PEP-Star: A Performance Enhancing Proxy for Low Earth Orbit Satellite Communications in Disaster-Resilient ASEAN Network Infrastructure

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About the Project

Project Members :

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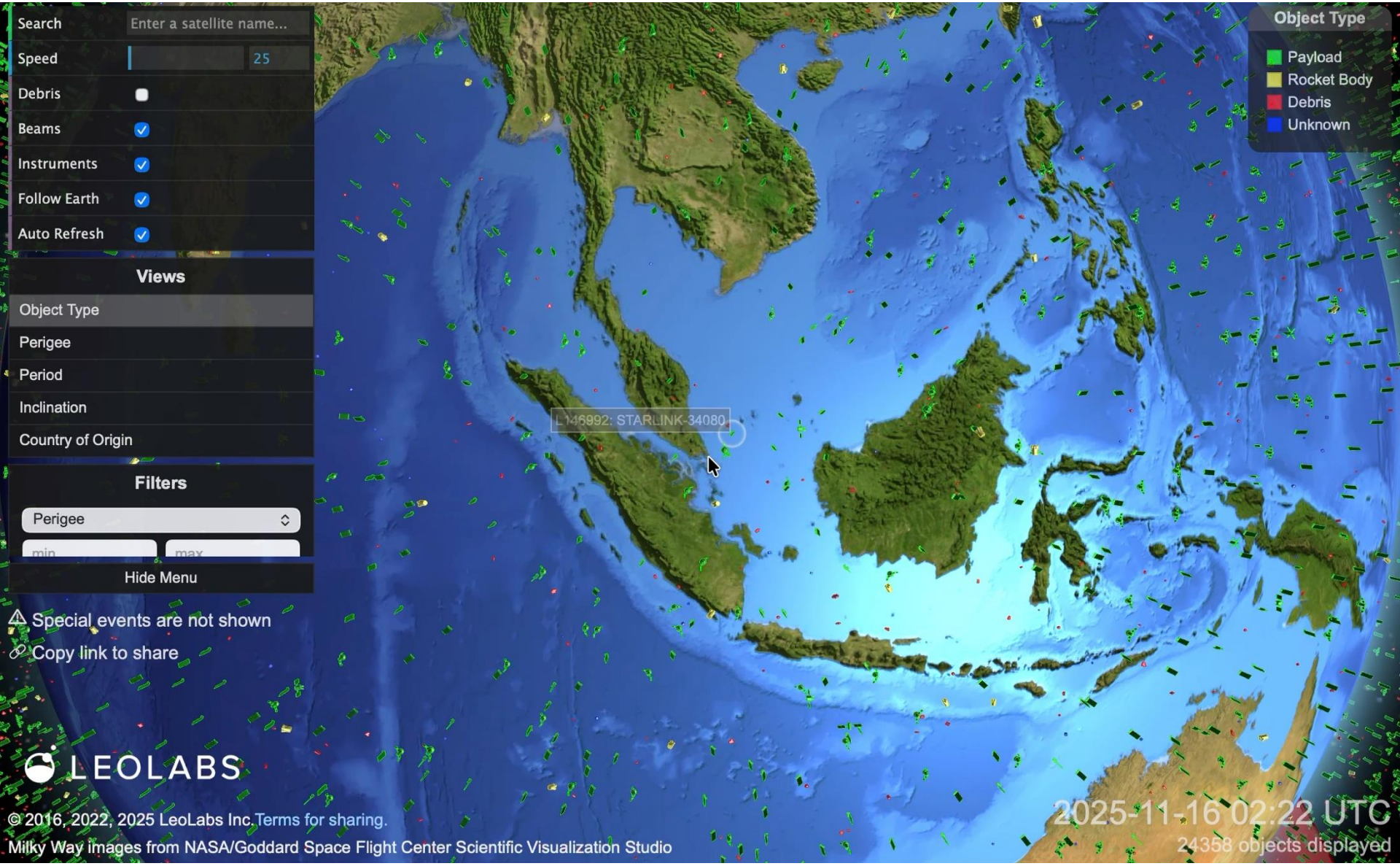
Project Duration :	**Project Budget:**	**Target Countries :**
15th September 2025 – 15th September 2027 (24 months)	USD 80,000	South East Asia

