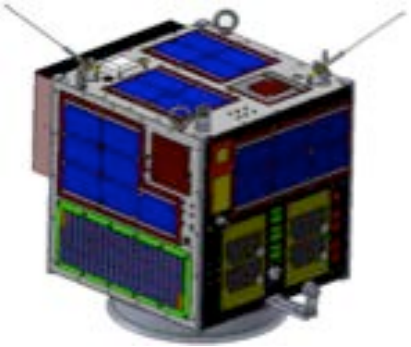
Agenda item 10
Technical Presentation at the 61st Session of the
Committee on the Peaceful Uses of Outer Space

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

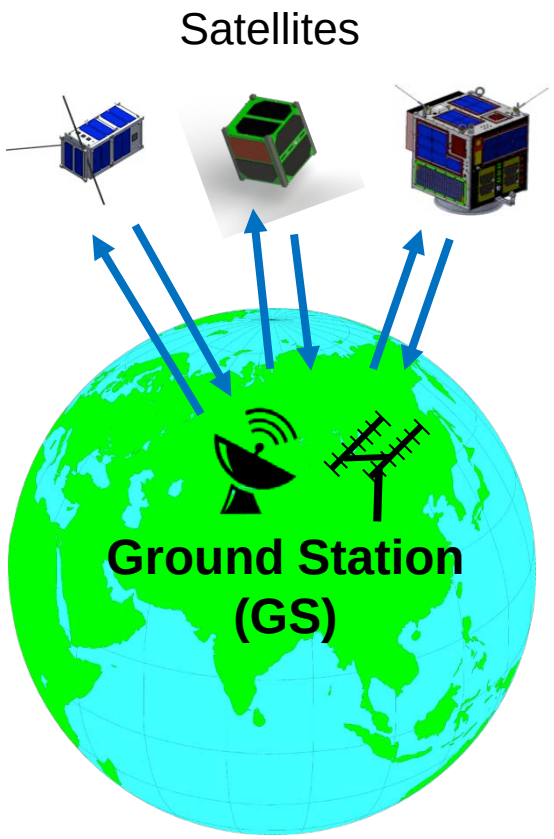
- **Efficient use of *Micro/Nano Satellite systems (constellations)*** ***(300 placed in orbit in 2017)***
  - ***Sharing resources***
  - ***Helping less developed institutions to reach higher levels***
  - ***Increased usage time of expensive systems (ground stations)***
  - ***Reduced downtime***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

- ***help yourself help other***

how we can help SDGs...?

