CELTIC-NEXT
Proposers Brokerage Day

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Pitch of the Project Proposal

AI-Orchestrated Programmable Multi-Orbit Space-Terrestrial Networks

orchAstra

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Problem

AI-Orchestrated Programmable Multi-Orbit Space–Terrestrial Networks

Main Problem

- Multi-orbit constellations are expanding but satellites **do not cooperate at network level.**
- Inter-satellite links (**ISL**) and **multi-orbit paths** remain largely **underused**
- **System-level coordination** across missions and orbits is missing.
- Network operation remains **tightly coupled to ground stations** due to static and mission-specific architectures

Resulting Inefficiencies

- Network scale is **not fully exploited**
- Idle satellites **cannot support** active missions.
- Communication architectures is **re-designed** per mission.
- Operations remain **strongly dependent** on ground station visibility.

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Solution

orchAstra enables satellites to operate as **a shared, programmable network**.

HOW?

- A mission-agnostic **SDN-based,**space-terrestrial network architecture
- Satellites operate as **programmable network nodes** across VLEO, LEO, and MEO
- **Policy-driven orchestration** of routing and resources across ISLs and ground stations
- **Delay Tolerant Network (DTN) as a first-class capability** for disrupted and time-varying connectivity.
- **Strict separation of control and data planes** to preserve operational safety.

WHY?

- Enables **in-orbit cooperation** without redesigning mission communication stacks.
- Reduces **dependence on continuous ground station** visibility, improving operational flexibility.
- **Provides a reusable networking foundation** aligned with future 6G NTN evolution.
- **Complements NTN access technologies** by addressing spacecraft-side networking and TC/TM robustness.

About Plan-S

We design, manufacture, launch, and operate advanced satellite systems entirely in-house, powered by a world-class dedicated team and fully integrated capabilities across the space value chain.

FOUNDED IN 2021, TÜRKİYE

MISSION

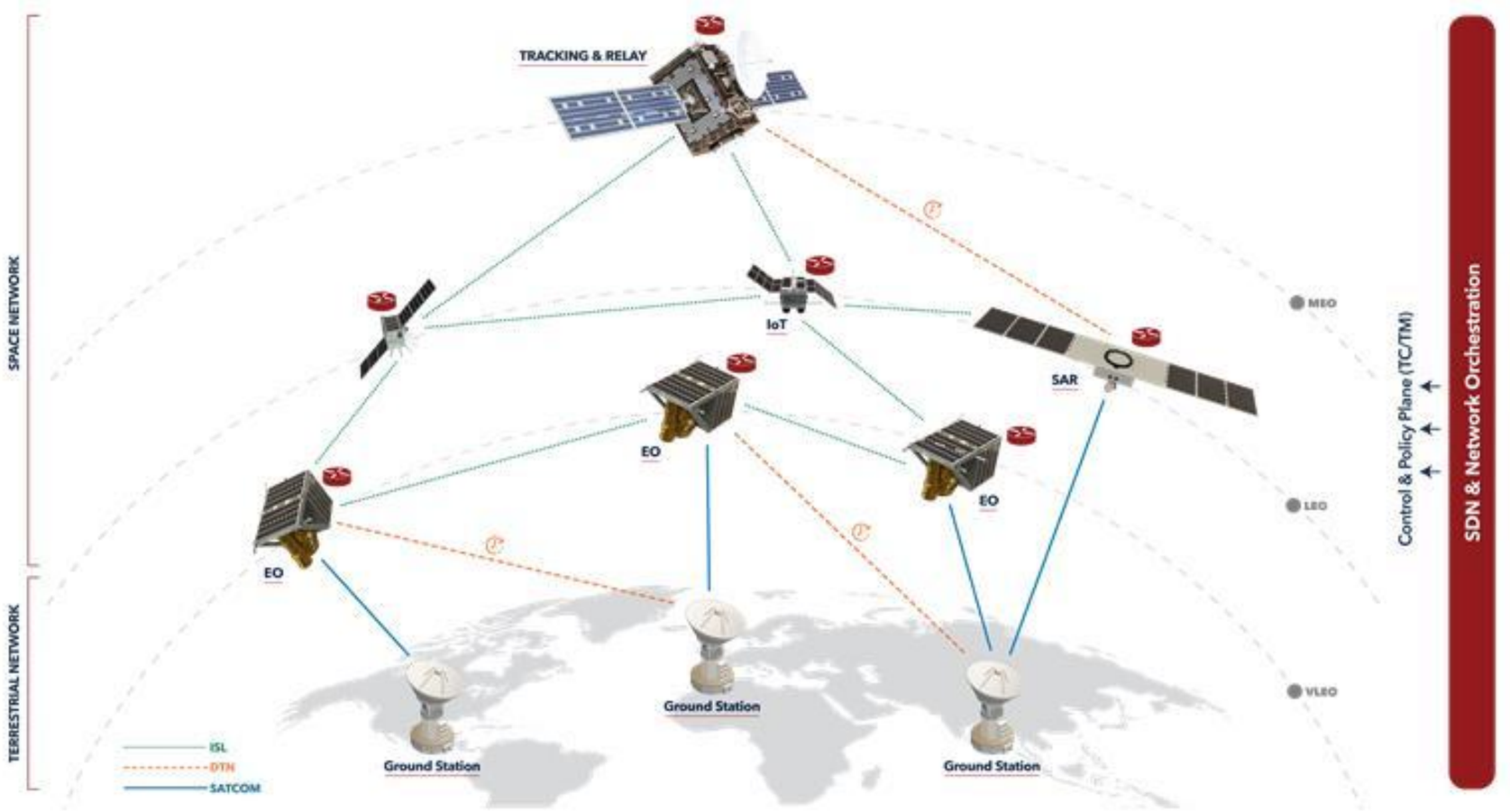
To build advanced satellite systems for tomorrow's challenging space missions.

VISION

To become the premier space technology company driving the transition to smarter space systems.

EXCELLENCE FOR THE NEW ERA OF INTELLIGENT SPACE

How it Works



- ✓ Cooperative satellites across multiple orbits (VLEO–LEO–MEO)
- ✓ ISL ground connectivity combined under unified network control
- ✓ Single orchestration layer managing control and data flows end-to-end
- ✓ In-orbit routing and forwarding reduce ground-station dependency
- ✓ Security-tiered communication across control and data planes

Satellites Operate as a **Shared, Programmable Network** Across Space & Ground

Milestones

Expected Outcome

A validated, reusable, programmable space–terrestrial networking architecture, demonstrated on real satellite systems and representative operational scenarios.

Impact

More efficient use of ISLs and existing space assets, reduced mission-specific redesign effort, and a scalable architectural path toward integrated 6G terrestrial and non-terrestrial networks.

Looking for Partners

Coordinator

Plan – S Satellite and Space Technologies

Telecom Operator

Türk Telekom

Research & Academic Partner

Çiçek ÇAVDAR
Professor of Communication Systems
KTH Royal Institute of Technology
(*Checking the availability of national funding is in progress)*

Contact Info

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Presentation is available via:

Join the Consortium Building Sessions

4. February
from 11:00-12:00 CET

Connection details:
Via
www.celticnext.eu/new-ideas