Satellite Handover Challenges



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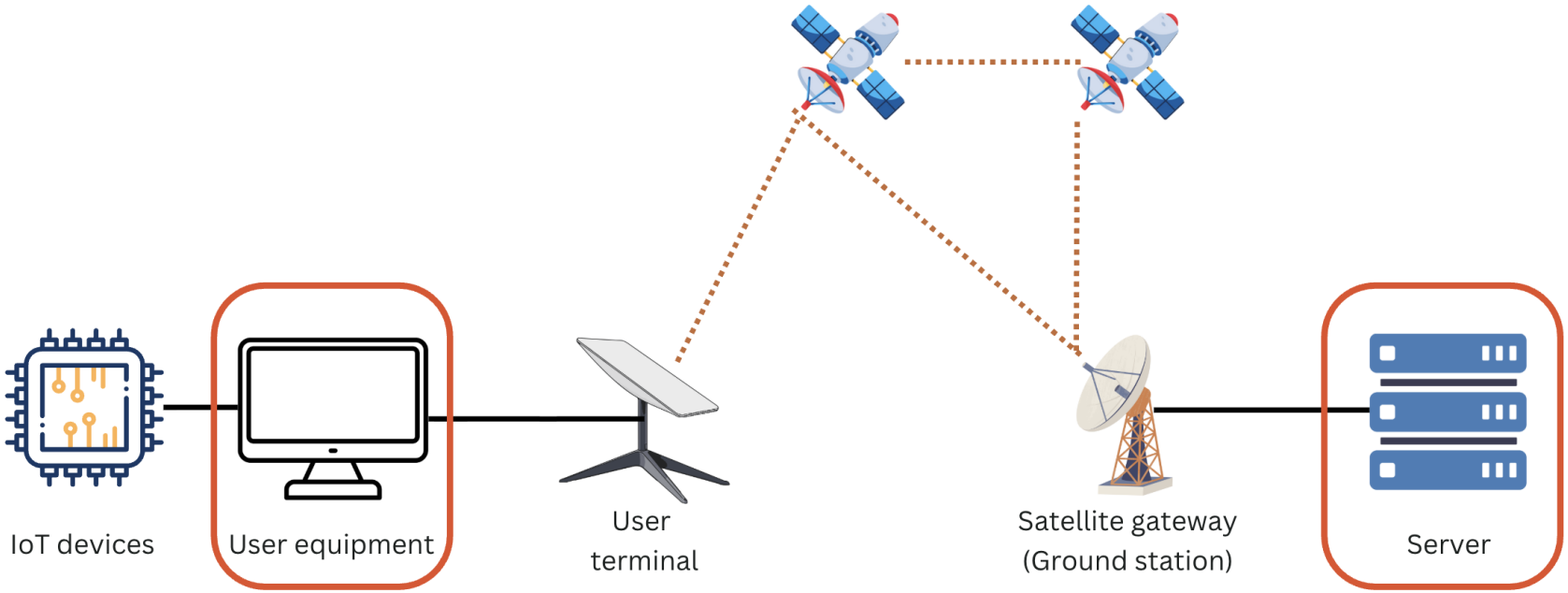
- To develop a proxy system that enhances Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) performance over LEO satellite networks;
- To implement handover-aware mechanisms to maintain continuous data flow during satellite transitions; and
- To integrate these protocols into a disaster management system.



