
SAFRAN SPACE
Space Surveillance Services
Noel Ballot
SVP Sales & Marketing
Noel.Ballot@safrangroup.com

GLOBAL PRESENCE, GLOBAL CUSTOMERS

Through system integrators

NORTHROP GRUMMAN · AIRBUS DEFENCE & SPACE · ThalesAlenia Space · BOEING · MAXAR · OHB · MITSUBISHI ELECTRIC

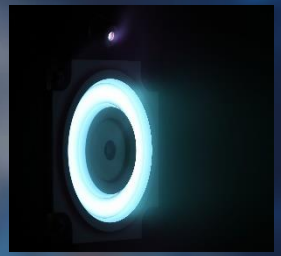
Directly to Space Agencies and International MoD

esa

To the New Space

ASTRANIS · YORK SPACE SYSTEMS · kinéis · LEAFSPACE · Astroscale · ROCKET LAB · Relativity · Virgin Orbit · aws · …

A GLOBAL SPACE EQUIPMENT & SOLUTIONS PROVIDER



Electric propulsion systems

On-board & ground optics

Telemetry, TT&C & Communication

Space & Spectrum Awareness

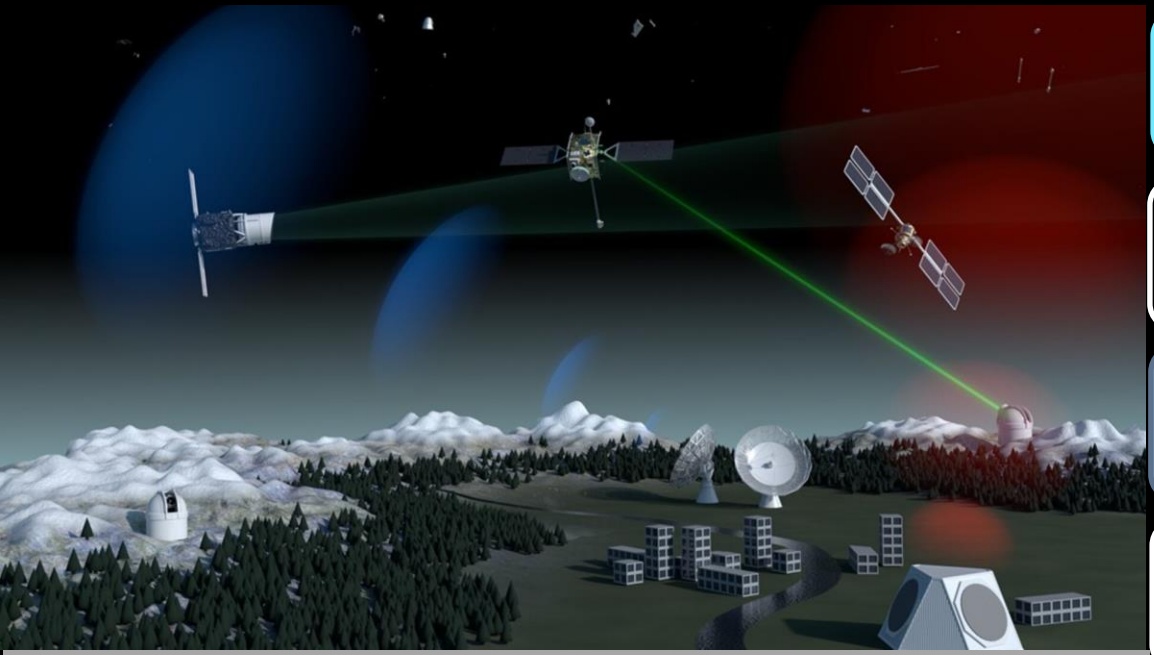
Timing & radio-navigation

Launch-vehicle instrumentation & navigation

Space Situational Awareness

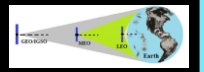
Products & Services

PASSIVE RF TO AUGMENT SPACE DOMAIN AWARENESS



With the courtesy of ESA: https://www.esa.int/ESA_Multimedia/Images/2017/04/Surveillance_network ; copyright ESA/Alan Baker, CC BY-SA 3.0 IGO

■ **Space Based**
+ Closest detection and monitoring
- Relative speeds



■ **Ground – Optical**
+ Detects active or passive objects and debris
- Day / night and weather constraint

■ **Ground– Radio**
+ No day / night and weather constraint.
- Limited to RF active objects

■ **Ground - Radar**
+ Efficient on debris and satellites in LEO
- Cost, limited efficiency on MEO / GEO arc.

