

Exhibit B - SoFIE Experimental Earth Station Communications Architecture

6/28/2026

The SoFIE Earth Station (ES) is located at Saint Francis University in Loretto, Pennsylvania and is composed of a UHF uplink/downlink capability for telecommands and an S-band downlink capability for science data (Figure 1, Table 1).

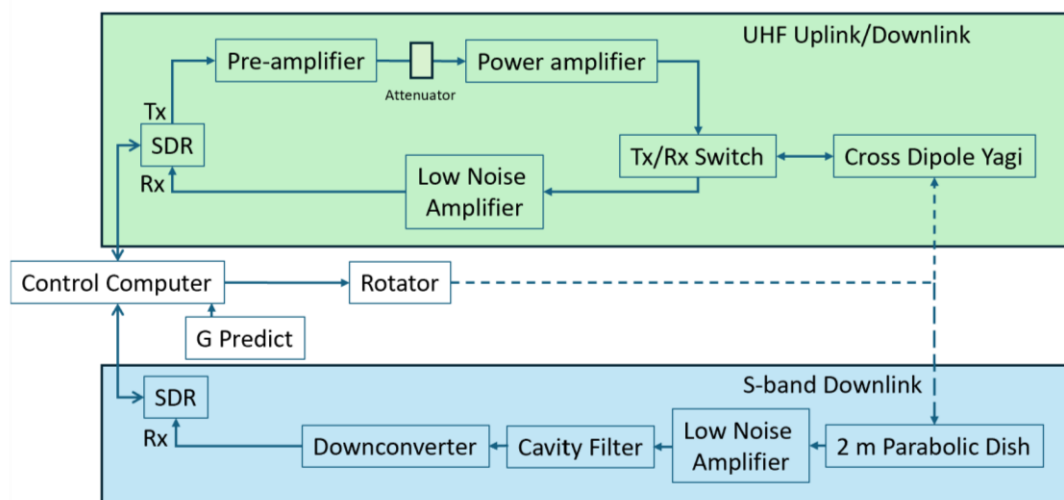


Figure 1: SoFIE Earth Station Block Diagram.

Band	Component	Manufacturer	Model	Comment
UHF	SDR	ETTUS	B200 Mini	
	LNA	Mini Circuits	ZX60-112LN+	Gain = 27 dB
	Pre-amplifier	Mini Circuits	ZX60-112LN+	Gain = 27 dB
	Power Amplifier	KH6HTV-VIDEO	Model 70-9B	Max = 70 W
	Tx/Rx Switch	Tohtsu	CZX-3500 Coaxial Relay	Isolation = -65 dB
	Cross Element Dipole Yagi	M2	436CP16	Beamwidth = 42° Gain = 13.3 dBi Polarization = RHCP
S-Band	SDR	SDRPlay	RSP1B	
	Downconverter	Nooelec	Ham It Down 3GHz Downconverter	
	LNA	Mini Circuits	ZX60-272LN-S+	Gain = 14 dB
	Cavity Filter	Mini-Circuits	ZVBP-2400-S+	
	2m dish + Helix feed	RF HamDesign	LX-13XL	Beamwidth = 4.3° Gain = 31.8 dB Efficiency = 60% Polarization = LHCP

Table 1: SoFIE Earth Station RF component list.

1. Earth Station Identifying Information

a. Location:

Saint Francis University
132 Franciscan Way
Loretto, Pennsylvania 15940

b. Coordinates of ES (WGS84 datum):

Latitude: 40° 30' 15" N
Longitude: 78° 38' 15" W

c. Configuration: The ES RF elements include a single UHF Cross Yagi antenna for telecommand uplink/downlink at 9600 bps. The ES also has a single S-band parabolic dish for science downlink at 1 Mbps.

2. UHF Uplink/Downlink

a. Antenna: M2 Cross-Element Yagi (436CP16)

b. Quantity: 1

c. Single or Multibeam: Single

d. Azimuth / Elevation Range: 360° azimuth, 90° elevation

e. Traffic Type: Telemetry, Telecommand

f. Uplink definition

- i. Transmit path: ETTUS B200 Mini SDR + 2 stage power amplification + antenna
- ii. Center Frequency: 437 MHz
- iii. Data Rate: 9600 bps
- iv. Channel Bandwidth: 23.1 kHz
- v. Emission Designator: 23K1G1D
- vi. Modulation Type: BPSK
- vii. FEC Type: BCH
- viii. Polarization: RHCP
- ix. Beamwidth: 42°
- x. Total Input Power at antenna flange: 20W (13 dBW)
- xi. Antenna Gain: 13.3 dBi
- xii. Max EIRP Per Carrier: 26.3 dBW
- xiii. Max EIRP Density per Carrier: 18.68 dBW/4 kHz

g. Downlink definition

- i. Receive path: Antenna + low noise amplifier + ETTUS B200 Mini SDR
- ii. Center Frequency: 437 MHz
- iii. Data Rate: 9600 bps
- iv. Channel Bandwidth: 23.1 kHz
- v. Emission Designator: 23K1G1D
- vi. Modulation Type: BPSK
- vii. FEC Type: BCH
- viii. Polarization: RHCP

- ix. Beamwidth: 42°
- x. Antenna Gain: 13.3 dBi
- xi. G/T: -14.7 dB/K

3. S-band Downlink:

- a. Antenna: RF Ham Design 2m parabolic + Helic feed
- b. Quantity: 1
- c. Single or Multibeam: Single
- d. Azimuth / Elevation Range: 360° azimuth, 90° elevation
- e. Traffic Type: Science Data
- f. Downlink definition
 - i. Receive path: Antenna + low noise amplifier + filter + down converter + RSP1B SDR
 - ii. Center Frequency: 2425 MHz
 - iii. Data Rate: 1 Mbps
 - iv. Channel Bandwidth: 0.840 MHz
 - v. Emission Designator: 840KG7D
 - vi. Modulation Type: QPSK
 - vii. FEC Type: BCH
 - viii. Uplink Polarization: LHCP
 - ix. Beamwidth: 4.3°
 - x. Antenna Gain: 31.8 dBi
 - xi. G/T: 7.2 dB/K

UHF and S-band link budget analysis results may be found in Exhibits E and F, respectively.