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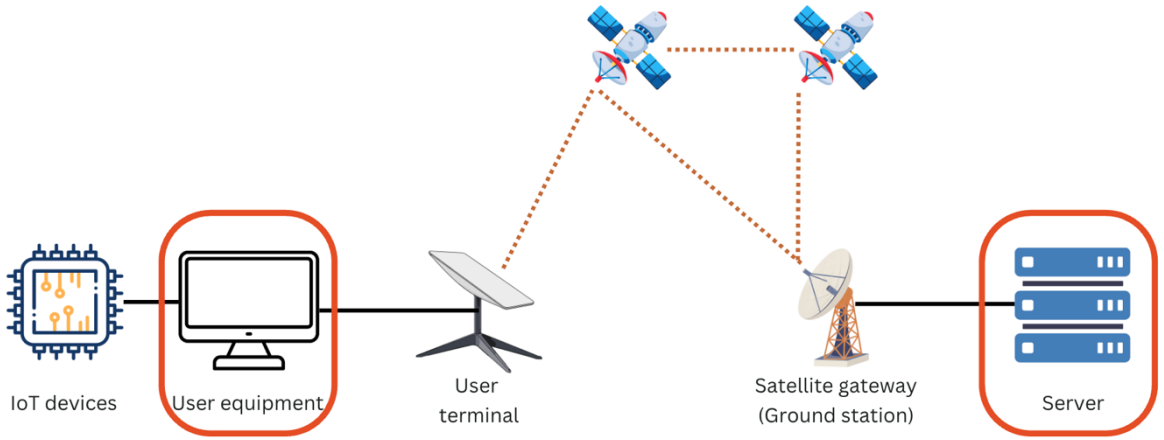
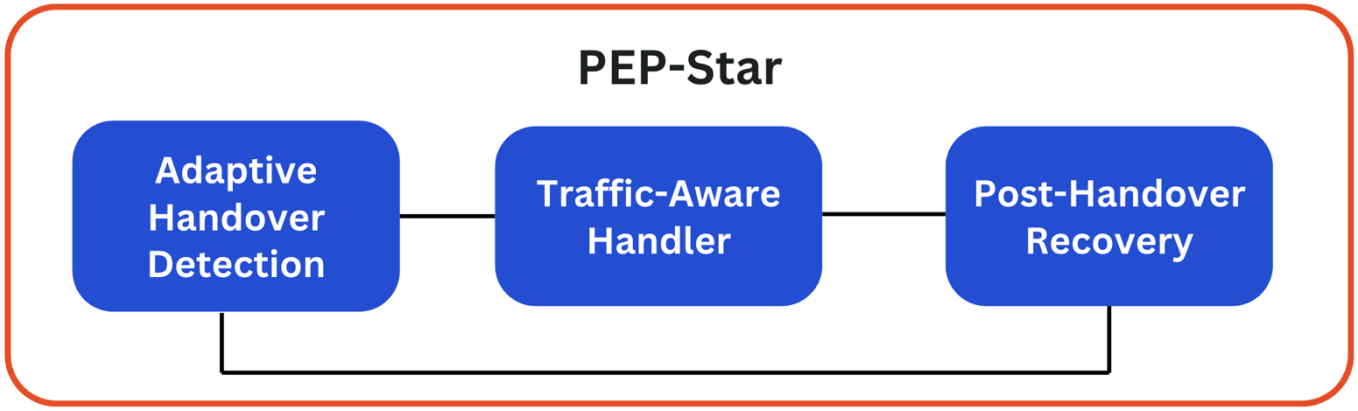
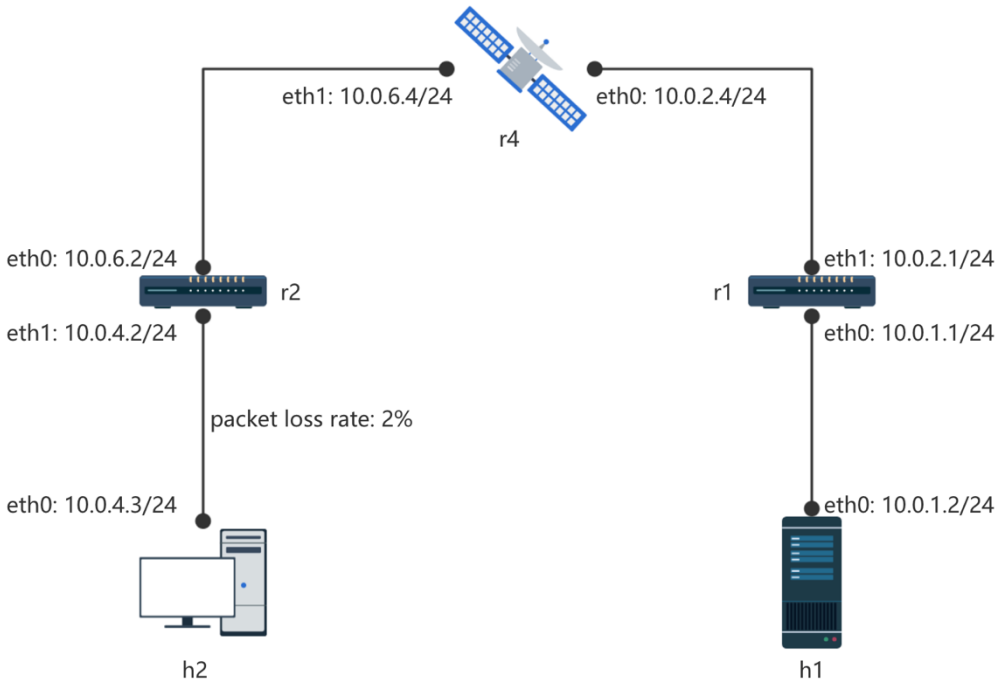


