



Connecting Worlds: IEEE's Role in Engaging Academia and Industry and Developing Non-Terrestrial Networks



Saifur Rahman

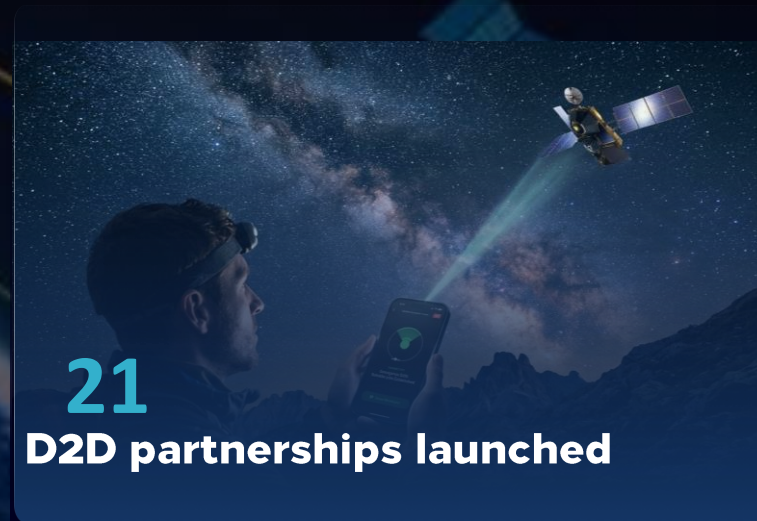
2023 IEEE president & CEO, Joseph Loring
professor at Virginia Tech.

Space-Enabled Sustainability on Earth

**Keeping space sustainable while
connecting every corner of the planet**

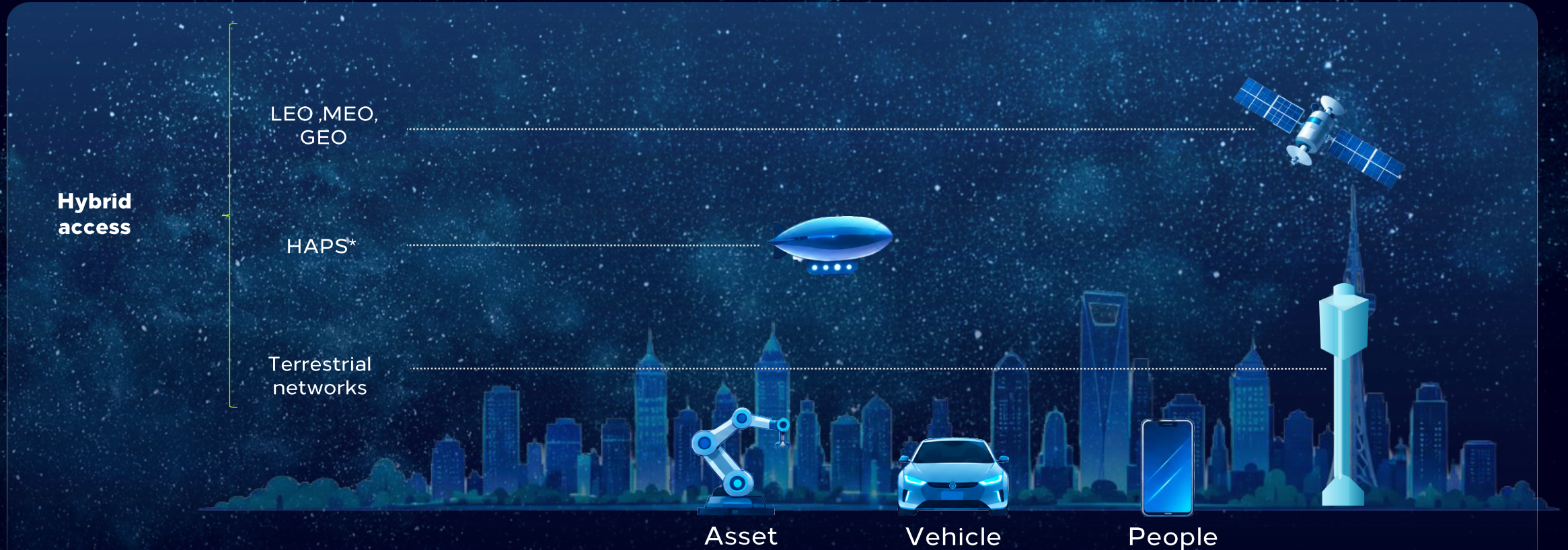


NTN has crossed from standards work into commercial scale



The executive question is no longer “if.” It is how to make integration repeatable.