https://sustainabledevelopment.un.org/sdgs

Satellites Communication

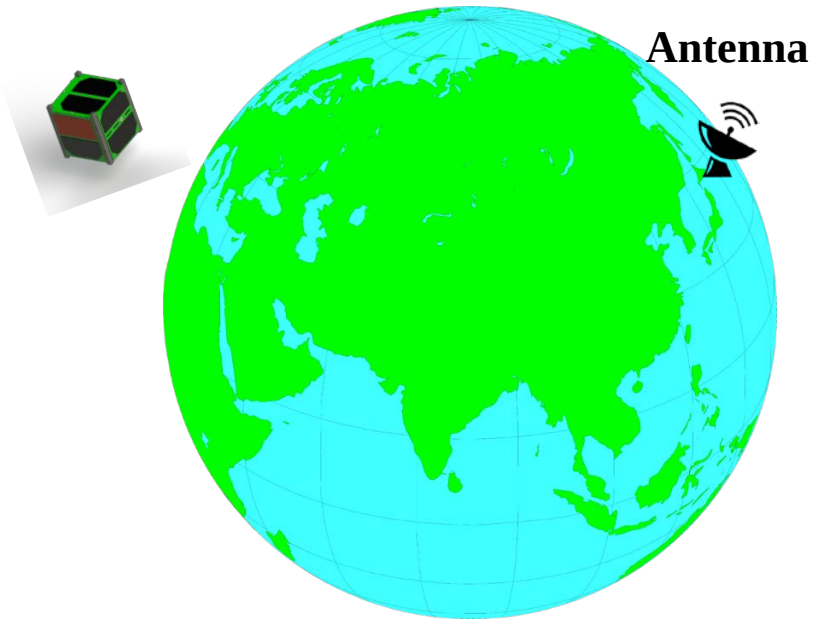


Function of Ground Station

- 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

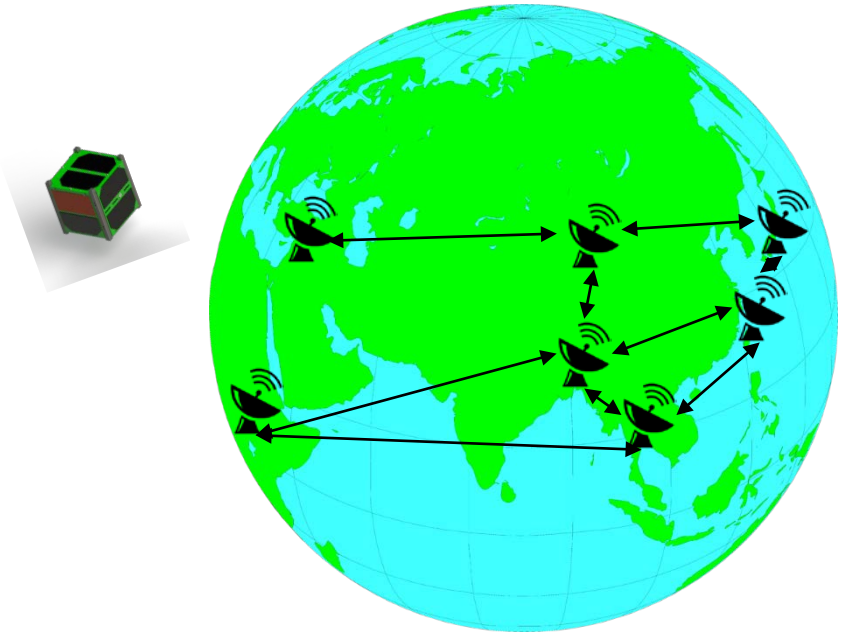
- Limited communication time window in LEO
- Average communication time = 40 minutes/day
- Require long time to download payload data



40 min/ 1day
[10min x 1 pass x 4 times]

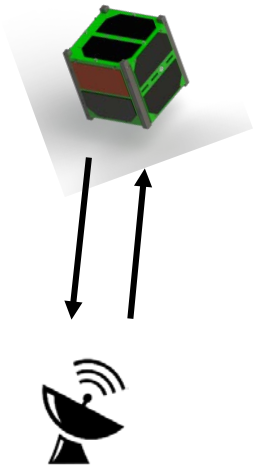
Antenna Sharing

- Increase the number of tracking antennas



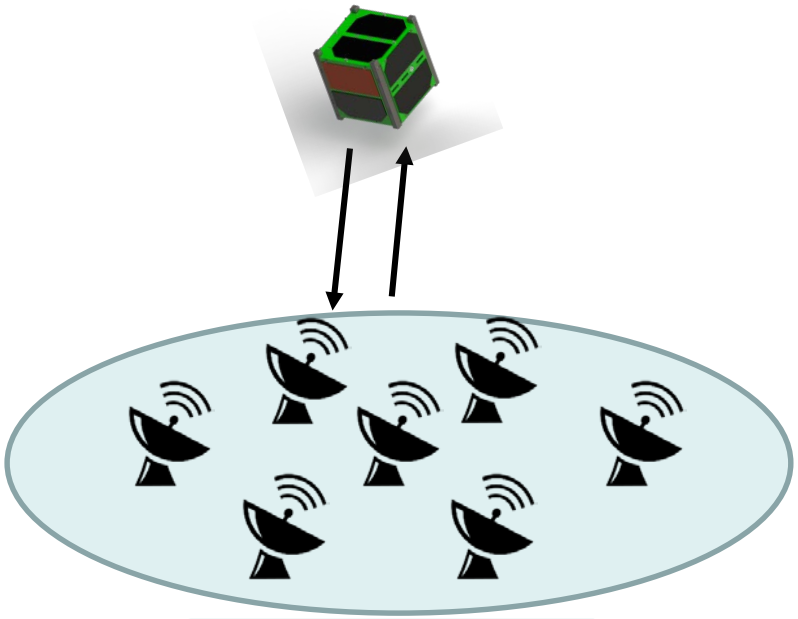
By connecting more antenna
Time Resolution Increases!

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!!

