

Project Description: S-Band Groundstation

Note: the Canadian Space Agency(CSA) has already done a reference design for a UHF-VHF system. Take a look at it to base your design off of it!

Project Description in Brief:

The goal of the groundstation team will be to create a groundstation hardware infrastructure for an S-band (2000MHz) signal from space to earth[AKA: Space transmits signal and Earth receives). This project will include components such as RF filters, switches, antennas, transceivers, power protection components and isolators as needed. The list of expected items to be completed over the course of the project is:

- 1) Link Budget for the S-band system assuming an S band transmitter from Endurosat with their S-band patch antenna as well.
 - a. <https://www.endurosat.com/cubesat-store/cubesat-communication-modules/s-band-transmitter/?v=3e8d115eb4b3>
 - b. <https://www.endurosat.com/cubesat-store/all-cubesat-modules/s-band-patch-antenna/?v=3e8d115eb4b3>
 - c. Assumed groundstation transceiver is the USRP SDR. (See SDR folder in Github/groundsegment/COMMS—GS 2020 folder
 - d. Ansys HFSS Simulation for the (Must be chosen) groundstation antenna and (given) patch antenna.
 - e. Watch training videos from CSA to get started. Must email nmitch6@uwo.ca to get access to these videos (COMMS and Frequency Licensing videos will be needed! Other videos available if you want to watch)
 - f. Look at Github/Groundsegment/COMMS – GS2019 for an example groundstation architecture link budget!
 - g. Antenna noise temperature calculations
 - h. Insertion loss characteristics of the various components (quantifying the power emitted from the antenna)
- 2) A list of requirements for a groundstation assuming an S band transmitter from Endurosat with their S-band patch antenna as well. (Refer to CCP-CSA-00058-REQ-RP-Rev-P2 in the Github/groundsegment/COMMS—GS 2020/Example CSA documents folder for an example of a VHF and UHF Requirements doc)
- 3) System Block Diagram for the groundstation infrastructure.
 - a. Shows how the components are connected together. (see CCP-CSA-00101-DEV-SP-P1 in the example CSA documents)
- 4) Noise control for the out of band 3rd harmonic noise.
- 5) A “mock” groundstation prototype which can operate at a close band for much less cost. (example... Wi-Fi is very close...)

Github link:

<https://github.com/cubesat-project/CubeSat>