The opportunity is not satellite alone—it is one hybrid service fabric



A single customer promise requires cross-layer mobility, identity, security, spectrum and operations

Four executive value pillars justify coordinated investment now

Reach

Extend service beyond
economical terrestrial
coverage

Resilience

Maintain critical
communication when
ground networks fail



Continuity

Create one service experience across
terrestrial and satellite domains

Asset Intelligence

Connect remote equipment with
standards-based IoT

**Value materializes only when standards, test evidence, devices, spectrum
and operating models move together.**

Six cross-domain gaps still block repeatable deployment

Engineering Gaps

Mobility

Fast topology changes, delay and compensation must work together

Spectrum

D2D growth raises interference, which needs regulatory coordination

Hardware

Link budgets, antennas, RedCap and battery life constrain experience

Operating Gaps

Interoperability

Proprietary paths must provide converge toward repeatable multi-vendor behavior

Security & Resilience

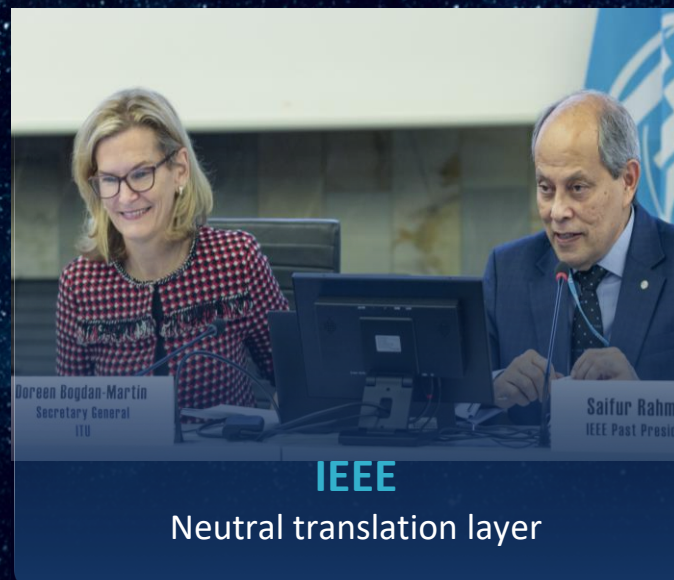
Identity, routing, on-board processing and recovery span domains.

Economics & Operation

Service assurance, roaming, SLAs and liability remain fragmented.

These gaps cross corporate and disciplinary boundaries—exactly where neutral coordination creates leverage.

The missing capability is a neutral translation layer across research, standards and products



Answering those questions determines readiness, and it can only be ascertained through a direct dialog between industry and academia

Attract student talent to achieve a connected earth and sustainable space

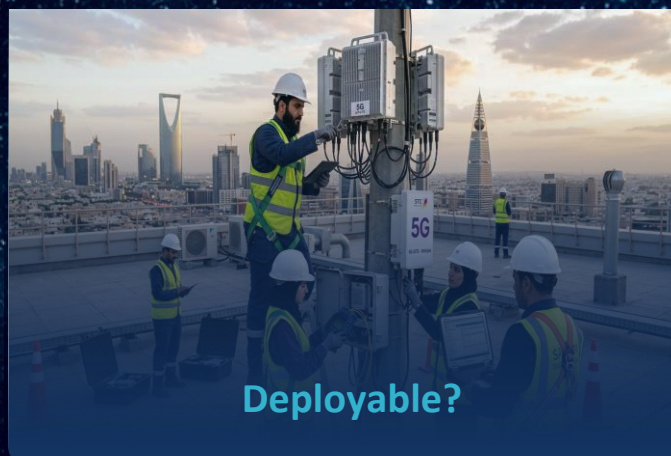
CST wants them to



We want students to participate and believe that they are part of the solution

Research competitions are one important means to bridge
the two sides

Is the idea:



Answering those questions determines readiness, and it can only be ascertained through a
direct dialog

CST- IEEE research competition is a great platform



IEEE-CST
Global research competition
on Non-Terrestrial Networks

The competition is a platform for idea exposure and academia-industry dialog

The competition connects academics, professionals, and policymakers

The global research competition on
Non-Terrestrial Networks (NTN)

2022
2nd Edition (NTN'22)

28

Submitted papers

Third Winner
5,000 USD

2024
2nd Edition (NTN'24)

60

Submitted papers

First Winner
15,000 USD

2026
3rd Edition (NTN'26)

