# LEO Diversity

LEO-DIVE investigates satellite system architectures implementing switched diversity at UT for low frequency band scenarios (e.g., S-band) with omni-directional antennas and/or high frequency band scenarios (e.g., Ka-Band) with high-gain multi-beam ground terminals. The diversity techniques are assessed for either rural or urban scenarios, and an in-depth analysis is conducted for both transparent and regenerative payloads.

The System Testbed (STB) of LEO-DIVE project is one of the activity core developments. The STB integrates various simulators such as Matlab Satellite Communications Toolbox, Matlab 5G NR Toolbox and open-source ns-3 with proper 5G extensions and provides the following capabilities:

* Standards-based tools for developing, modelling, and validating satellite communications systems and links are available through the commercial MATLAB/Satellite Communication Toolbox.
* Functions and reference examples for the modelling, simulation, and verification of 5G NR and 5G-Advanced communications systems that are standard-compliant with the commercial MATLAB/5G NR Toolbox.
* Open-source ns-3 based simulator with pluggable 5G modules for simulating traffic and for integrating and testing multi-diversity techniques in a 5G NTN environment.

The proposed architecture can effectively simulate various systems setups for UTs and LEO constellations under the proposed switched diversity techniques. Next, extensive comparisons considering system scenarios not implementing MDT (Multi-Satellite Diversity Techniques) assess the overall improvement of achievable data rate and outage probability both at FWD and RTN links either in low- or high-frequency bands.

The proposed STB is also expected to model the orbital configuration and its effects (e.g. velocity of the satellite and Doppler shifts) together with the selected channel models.