10

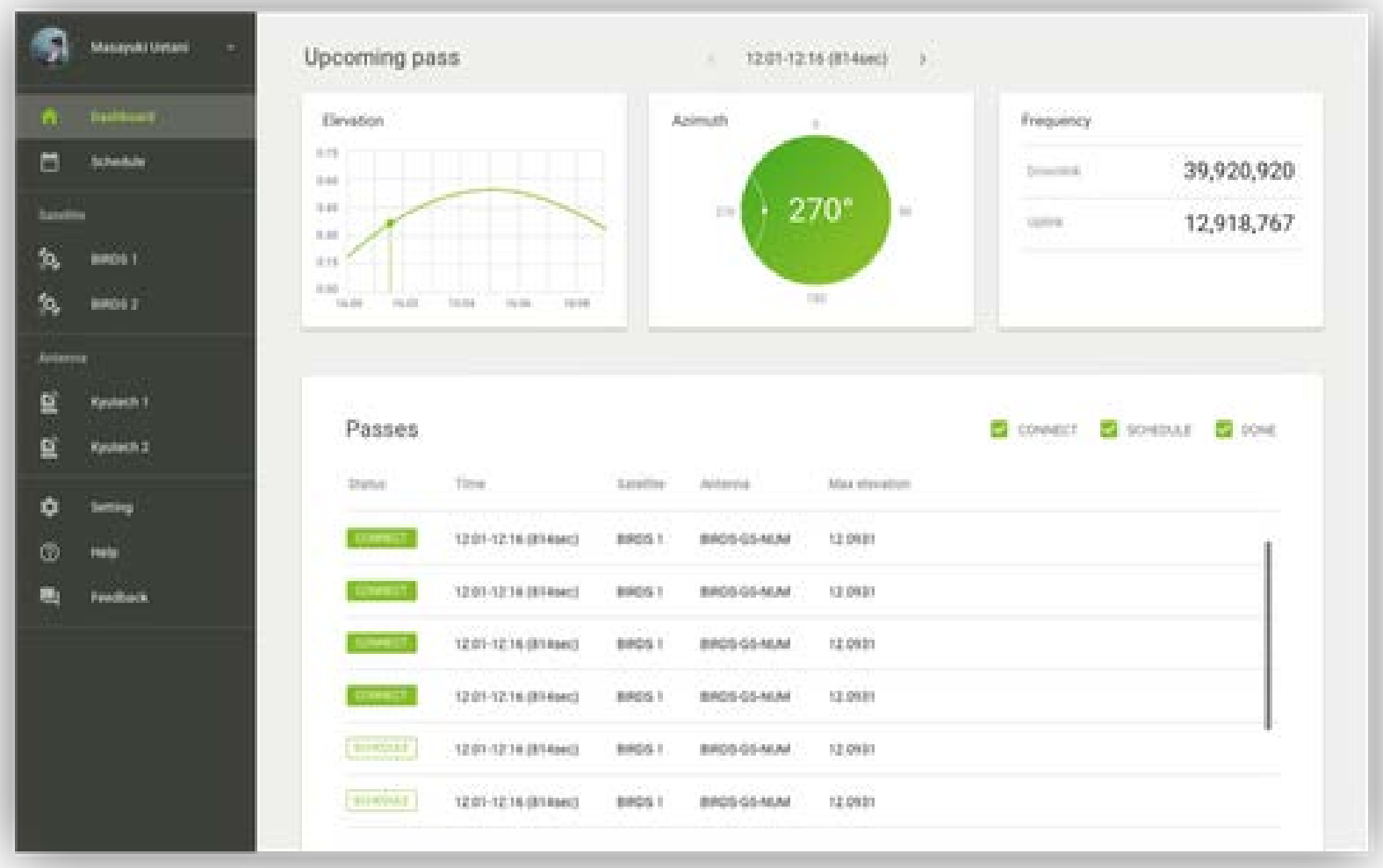
A solution: StellarStation

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

