GLOBAL ANTENNA SHARING PROJECT
for achieving Sustainable Development Goals

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A UNISEC-GLOBAL PROJECT

The Global Antenna Sharing Project initiated by

• Kyushu Institute of Technology, UNISEC-Japan

in collaboration with

• Istanbul Technical University, UNISEC-Turkey

with support of InfoStellar, Japan
What is UNISEC-Global?

- University Space Engineering Consortium (UNISEC)-Global is an international NGO, consisting of local-chapters across the world. Established in 2013, and accepted as permanent observer by UNCOPUOS in 2017.
- Its primary objective is to help create a world where space science and technology is used by individuals and institutions in every country, rich or poor for peaceful purposes and for the benefit of humankind.
- Has provided hands-on satellite training program, conferences and competitions

15 Local Chapters and 135 universities from 40 countries with 47 POC
Vision 2030-ALL

The 2030 Agenda for Sustainable Development

Key Principle: No one will be left behind.

Vision 2030-ALL

“By the end of 2030, let’s create a world where university students can participate in practical space projects in all countries.”

Need wise strategies, partners, collaborators and supporters

6th UNISEC-Global Meeting will be held at ISU Strasbourg, France in Nov 19-21, 2018
Main Goal of Project

- Efficient use of Micro/Nano Satellite systems (constellations) *(300 placed in orbit in 2017)*
  - Sharing resources
  - Helping less developed institutions to reach higher levels
  - Increased usage time of expensive systems (ground stations)
  - Reduced downtime
  - Better use of systems

- help yourself help other
how we can help SDGs...?

https://sustainabledevelopment.un.org/sdgs
Satellites Communication

Function of Ground Station

• Pointing to a satellite (Satellite tracking)
• Send telecommand to satellite
• Receive telemetry/mission data from satellite
• Process RF signal (Mod/Demodulation, Coding/Decoding)
Limitation of Communication Time

- Limited communication time window in LEO
- Average communication time = 40 minutes/day
- Require long time to download payload data
Antenna Sharing

- Increase the number of tracking antennas

By connecting more antenna
Time Resolution Increases!
Advantage of Many Antennas

1 Antenna
1 Satellite with 1 Antenna
35-65 Min / day

Many Antenna
1 Satellite with 7 Antenna
145 Min / day

Time resolution increase up to 3 time!!
A solution: StellarStation

A cloud-based software platform that connects satellite operators with antenna owners, solving both the problem of insufficient satellite access time and unused antenna idle time.

The process is simple:

• Share your antenna’s idling time and get credits.
• Use your credits to access other antennas around the globe.
• Exchange your credits for cash, or buy additional credits for even more antenna access time.
Graphical User Interface
A new standard for satellite ground stations

• Flagship product, StellarStation. Reshape the satellite operation scene in three major ways:

1. Shifting the paradigm to antenna sharing, opening up large numbers of antennas for use and dramatically increasing access

2. Solidifying satellite communications into a standardized system so that this increased access can be seamlessly utilized

3. Creating a real-time transmission environment for satellites, thus lowering the barrier to entry on satellite operations
space development for everyone

• Building this new ecosystem for ground station networks, we hope to open the door for previously unachievable space development.

• Space for everyone!
StellarStation Amateur

• Built on the StellarStation platform, StellarStation Amateur provides free LEOP support for amateur UHF band satellites.
• Use StellarStation Amateur to access invaluable telemetry data and schedule passes using member worldwide antenna network during a critical phase of launch and satellite operations.
İTÜ-SSDTL VHF/UHF GS

ANTENNA
Additional Equipment for Antenna Sharing
İTÜ-SSDTL COMM LAB with StellarStation
GSN Device

- **Receiver**
  - Satellite downlink signal reception
  - Output in IQ data (raw data)
  - Centralized demodulation and decoding are done by software defined radio (SDR) at Central Server.

- **TLM transfer**
  - Transfer IQ data or processed data to Central Server

- **Transmitter (optional)**
  - Satellite uplink signal transmission
  - Encoded and modulated IQ data from Centralized SDR at Central server and transmits uplink signal to satellite.
How use our GS network?

Go to: https://www.stellarstation.com/amateur
and Sign up for an account
Select satellite and download data

Use web based GUI to:
- Download telemetry (Raw Data) from satellites
- See available passes across the world
- Demodulate / Decode in the cloud and view the Telemetry in browser.*

* To be available
Re-processing satellite downlink data

The satellite downlink data can be re-play and processing by using **SDR#** and **GNU radio**

* To be available
**Downloaded Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Packet ID</td>
<td>ON</td>
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<tr>
<td>MCU Status</td>
<td>ON</td>
</tr>
<tr>
<td>SD Card 1 Status</td>
<td>ON</td>
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<tr>
<td>Battery Status</td>
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<tr>
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<tr>
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<td>BCR3B Volt</td>
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<tr>
<td>3V3 Curr Usage</td>
<td>21.24 mV</td>
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<tr>
<td>EPS Batt Volt</td>
<td>7.53 V</td>
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<tr>
<td>3V3 Curr</td>
<td>5.04 V</td>
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<tr>
<td>Batt Volt</td>
<td>7.61 V</td>
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<tr>
<td>Batt Temp</td>
<td>21.82 C</td>
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<tr>
<td>Batt 3V3 Curr</td>
<td>6.64 mA</td>
</tr>
<tr>
<td>Batt 1 Heater</td>
<td>OFF</td>
</tr>
<tr>
<td>Batt2 Temp</td>
<td>OFF</td>
</tr>
<tr>
<td>Batt 3 Heater</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Graph:**

![Batt Volt Graph](image_url)

- **Axis:** Batt Volt (V)
- **Range:** 04:59:40 to 05:00:40
- **Values:** 6.64 mA, 3.34 V, 23.45 C
How to join the Global Antenna Sharing Project with your Antenna

• Contact us to get a template of MoU.
• Review the MoU and make revisions that you deem necessary.
• Fill out Antenna Configuration Questionnaire: https://goo.gl/forms/FNYypPrzHNR1V5vu2
• A Block Diagram of your ground station is required to be sent.
Further Benefits

UNISEC-Global provides Information and help on:

- How to operate a satellite
- Regulations and frequency coordination
- Ground Station Network Access
- Frequency Sharing
Questions?
Thank you
Contact

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