Aerobits

See beyond

Subsystems for UAS
integration into the airspace

Who we are?

Aerobits is a Polish technology company that has been operating on a global market since 2017. We deal with miniaturization of avionic systems, such as aviation transponders.

All solutions are based on a patented technology that allows to process radio signals on very small surfaces. This concept is at the core of our OEM modules (low-level assembly function modules), which are the basic building block of miniaturized avionics.

Developing safety in the airspace

Unmanned Aircraft Systems (UAS), commonly known as drones, open up new opportunities in the civil, commercial and military sectors. However, this impressive technology comes with certain risks.

UAS enter the orderly airspace that until now was used only by manned air traffic. Legal regulation of the use of the airspace turns out to be insufficient for many reasons and forces the search for system concepts. A hint here are aviation solutions and procedures that have evolved over the years along with the growing volume of traffic.

ATM (Air Traffic Management), having various types of radars, is able to locate manned aircraft and guarantee safe separation between them. Also in unmanned systems it is planned to implement a similar solution called UTM (Unmanned Traffic Management). UTM will be nothing else but a functional extension of ATM. It is about the integration of drones into the airspace, which is seen as one of the greatest challenges of

modern aviation. The main difficulty is to ensure anti-collision for all airspace users, in line with the DAA (Detect and Avoid) concept. Achieving this goal is possible by maintaining system compatibility between manned and unmanned aviation. Therefore, it is necessary to miniaturize the avionics, which will allow the installation of appropriate systems on small drones.

The intensification of global activities towards the inclusion of UAS into the airspace shows the idea of fusing many information technologies. In addition to micro-avionic systems, UAS will also be equipped with technologies such as Wi-Fi, Bluetooth and LTE. It will allow easier identification and tracking by local airspace managers.

Subsystems for UAS integration into the airspace

Global reach

Our technologies are currently used in over 50 countries by over 350 customers.

Monitoring of airspace

We create solutions for the broadly understood management and monitoring of airspace.

Ground infrastructure

Our ground infrastructure is becoming frequent requirement in the European Union and beyond.

Leader in the world

Due to very early ideas of miniaturization of avionics, we became a leader in the world.

Our history

The beginnings of Aerobits date back to 2015, when a subminiature ADS-B implementation (Automatic Dependant Surveillance-Broadcast) was created at the West Pomeranian University of Technology in Szczecin in conjunction with the multi- GNSS (Global Navigation Satellite Systems) function. The OEM module with an area of only <4cm2 and weighing 1.5g, to this day is the smallest ADS-B / GNSS fusion in the world.

A year later, much faster systems with FPGA support were created and presented for the first time publicly at the ILA Berlin Air Show 2016. Our solutions were interesting for various institutions and organizations which are responsible for creating the laws for the UAS in the European Union. An additional impulse for further actions was the prestigious award in the European Satellite Navigation Competition 2016. It was just the beginning - during 2019 we received a grant from NCBiR (project value 2,5 mln PLN), in 2020 we had our first deployments of the UAS monitoring ground infrastructure in Poland and Germany and during 2021 we have conducted with LMT, Latvia's Telekom, nationwide demonstrational PoC for UAS monitoring system. Together with our partner Droniq GmbH, a JV by DFS & Deutsche Telekom, we build on a common standard for the UTM/U-Space in Europe.
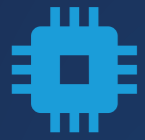
OEM
- low level modules

Aerobits provides low-level ADS-B devices for integration directly on printed circuit boards. It is a convenient way to design unique devices that require access to air traffic information in their structure. We offer multiple technological solutions that differ in size and data processing capabilities.

Depending on the target application, we offer single and multi-core solutions based on ADS-B, FLARM and UAT technology, some with integrated GNSS receivers. The smallest solutions are the size of the one cent coin. An important feature of the modules is the very high ADS-B input sensitivity of the receivers, ensuring compliance with ETSI avionic standards on an extremely small surface.
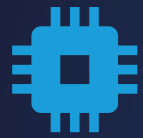
Regardless of the type of module, we offer the customization of the firmware, which provides a number of communication interfaces and on-demand software solutions.