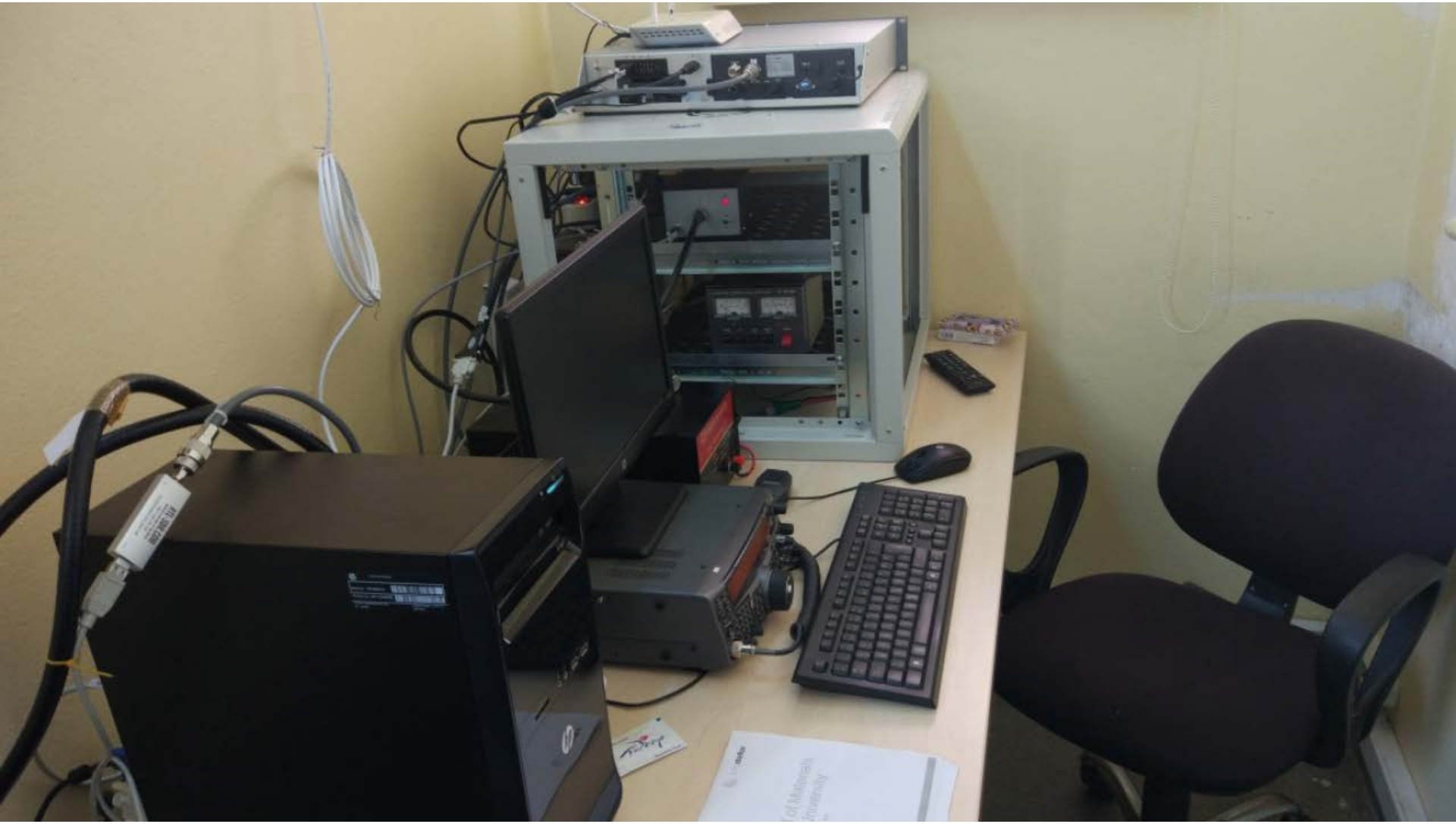
Additional Equipment for Antenna Sharing