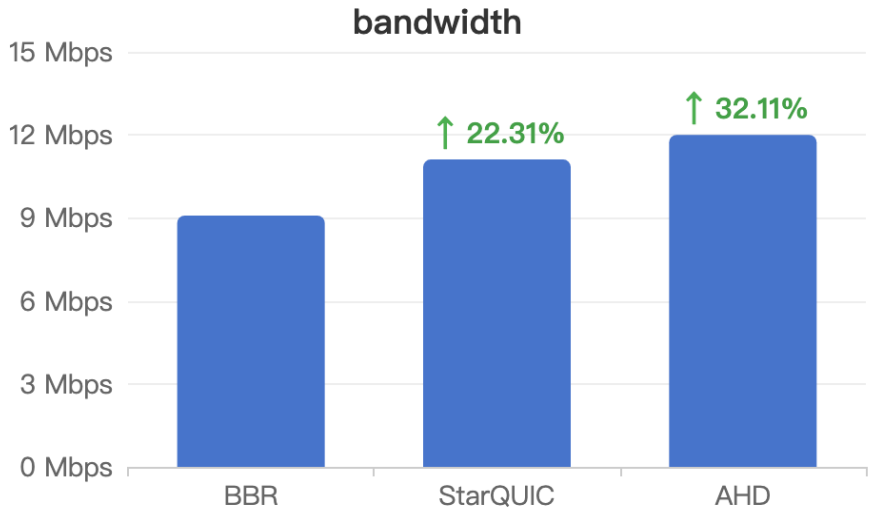


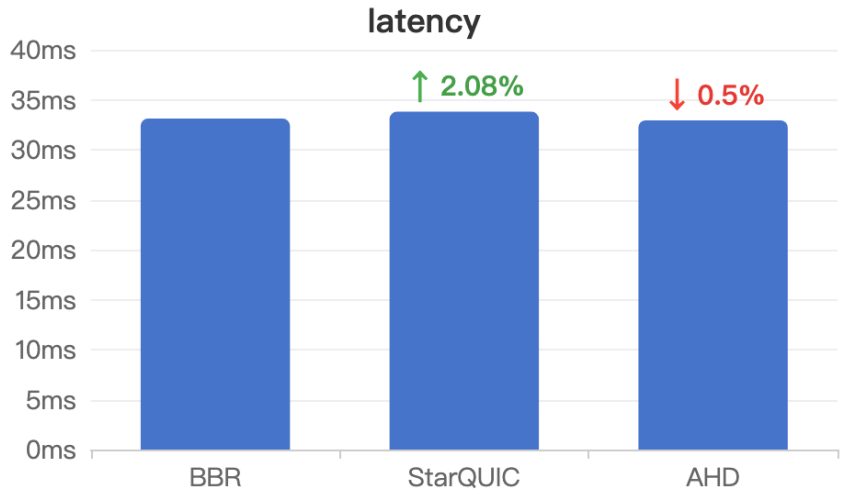
Network Topology Diagram of Simulated Environment

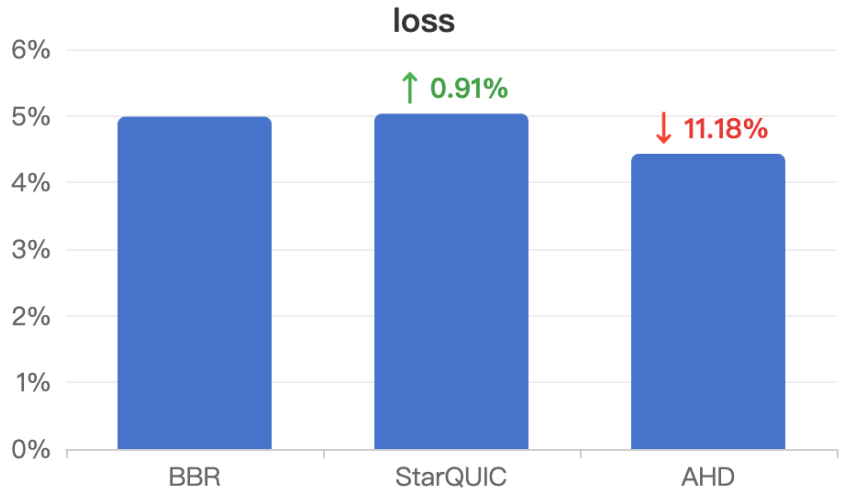


bandwidth r4-eth0	bandwidth r2-eth1	delay r4-eth0	delay r2-eth1
7.679483	27.2679	10.004434	14.805297
6.177609	27.911682	12.999328	15.949217
