

Design review of the NUTS Ground Station

Requirements table

Code	Description
R05-GS-NGH-001	The ground station must send commands to the satellite
R02-GS-CW-001	The ground station must decode the beacon signal
R03-GS-NGH-002	The ground station must process housekeeping data
R04-GS-NGH-003	The ground station must receive payload data from the satellite
R06-GS-RS-001	The ground station must use FEC to prevent data corruption and loss

System overview

The role of the ground station is to provide communication with the satellite for the duration of the mission. The communication will take place on two different frequencies, VHF (145.98 MHz) and UHF (437.305 MHz), to give some flexibility with regards to noise and other communication. The data is encoded using the [NGHAM](#) packet radio protocol developed by J. Skagmo, LA3JPA.

The RF-frontend consists of an antenna with a PA for uplink and an LNA for downlink. This is connected to an USRP which performs filtering and mixing for basisband processing. The basisband signal processing and encoding/decoding is done by a computer running GNURadio.

GNURadio

USRP

RF-Frontend

- LNA/PA
- Antenna: circularly polarized

Gpredict

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Flyby

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Abbreviations

- CW: Continous wave
- GS: Ground Station
- LNA: Low Noise Amplifier
- NGH/NGHAM: Next Generation Ham
- PA: Power Amplifier
- RF: Radio Frequency
- RS: Reed-Solomon
- SDR: Software Defined Radio
- UHF: Ultra high frequency
- USRP: Universal Soft Radio Peripheral
- VHF: Very high frequency