SP1200 Main Unit

CRU Type-C1

Cable 1

İTÜ-SSDTL COMM LAB with StellarStation

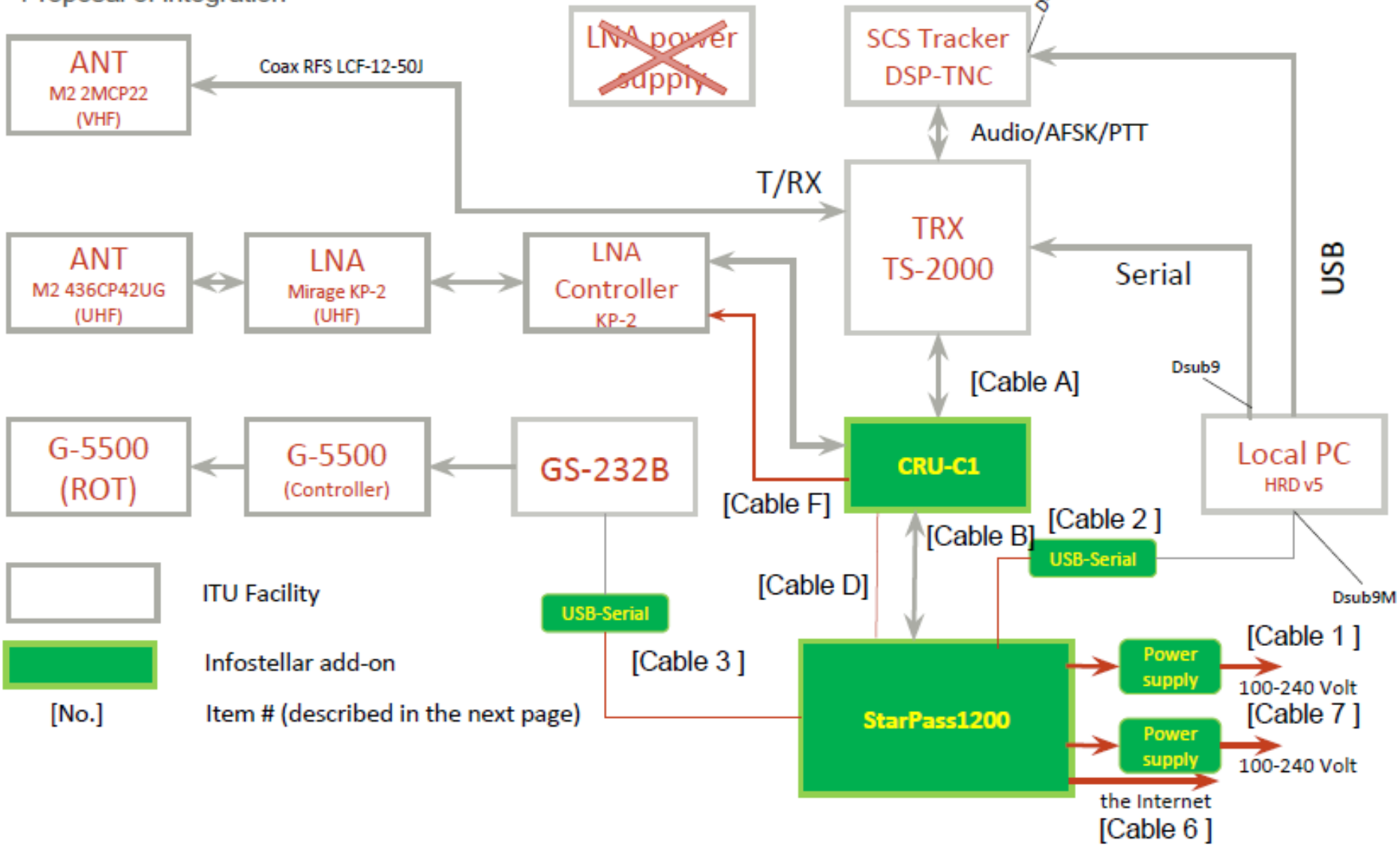


Istanbul Technical University (ITU) Space Systems Design and Test Lab.