6.177609	29.030896	11.229219	14.287248
6.177609	23.635626	10.17478	14.580799
6.177609	28.308149	7.620991	15.715215
6.177609	26.277565	11.601738	14.615697
7.685301	29.714126	10.183283	14.706756

Simulation Results







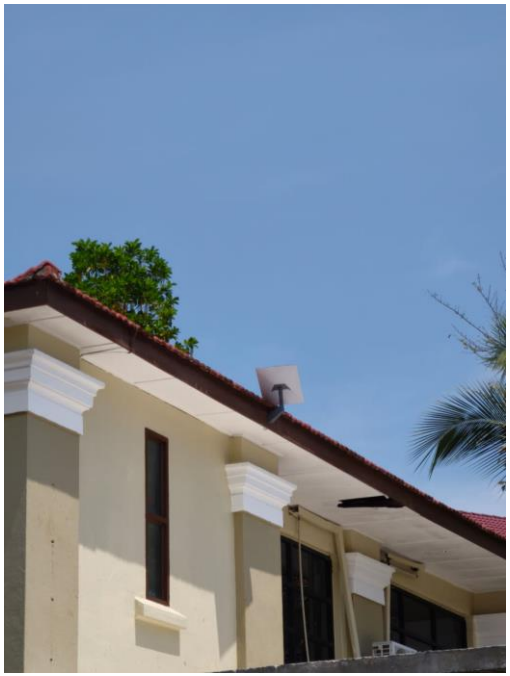
Project's Kick-off Meeting (29th January 2026) at Makassar, Indonesia

