ETSI Research Conference 2023

Maximizing the Impact of European 6G Research through Standardization

ETHER Overview and Standardization Plans

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08/02/2023

1. Project Overview

- **Project Name:** ETHER – sElf-evolving terrestrial/non-Terrestrial Hybrid nEtwoRks
- **Project website:** ether-project.eu
- **Stream:** SNS-2022-STREAM-B-01-03: Communication Infrastructure Technologies and Devices
- **Goal:** ETHER is going to provide a framework for the terrestrial/non-terrestrial network ecosystem that involves an efficient and zero-touch resource management, provides solution for key radio access network (RAN) challenges, and identifies the business opportunities for potential stakeholders

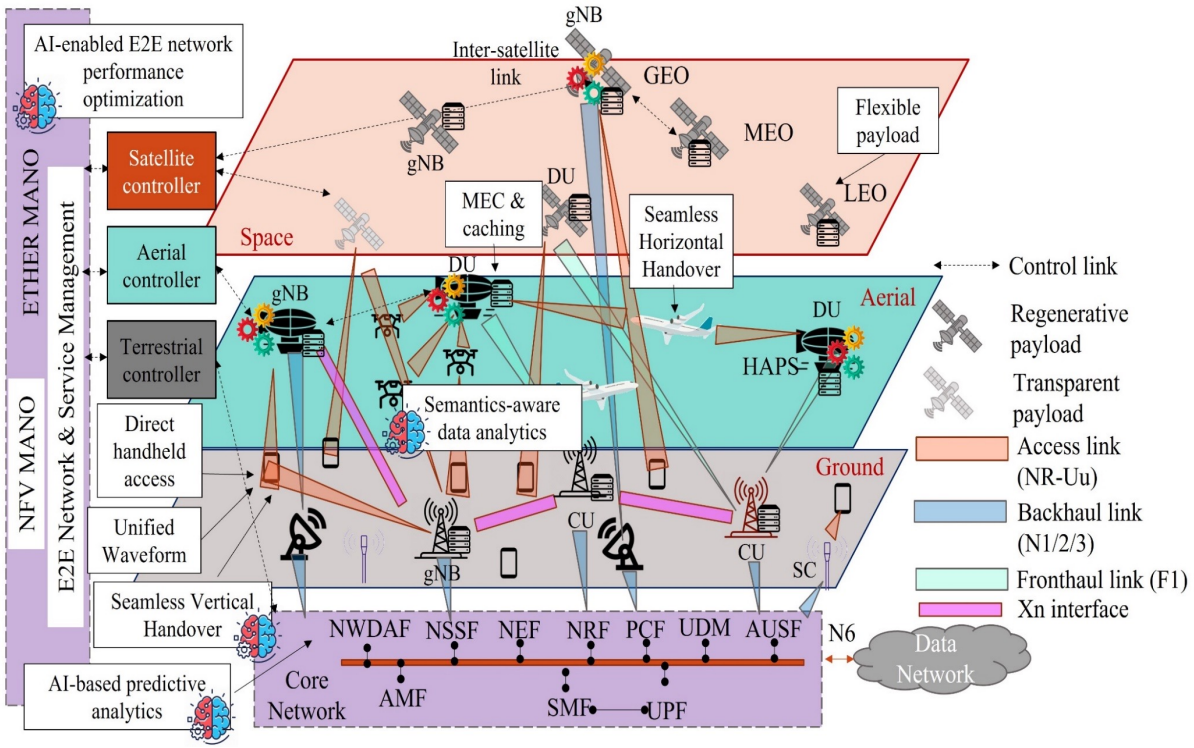
Number	Role	Short name	Legal name	Country
1	COO	uni.lu	UNIVERSITE DU LUXEMBOURG	LU
2	BEN	AUTH	ARISTOTELIO PANEPISTIMIO THESSALONIKIS	EL
3	BEN	CA	COLLINS AEROSPACE IRELAND, LIMITED	IE
4	BEN	AVA	AVANTI HYLAS 2 CYPRUS LIMITED	CY
5	BEN	SIOT	SATELIO IOT SERVICES, SL	ES
6	BEN	Ubiwhere	UBIWHERE LDA	PT
7	BEN	I2CAT	FUNDACIO PRIVADA I2CAT, INTERNET I INNOVACIO DIGITAL A CATALUNYA	ES
8	BEN	NBC	NEARBY COMPUTING SL	ES
9	BEN	NCSR "D"	NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"	EL
10	BEN	LIU	LINKOPINGS UNIVERSITET	SE
11	BEN	OPL	ORANGE POLSKA SPOLKA AKCYJNA	PL
12	AP	MARTEL GMBH	MARTEL GMBH	CH
13	AP	Net AI	NET AI TECH LTD	UK