Stellar Station Installation Proposal

Proposal of integration

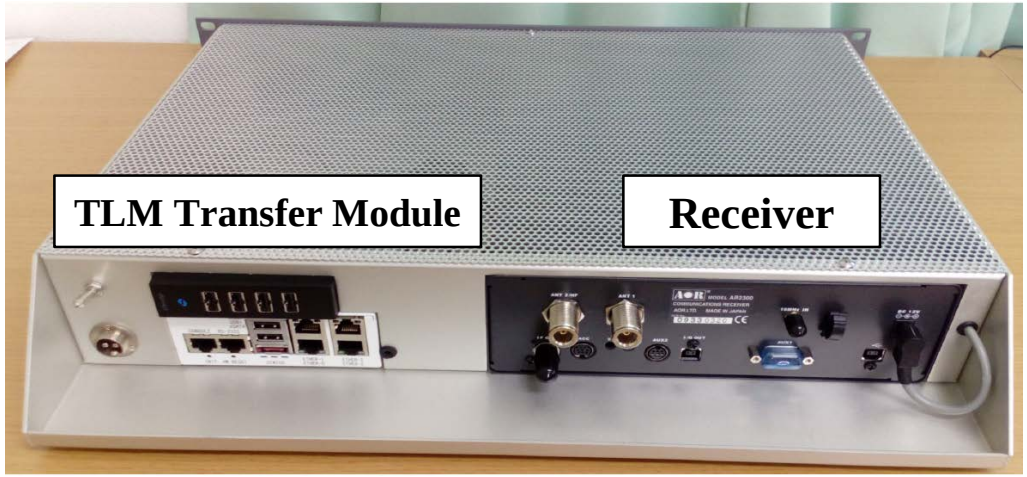
Infostellar inc



UNISEC GLOBAL
University Space Engineering Consortium

GSN Device

Front Panel

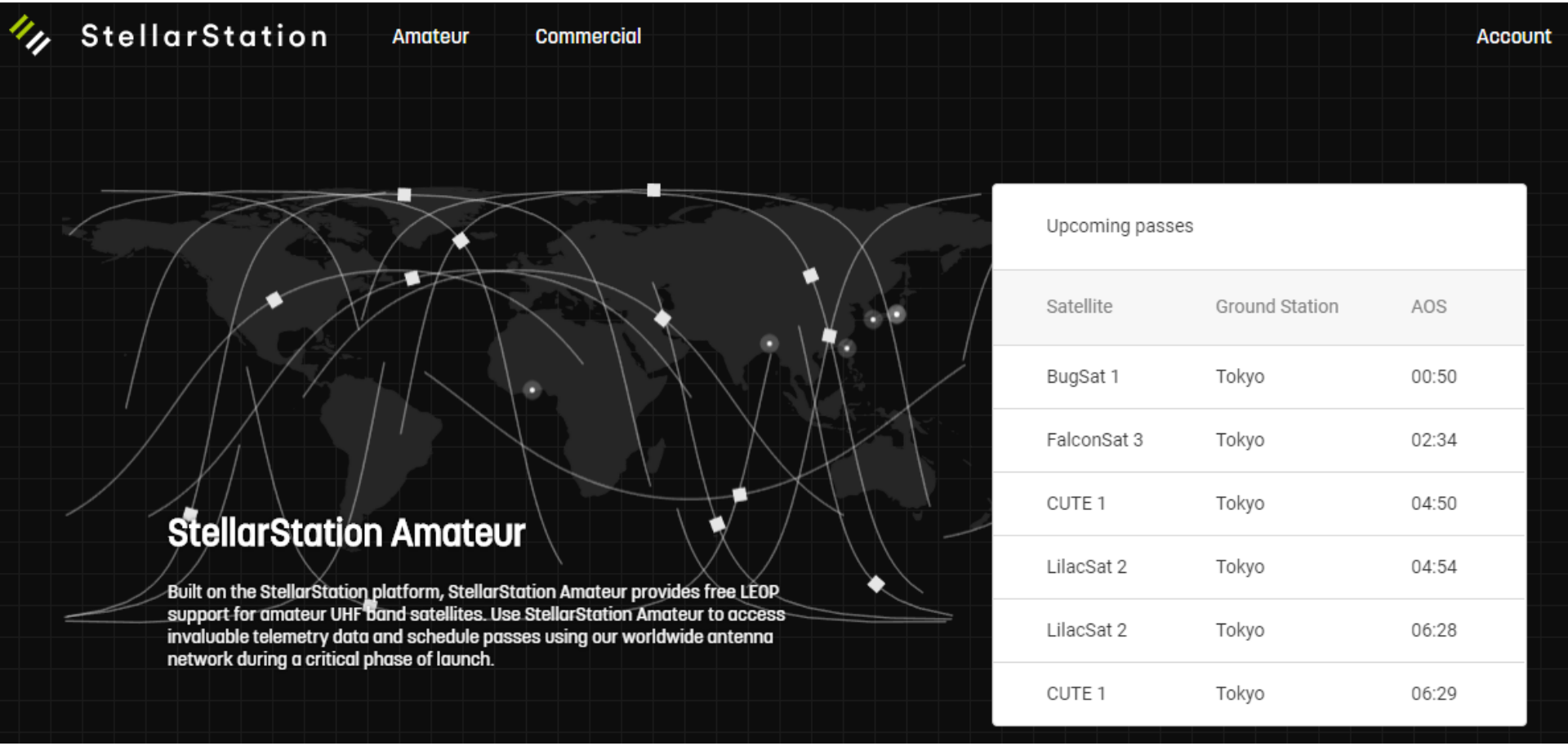


Rear Panel

- 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

Latest Telemetry 2 days of tracking left How to decode the IQ data

Status	AOS (Local Time)	LOS (Local Time)	Duration	Max Elevation	Ground Station	
Upcoming	2018/06/19 13:09	2018/06/19 13:19	09:30	73°	Tokyo	Scheduled
Upcoming	2018/06/18 14:26	2018/06/18 14:35	08:49	21°	Tokyo	Scheduled
Upcoming	2018/06/18 12:51	2018/06/18 13:00	09:02	22°	Tokyo	
Downlinked	2018/06/17 14:07	2018/06/17 14:16	09:30	82°	Tokyo	Download
Downlinked	2018/06/17 06:09	2018/06/17 06:18	09:09	28°	Tokyo	Download
Downlinked	2018/06/16 15:23	2018/06/16 15:32	08:30	16°	Tokyo	Download
Downlinked	2018/06/16 13:48	2018/06/16 13:58	09:11	27°	Tokyo	Download