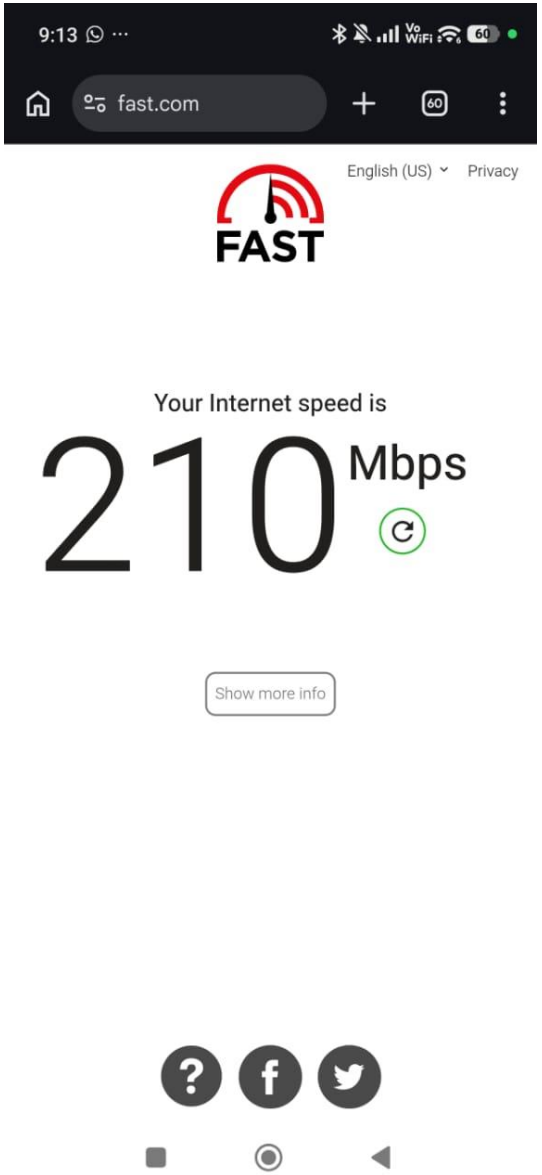
- Discussed strategic and operational issues of the project implementation.
- Refined the project methodology, exchanged ideas and discussed the approach for research and development collaboration.

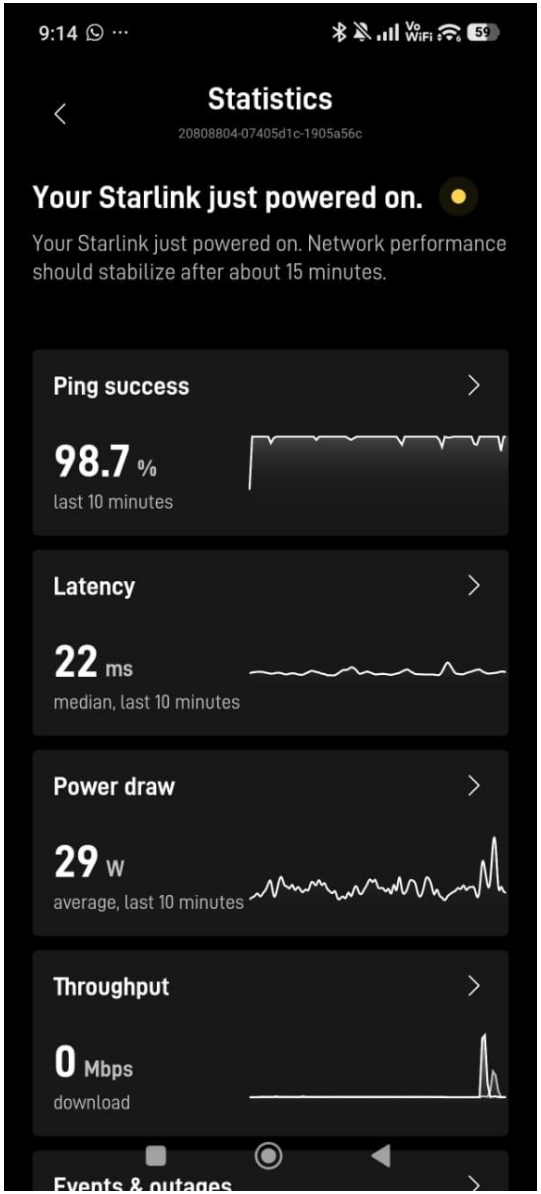
Disaster Management and Community Resilience Workshop (30th January 2026) at Makassar, Indonesia

