Altice Labs Innovation Summer Camp 2024 - Mission Ground Control Software for Nanosatellite

Código/Code	Summer Camp'24_Mission Ground Control Software for Nanosatellite
Departamento /Department	DAC1
Orientador/Tutor	Nuno Filipe Monteiro
ID	N5
Estagiário/Trainee	<a preencher pelos RH>

Tema /Título/Title	Mission ground control Software for Nanosatellite
Âmbito/Enquadramento /Framework	One of the new capabilities being introduced in 5G is the integration of terrestrial networks with non-terrestrial networks (NTN), whether they are High Altitude Platforms (HAPS) flying in the stratosphere, or satellites in low orbit (LEO) or geostationary orbit (GEO). The ability to deliver 5G over non-terrestrial networks means expanding high-speed broadband coverage to isolated areas, or to areas where terrestrial infrastructure cannot reach, such as airplanes or maritime use cases. This concept can be expanded to complement it, that is, 5G coverage in low orbit from base stations on the ground, therefore being a natural evolution of Air-to-Ground technology (3GPP). Altice Labs is currently developing a nanosatellite (AKA "5G Nanosatellite") that will embed a 5G Terminal (UE), customized to Non-Terrestrial Networks. This nanosatellite will perform an in-orbit (LEO) demostration that consists of connecting to 3 ground stations (gNB) and mantain bidirecional IP connectivity during that time. Nevertheless, ground operations during any nanosatellite mission are always complex and require a lot of efforts in terms of time, cost and needed resources. A way to reduce time and costs is to use or develop a specific software that allows user to manage all subsystems telemetry and commands at the same time in autonomy way.
Objetivos do Projeto/Goals	Define the requirements to perform the control and the management of spacecraft subsystems telemetry and commands.
Atividades/Activities	Activity plan: • Identify and specify the telemetry paramenters that will be sent from the nanosatellite down to the Mission Control Ground Station located at Tagus Park (Oeiras); • Identify and specify the relevant 5G Control plane paramenters that will be exchanged between the UE in orbit and the 3 gNBs (PDCCH, PUCCH, etc); • Identify and specify the commands that could be sent from Mission Control Ground Station located at Tagus Park (Oeiras) to the satellite to correct, adjust or change the operation of the satellite; • Identify the visual tools that could help monitor the orbit of the satellite and ease its operation.
Tecnologias envolvidas /Involved technologies	• 3GPP Non-Terrestrial Networks (NTN); • Space Communications; • Embedded systems; • RFSoC; • Satellite avionics.
Requisitos/Requirements	• Commitment, curiosity and desire to learn; • Interest in technologies associated with space.
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Local / Place	Aveiro
Modelo de Trabalho/Work Model (Remote/Mix/Local)	Local / Mix

Duração/Duration	2,3 ou 4 weeks
Data de Inicio/Start_Date	To Be Determined
Data de Fim/Due_Date	To Be Determined
Entre que datas/Between dates	Between July and September
Observações/Observations	N/A