Data Products

This section will cover the pata products generated by the Lektron mission. Consider these will vary depending on the P/L. The following information is presented in relation to ᴾᵒCat 1, ᴾᵒCat 2 and ᴾᵒCat 3.

1. Mission Data Products

The satellite mission will provide time-tagged, geolocated spectrograms and statistical data on Radio Frequency Interference (RFI) for both K-Band and L-Band. These bands are integral to a variety of critical applications:

- L-Band is primarily used for environmental monitoring, including soil moisture measurement, ocean salinity estimation, and sea ice thickness determination, all performed via microwave radiometry. It is also crucial for satellite navigation and GNSS reflectometry applications.
- K-Band supports atmospheric water vapor monitoring, short-range radar systems, and newly added 5G services.

The mission will also provide images on the visual spectrum, serving as a proof of concept for future PocketQube payload development and allowing the monitoring of large areas in critical enviromental states such as giant ice masses are rainforests. This task is performed by a VGA camera.

1.1. Scientific and Technological Questions to be Answered

The mission aims to enhance the understanding of electromagnetic spectrum occupancy in space. By providing RFI detection data, it will address key challenges related to spectrum interference regarding the impact of RFI on both communication and remote sensing. The data will also inform strategies for interference mitigation and spectrum optimization, ensuring the continued viability of K and L-Band applications.

The mission also aims to prove the feasibility of optical imaging by PQs.

Framework for Processing Mission Data Products:

RFI Data:

- Characteristics: Time-tagged geolocated spectrograms for K and L-Band frequencies.
- Sampling Frequency: High enough to allow detailed interference analysis and mitigation strategies. Specifically allowing for a high-resolution interference heatmap on ground.
- Ground Infrastructure: Data will be processed through a dedicated ground segment with advanced RFI detection capabilities, enabling both real-time and post-mission analysis.
- Data Volume:
  - **K-Band:** 2.8KB per measurement.
  - **L-Band:** 0.7KB per measurement.
- Accessibility: Data will be made available to certain stakeholders involved in the scientific sector like FARS and GRSS, promoting the collaborative development of spectrum usage strategies.

Optical Data:

- Characteristics: Time-tagged geolocated images of different Earth regions.
- Sampling Frequency: As defined by the operator.
- Ground Infrastructure: Data will be processed through a dedicated ground segment, enabling both real-time and post-mission analysis.
- Data Volume: Ranging from 2KB to 48KB. (more information provided here)
- Accessibility: Data will be made available to certain stakeholders involved in the scientific sector like FARS and GRSS.

Telemetry Data:

The satellite will generate telemetry data, including measurements of voltage, current, temperature, angular speeds, light intensity, and the Earth’s magnetic field. This data, although not commercially valuable, will be critical for assessing the operational state of the satellite and gaining insights into its long-term performance. The telemetry will be processed in near real-time and used to ensure optimal satellite functionality.

Services Provided:

The primary service offered by the mission will be comprehensive RFI data for K and L-Bands, enabling stakeholders to mitigate interference effectively, as well as close to real time Earth imaging. Additionally, the mission will provide operational health data for satellite performance monitoring, which will benefit satellite designers and operators for future missions.

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