PASSIVE RF TO AUGMENT SPACE DOMAIN AWARENESS

30 years Of experience in RF and signal processing

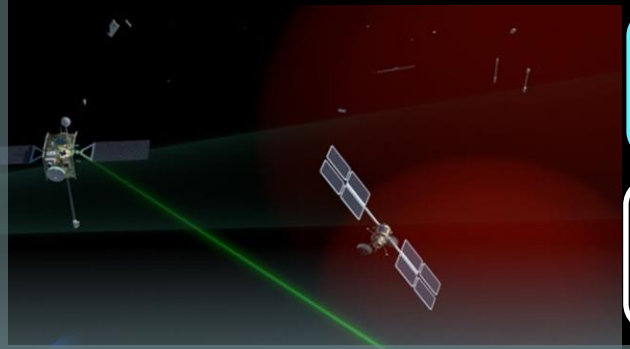
800+ Satellites tracked

7 years Of historical data

100 meters Accuracy on GEO orbits

24/7/365 Global Coverage Space Awareness

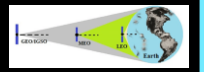
200+ antennas Already deployed on worldwide proprietary network



PASSIVE RF *to augment*
Space Domain Awareness

With the courtesy of ESA: https://www.esa.int/ESA_Multimedia/Images/2017/04/Surveillance_network ; copyright ESA/Alan Baker, CC BY-SA 3.0 IGO

■ **Space Based**
+ Closest detection and monitoring
- Relative speeds



■ **Ground – Optical**
+ Detects active or passive objects and debris
- Day / night and weather constraint

■ **Ground– Radio**
+ No day / night and weather constraint.
- Limited to RF active objects

■ **Ground - Radar**
+ Efficient on debris and satellites in LEO
- Cost, limited efficiency on MEO / GEO arc.

Space Situational Awareness

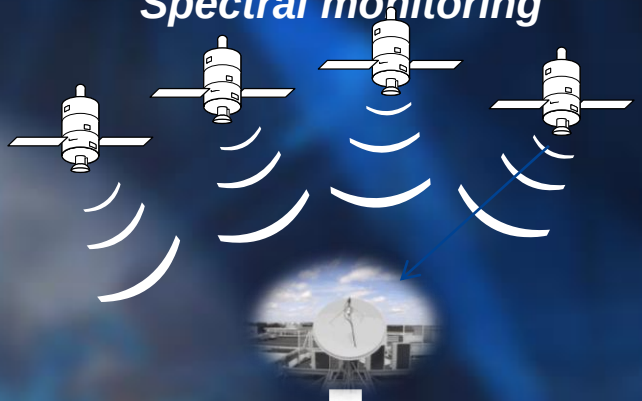
Data & Information Services

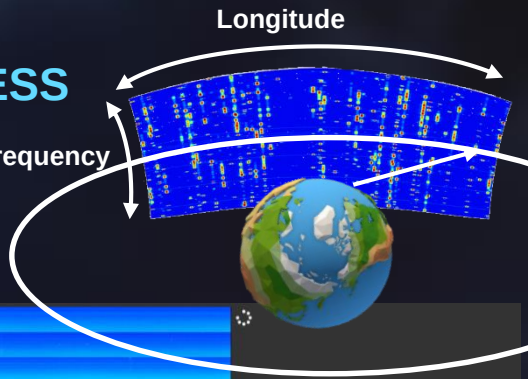
SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