2. Technical Information

Objectives

O-1	Provide solutions for a **unified and sustainable RAN** for the integrated terrestrial and non-terrestrial network
O-2	Provide an **AI-based framework** for the self-evolving network slicing management and orchestration of the integrated network
O-3	**Architect a viable, highly energy- and cost-efficient**, flexible integrated terrestrial and non-terrestrial 6G network offering seamless and continuous connectivity
O-4	Demonstrate the effectiveness of ETHER solutions by **experimentation activities** that target practical applications
O-5	Identify the key **benefits** that will drive the **investment** in the integration of non-terrestrial with terrestrial networks

3D Architecture



Technical Innovations

T-1	Integrated Architecture	T-2	Direct handheld device access at the Ka band from LEO satellites	T-3	Unified waveform design	T-4	Flexible payloads
T-5	Data analytics, edge computing, and caching	T-6	Horizontal/vertical handovers	T-7	Automated MANO for the integrated network	T-8	AI-driven E2E network performance optimization

3. Planned Standardization Activities

- **Standardization plans / objectives:** Active participation from an early stage and contributions to relevant SDOs, based on the scope of the project, will be pursued by the project's partners. Two-fold objective:
  - Ensuring that ETHER work is well aligned with the on-going work at SDOs
  - Promoting ETHER approaches and innovations into the evolution roadmap of the relevant standards

- **Project activities / technologies that may lead to standardization:**

AI-Based ETHER Joint Communication, Computational and Storage Resource Allocation Framework	Expansion of these algorithms to also account for both aerial and space layers	**AI-Based ETHER Monitoring Framework for Integrated Multi-RAT Traffic**	NetAI's Microscope traffic monitor will be extended to account for heterogeneous terrestrial, aerial, and space traffic apart from terrestrial	**ETHER Core Network**	The proof-of-concept core network with store-and-forward capability for discontinuous link operation will be expanded to account for the satellite dynamics, relative mobility and UEs location management
ETHER Flexible Payload System	Integrating the flexible payload system in an SDR board, also incorporating the ETHER MANO	**ETHER UE Antenna for Direct Handheld Device Access at the Ka Band**	Design of a handheld device antenna for broadband communication across the 3 layers		

3. Planned Standardization Activities

- **Potential targeted standardization bodies / groups:**

3GPP SA1 (focus on use cases and service requirements)	SIOT, I2CAT, UBW	3GPP SA2 (focus on system functional architecture)	SIOT, I2CAT, AVA, UBW	3GPP SA5 (focus on management, orchestration, and charging)	UBW	3GPP RAN WGs (focus on radio access protocols and radio access network architecture)	SIOT, I2CAT, UBW	ETSI SES/SCN	AVA, UL	ETSI ZSM	NBC, UL
ETSI MEC	NBC, UL	ETSI ENI	NBC, UL	IEEE P1918.1	LIU	NetworldEurope SatCom Working Group	AVA	Eurocontrol EASA, EUROCAE, RTCA	CA	O-RAN WG1-WG10	NBC, NETAI
ITU-T SG13	OPL	5G-PPP	UBW, SIOT, AUTH	AIOTI Standardization WG	UBW, UL	6G-IA	UBW, AUTH, UL, MAR, NBC, SIOT, CA, I2CAT, NCSRD, OPL				

- **Drawing upon as inputs:** ETSI OSM, ETSI TeraFlowSDN, O-RAN

- **Standardization planning and estimated time plan:** 3-5 years after the ETHER starting date