- Provided participants with practical insights into disaster response systems and network infrastructure resilience
- Speakers: Prof. Dr. Ilham Alimuddin and Prof. Dr. Adi Maulana

Project Activities: USM

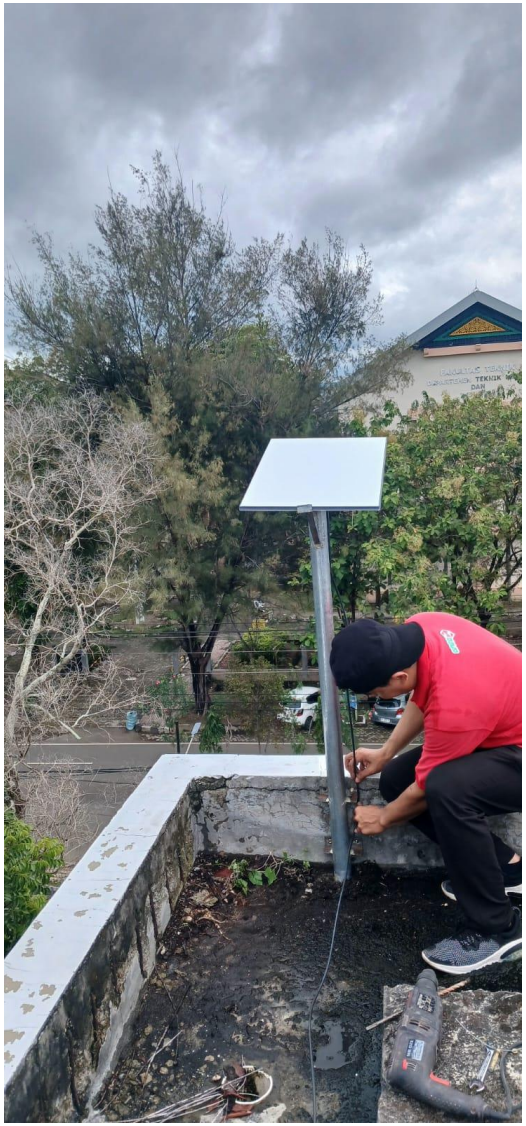






Project Activities: NUOL

Project Activities: Indonesia (UB, USK, BPBA, UNHAS)



Testbed


Vientiane, Laos
Banda Aceh, Indonesia
Penang, Malaysia
Makassar, Indonesia
Malang, Indonesia

Moving Forward

- Key Activities:
  - Satellite performance measurement of Starlink
  - Integration of algorithms into the system
  - Setup of weather monitoring sensors with Starlink

- Meetings:
  - USM (28 July 2026)
  - NUOL (June 2027)

- Deliverables:
  - Presentations at International Conferences
  - Journal Paper Publication

Budget

2-years financial support: USD 80,000

- 1st year: USD 40,000
- 2nd year: USD 40,000

Budget Spent:

- Purchase of server and workstations : USD 30,985.92
- Kick-off meeting: USD 6,689.34
- Purchase of IoT sensors: USD 1,890

Broader Impact

BROADER IMPACT

Technical Impact

Uninterrupted real-time environmental monitoring for early disaster detection

Societal Impact

Improve early warning dissemination to vulnerable communities in ASEAN

Regional Development

Strengthen regional cooperation in disaster management

Thank you for your attention!

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