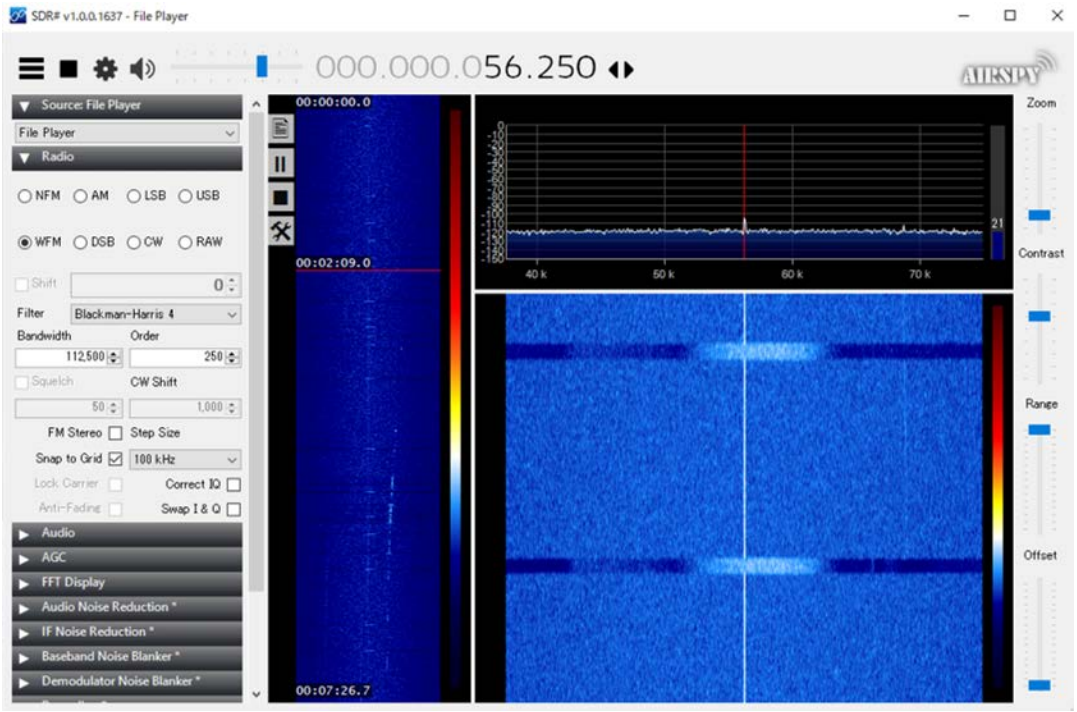
Click for download

Use web based GUI to:

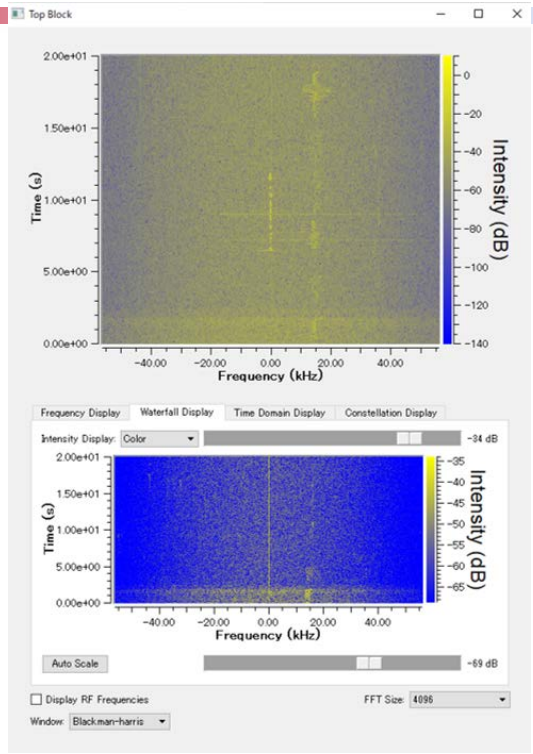
- Download telemetry (Raw Data) from satellites
- See available passes across the world
- Demodulate / Decode in the cloud and view the Telemetry in browser.*