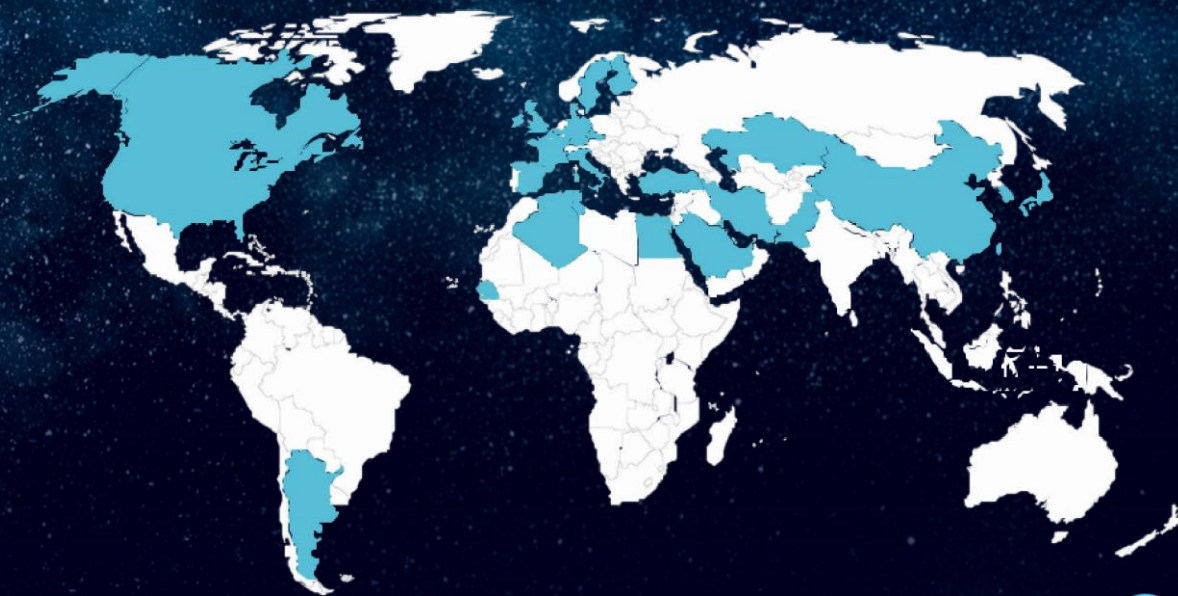
81

Submitted papers

Second Winner
10,000 USD

Contributions from around the globe

More than 280 competition participants in NTN'26



Competition Top 10 Finalists

Commercial Aircraft as Sustainable Relays for Satellite Direct-to-Device Access

Alessandro Traspadini; Marco Giordani;
Tommaso Melodia; Michele Zorzi



Mostly Asleep: How Much of an Orbital Data Centre Needs to Be Awake?

Camilo Jose Rojas; Juan A. Fraire; Fabio
Patrone; Nour Badini; Mario Marchese



When Every Cell Must Speak: Signaling-Aware Beam Hopping in LEO Satellite Networks

Siva Satya Sri Ganesh Seeram; Mustafa Ozger;
Cicek Cavdar



Sustainable Urban HAP Communications Through Geometry-Aware Fluid Antennas

Daniel Dinis; Islam Mohammad Tanash; Risto
Wichman



Affordable Connectivity from the Skies: A Subsidy-Aware Pricing Framework for Satellite Services Under Public Budget Constraints

Manobendu Sarker; Gunes Karabulut Kurt;
Wael Jaafar



AI-Enabled Multi-Layer NTN for Rapid Target Acquisition in Desert Search and Rescue

Abdullah Abu Zaid; Baha Eddine Youcef
Belmekki; Mohamed-Slim Alouini



Transmit Less, Deliver More: Frugal on-Device Intelligence for Energy- and Spectrum-Sustainable Direct-to-Satellite IoT

Alexander Y. Choguenaira-Florez; Herve
Rivano; Juan A. Fraire



EQROC: Hierarchical Reinforcement Learning for Energy- and QoE-Aware Satellite Resource Orchestration

Dhiraj Bhattacharjee; Pablo Madoery; Halim
Yanikomeroglu



Quantum-Safe Satellite Backhaul for the Unconnected: Post-Quantum IPsec over a GEO Link in a Private 5G Network

Mudhar Bin Rabieah; Adnan Alghammas;
Nouf Alsedairy; Mufeb Abdulrahman
Alsaqhan; Ahmed Alsubaihy; Hazim Alsallumi;
Hatim Alhazmi; Abdullah Aljuffri; Yasser M
Seddiq; Saleh A. Almarshed



Are HAPS Suitable for Next Generation URLLC Services?

Hadj Ahmed Chikh Dahmane; Mukhtiar
Ahmad; Mohamed-Slim Alouini



Technical committee of the competition

Competition Chairs

CST هيئة الاتصالات والفضاء والتقنية
Communications, Space & Technology Commission

Dr. Muhammad Alrabeiah
Advisor, CST



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Professor, Polytechnique
Montréal and Chair of IEEE
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Dr. Giovanni Giambene
Assoc. prof., University of Siena
and Vice-Chair of IEEE ComSoc
SSC



Technical committee members

40
Committee
members

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Dr. Jihwan P. Choi



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Maynooth University
National University of Ireland Maynooth

Dr. Mustafa Kishk



The University of Texas at Austin
Chandra Department of Electrical
and Computer Engineering
Cockrell School of Engineering

Dr. Jeffery Andrews



ETS

Dr. Wael Jaafar



جامعة الملك سعود
King Saud University

Dr. Paresh Saxena



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Dr. Saleh A. Alshebeili



SOUTHEAST UNIVERSITY

Dr. Li You



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Dr. Manlio Bacco



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some...**



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