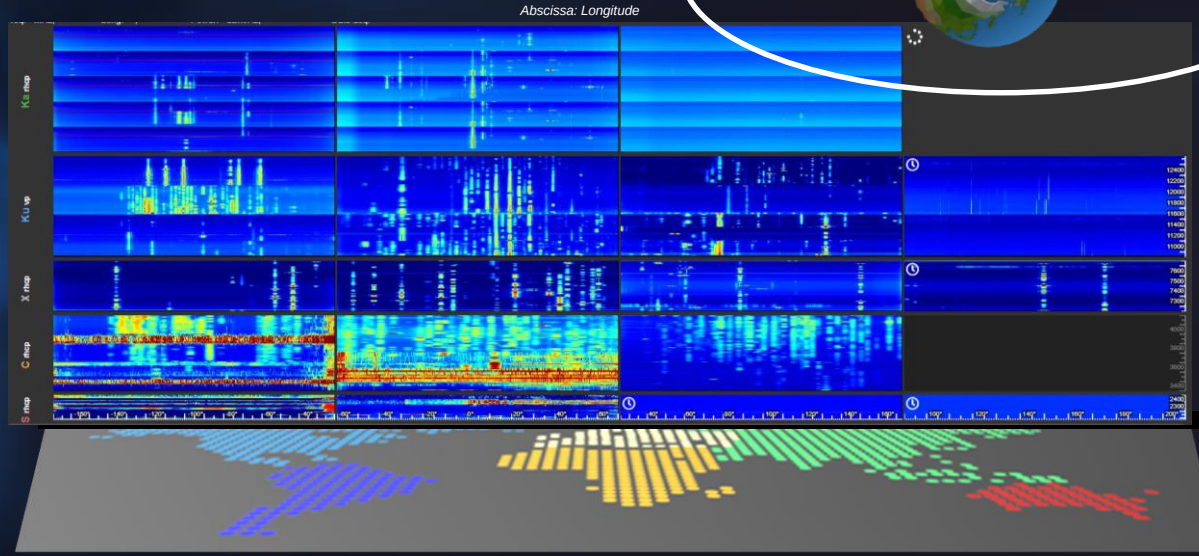
Cued and uncued signal watch of unknown satellites based on passive RF delivering always-on spectral usage of orbits of interest

SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

Spectral monitoring







Correlator

Signal processing

to reduce ambiguity spectrum space mapping

Analysis

Detection

of spatial & spectral events

Output 1

Output 2

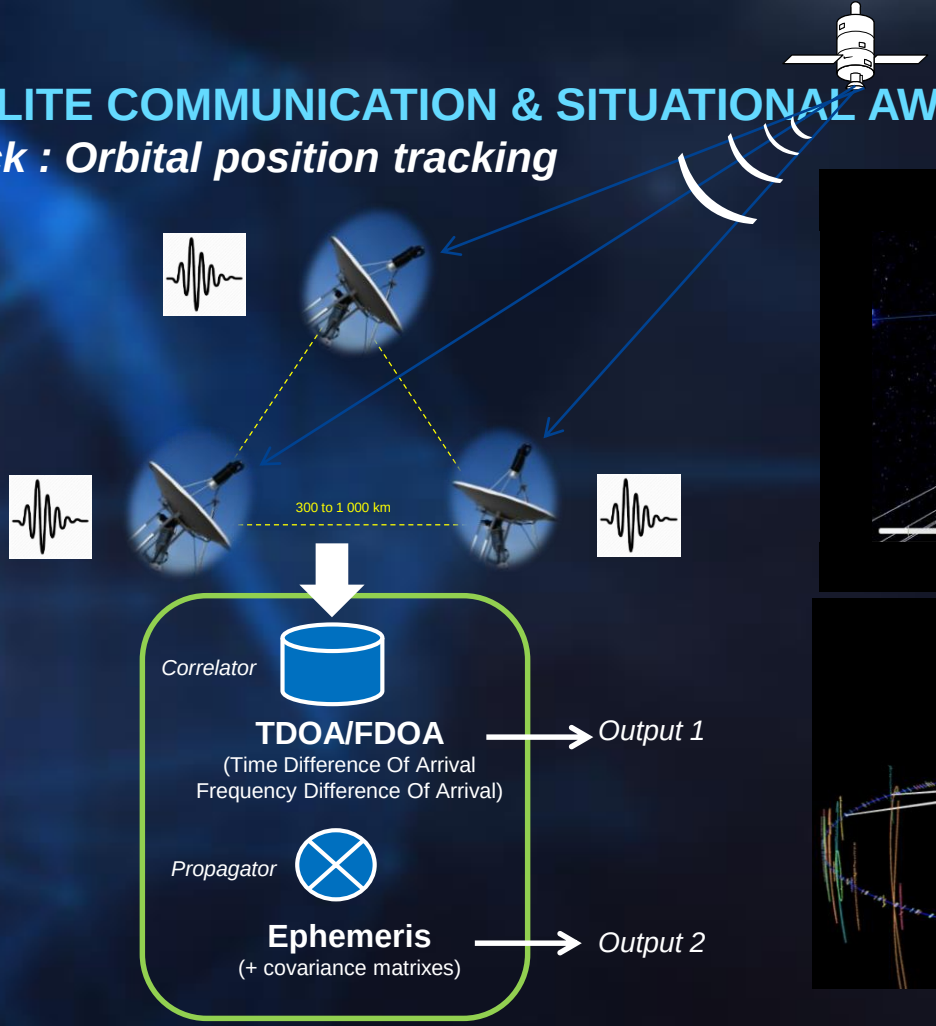
CONUS EMEA APAC OPAC

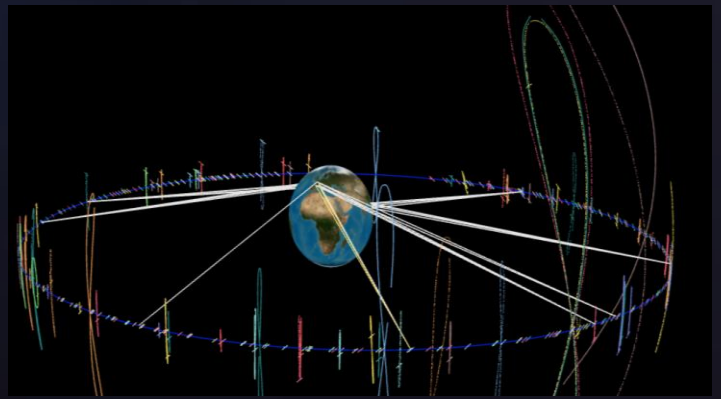
SATELLITE COMMMUNICATION & SITUATIONAL AWARENESS

Cued tracking of satellites based on passive RF, delivering persistent orbital positions and immediate maneuver detection.

SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

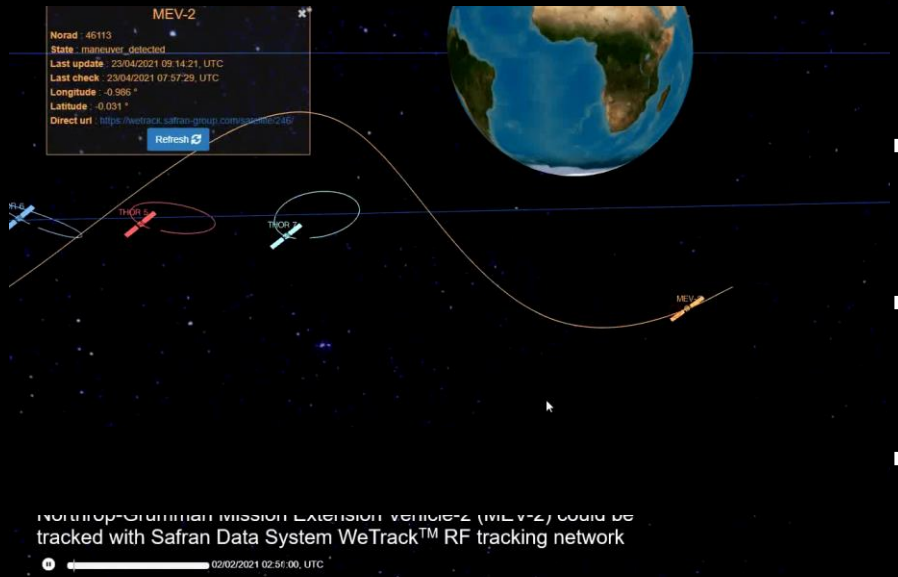
WeTrack : Orbital position tracking





SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

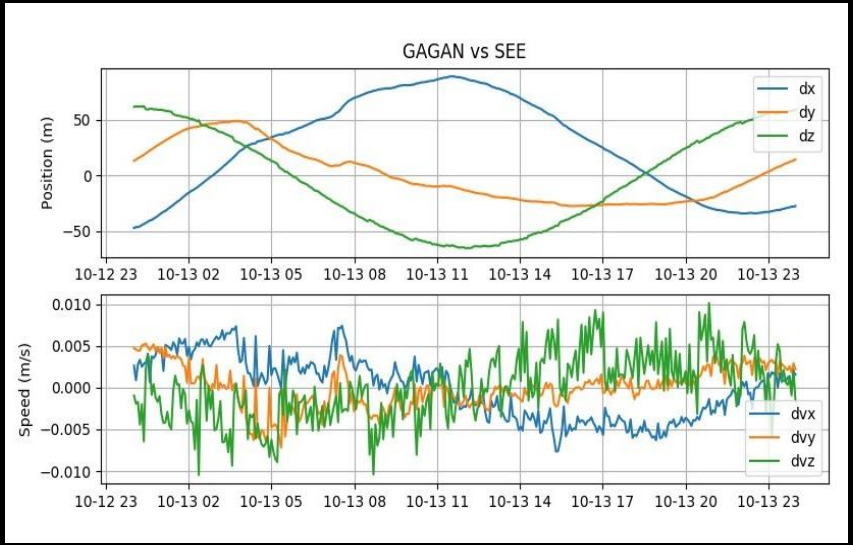
WeTrack™ : Use cases



- **Early maneuver detection**
  - WeTrack detects maneuvers (high revisite rate);
  - Eases the next optical observation association.
- **Surveillance of ASSETS/slots**
  - Scanning few degrees around a satellite slot to detect any approaching satellite.
- **Tracking satellite of interest**
  - Tracking with a high revisit rate any satellite of interest of in close approach.
- **In Orbit servicing**
  - Continuous tracking on the payload and/or telemetry signals
  - Upmost accuracy due to measurments error bias concellation
  - No cross tagging

SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

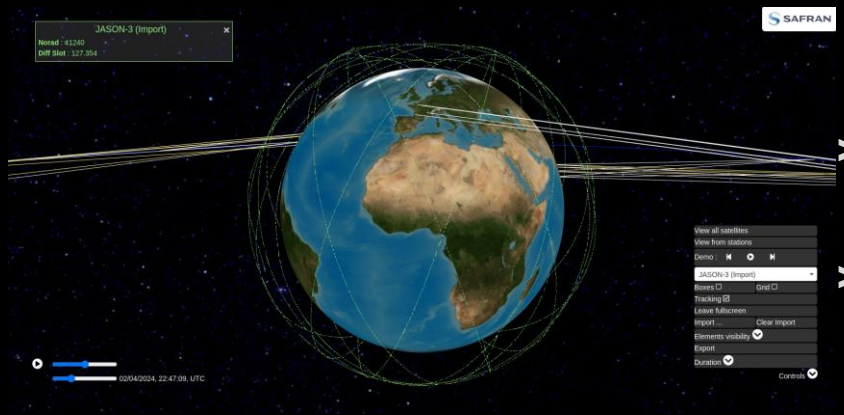
WeTrack™ : Use cases



- **Tracking Drift / Relocalisation**
  - ➢ Constant tracking of teh drifting satellite.
- **Satellite Characterisation**
  - ➢ Unique satellite identification and characterization from the injection on the lelecoms and telemetry (even in Spread Spectrum)
- **Behavior study**
  - ➢ Recording of all available data for analysis
- **Flight Dynamics**
  - ➢ Primary or Second source, Backup, Rescue, Calibration.

SATELLITE COMMUNICATION & SITUATIONAL AWARENESS

WeTrack™ : Use cases



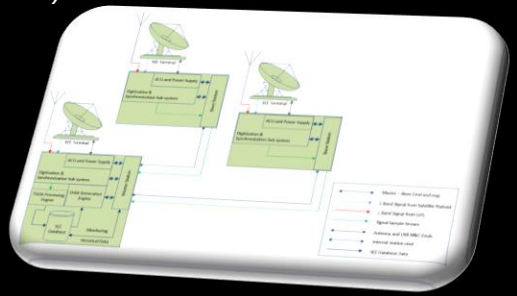
- **XGEO tracking**
  - Continuous tracking of Artemis-Orion mission
  - Data available on Chandrayaan-3
  - Continuous tracking of Intuitive Machine

- **LEOP tracking**
  - Tracking in cooperative mode of Telekom 13

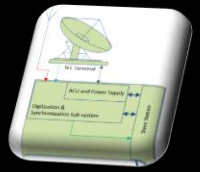
- **LEO tracking**
  - All sensors have been updated to track NGSO satellites and all are multi-task capable (Watch/Track on all orbits).
  - Commitment to track >4000 satellites mid 2025
  - LEO service start planned beginning of 2025

Passive RF footprint

RF passive 3 stations (minimum Wetrack baseline)

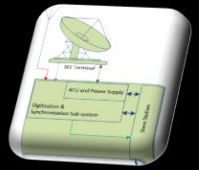


Sites



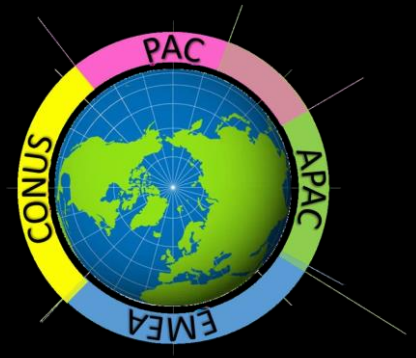
+1 RF passive station for:

- Energetic spectrum scanning (WeWatch)



+1 RF passive station for:

- Redundancy
- Performance




SAFRAN
STARLINK 62 WEST A