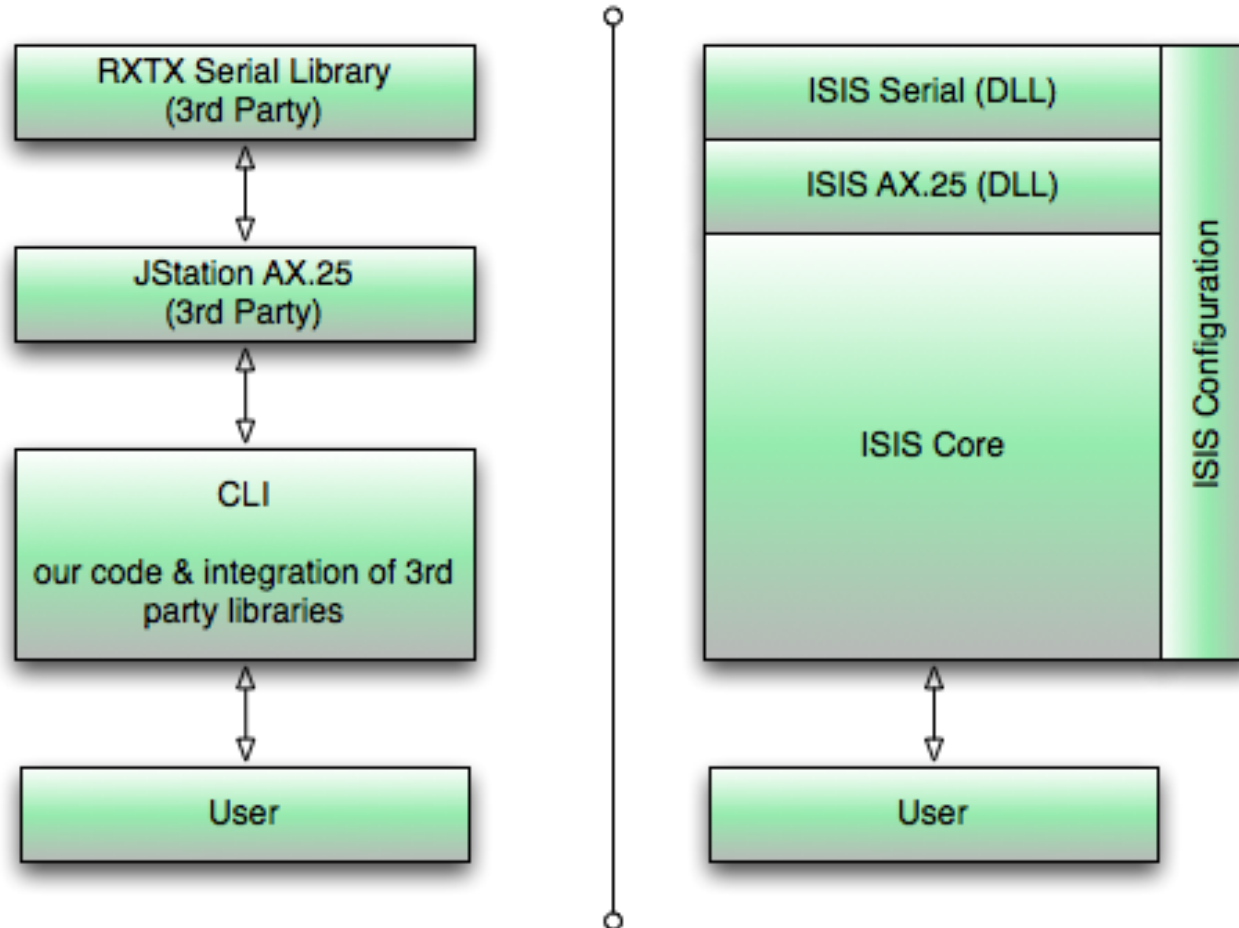
■ Desired Features:

- File based procedures
- Real-time telemetry plotting
- GUI (graphical user interface)



GN Commands & Telemetry

■ Architectures:



GN Commands & Telemetry

■ Current system

- Developed in-house, CLI
- Small, simple, leverage 3rd party serial, AX.25

■ Features

- Meets minimum requirements
 - Sends commands, receives data
- Includes variety of test aides

■ Plan/Future

- USB path + essential testing related additions/changes