* To be available

Re-processing satellite downlink data



SDR#



GNU Radio

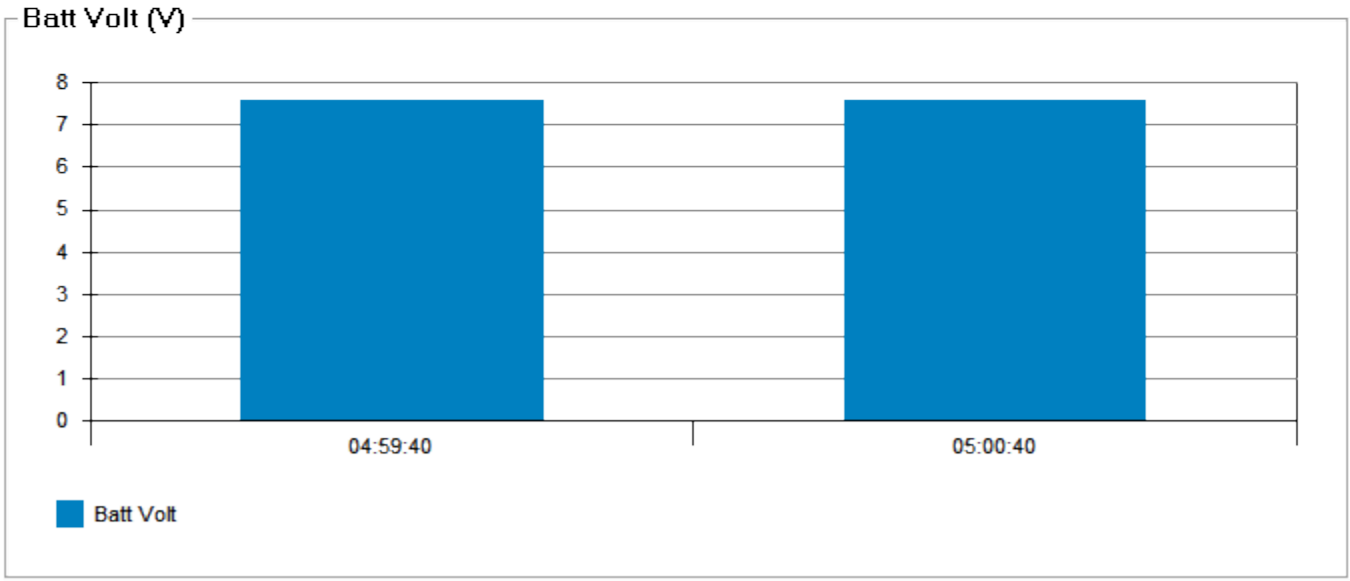
The satellite downlink data can be re-play and processing
by using **SDR#** and **GNU radio**

* To be available

Downloaded Data

Packet ID	2827		Mode	SAFE		Exec Number	1291845	
MCU Status	ON		Beacon Status	ON		Modem Status	ON	
SD Card 1 Status	ON		SD Card 2 Status	ON		EPS Status	ON	
Battery Status	ON		Transponder Status	OFF		Control Card Speed	OFF	
Accel Status	OFF		Magn Status	OFF		Gyro Status	OFF	
Accel X	0.00	g	Accel Y	0.00	g	Accel Z	0.00	g
Magn X	0.00	µT	Magn Y	0.00	µT	Magn Z	0.00	µT
Gyro X	0.00	deg/s	Gyro Y	0.00	deg/s	Gyro Z	0.00	deg/s
BCR1 Volt	0.05	V	BCR1A Curr	1.96	mA	BCR1B Curr	1.96	mA
BCR2 Volt	0.05	V	BCR2A Curr	1.96	mA	BCR2B Curr	1.96	sn
BCR3B Curr	1.96	mA	BCR3A Curr	1.96	mA	BCR3 Volt	0.05	V
3V3 Curr Usage	21.24		Diode Out Volt	7.65	V	Diode Out Cur	263.93	mA
EPS Batt Volt	7.53	V	EPS Batt Curr	36.66	mA	5V Curr Usage	22.57	mA
3V3 Curr	0.00		5V Volt	5.04	V	5V Curr	41.90	mA
Batt Volt	7.61	V	EPS Temp	-273.15	C	3V3 Volt	0.00	V
Batt Temp	21.82	C	Batt Curr Dir	CHAR	mA	Batt Curr	498.53	mA
Batt 3V3 Curr	6.64	mA	Batt 5V Volt	5.04	V	Batt 5V Curr	6.64	mA
Batt 1 Heater	OFF		Batt 1 Temp	23.05	C	Batt 3V3 Volt	3.34	V
Batt2 Temp	23.85	C	Batt 2 Heater	OFF		Batt 3 Temp	23.45	C
Batt 3 Heater	OFF		OBC Uptime			Transp Act Time	01/01/1970	

YM1RAS --> TA2MKA 18/08/1976 03:54:02



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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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