Product	TT-SC1	TT-SC1-EXT	TT-SF2	TT-SG1	TT-SU2
CARRIER FREQUENCY (mHz)	1090 (ADS-B)	1090 (ADS-B)	1090 (ADS-B) 868, 915 (FLARM) 4 GNSS concurrent	1090 (ADS-B) 3 GNSS concurrent	1090 (ADS-B), 978 (UAT) 4 GNSS concurrent
RX SENSITIVITY (dBm)	-84 (ADS-B)	-84 (ADS-B)	-85 (ADS-B) -103 (FLARM) -167 (GNSS)	-88 (ADS-B) -167 (GNSS)	-85 (ADS-B) -95 (UAT) -167 (GNSS)
POWER SUPPLY (DC)	3.3	3.3	3.3	3.3	3.3
CURRENT CONSUMPTION (mA)	70	70	130	130	130
DIMENSIONS (mm)	13x16(a) 13x20(b)	13x16(a) 13x20(b)	19x18.5(a) 19x22.5(b)	19x18.5(a) 19x22.5(b)	19x18.5(a)
WEIGHT (g)	1.2	1.2	1.8	1.8	1.8
ADS-B IN	☒	☒	☒	☒	☒
FLRAM (IN/OUT)	☐	☐	☒	☐	☐
UAT (IN)	☐	☐	☒	☐	☒
MODE A/C/S	☐	☒	☒	☒	☒
BUILD-IN GNSS	☐	☐	☒	☒	☒
TIMESTAMP (MLAT DATA SOURCE)	☐	☒	☒	☒	☒
GNSS			72-channel engine GPS/QZSS L1 C/A GLONASS L10F BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN	72-channel engine GPS/QZSS L1 C/A GLONASS L10F BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN	72-channel engine GPS/QZSS L1 C/A GLONASS L10F BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN

OEM
- low level modules

TT-SF2

TT-SF2 is a high quality and low price OEM ADS-B/GNSS receiver/FLARM transceiver series operating at 1090MHz and region dependent FLARM frequency. It is based on the proven FPGA-In-The-Loop™ technology, which is a unique combination of a pingle and FPGA. The patented solution allows high-speed RF data processing with significantly reduced number of electronic components.

Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.

`ADS-B` `MODE A/C/S` `FLARM` `GNSS`

Features:
- Fastest ADS-B implementation on a surface of <4cm^2
- Receiving of ADS-B, Mode-A/C/S with RF signal
- Licensed FLARM technology
- RF signal strength/quality analysis
- Time stamp for multilateration
- Best-in-class aircraft tracking
- Multiple supported protocols: AERO, MAVLink
- Scalable OEM solution with enormous customization potential
- Firmware update capability
- Weight < 2g
- Designed to meet MOPS defined in TSO-C199
- Evaluation kit available

Application:
- SAA / DAA (Sense and Avoid / Detect and Avoid)
- UAS collision avoidance systems
- UTM / U-Space traffic awareness devices
- Early warn devices for UAS operators
- Collision prediction devices for gliders / paragliders
- ADS-B In devices that meet the NextGen/SESAR philosophy

TT-SC1

TT-SC1 is a high quality and low SWaP OEM ADS-B receiver series operating at 1090MHz. The patented FPGA-In-The-Loop™ technology allows high-speed RF data processing with significantly reduced number of electronic components.

Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.

`ADS-B`

Features:
- Smallest ADS-B implementation on a surface of <2cm²
- Receiving of ADS-B with RF signal strength/quality analysis
- Simple module integration and configuration via UART interface and AT commands
- Multiple supported protocols: AERO, MAVLink
- Scalable OEM solution with enormous customization potential
- Firmware update capability
- Small outline: 16.0(a)/20.0(b) x 13.0 x 2.65mm
- Designed to meet MOPS defined in TSO-C199
- Evaluation kit available

Application:
- SAA / DAA (Sense and Avoid / Detect and Avoid)
- UAS collision avoidance systems
- UTM / U-Space traffic awareness devices
- Early warn devices for UAS operators
- Collision prediction devices for gliders / paragliders
- ADS-B In devices that meet the NextGen/SESAR philosophy

TT-SG1

TT-SG1 is a high quality and low price OEM ADS-B/GNSS receiver series operating at 1090MHz. It is based on the proven FPGA-In-The-Loop™ technology, which is a unique combination of a pingle and FPGA. The patented solution allows high-speed RF data processing with significantly reduced number of electronic components.

Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.The basic version of module offers the possibility of receiving and decoding ADS-B and Mode-A/C/S in different modes.

`ADS-B` `MODE A/C/S` `GNSS`

Features:
- Fastest ADS-B implementation on a surface of <4cm^2
- Receiving of ADS-B, Mode-A/C/S with RF signal
- Build in GNSS receiver
- RF signal strength/quality analysis
- Time stamp for multilateration
- Best-in-class aircraft tracking
- Multiple supported protocols: AERO, MAVLink
- Scalable OEM solution with enormous customization potential
- Firmware update capability
- Weight < 2g
- Designed to meet MOPS defined in TSO-C199
- Evaluation kit available

Application:
- SAA / DAA (Sense and Avoid / Detect and Avoid)
- UAS ground stations and high-density traffic surveillance
- UTM / U-Space construction (traffic surveillance network)
- Traffic-flow analysis and statistics
- Monitoring of 1090MHz band (signal integrity check)
- ADS-B/In/Out devices that meet the NextGen/SESAR philosophy

TT-SC1-EXT

TT-SC1-EXT is a high quality and low SWaP OEM ADS-B receiver series operating at 1090MHz.

Mode A/C/S in the concept with precise timestamp for enabling multilateration implementations..

The patented FPGA-In-The-Loop™ technology allows high-speed RF data processing with significantly reduced number of electronic components.

Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.

`ADS-B` `MODE A/C/S`

Features:
- Smallest ADS-B implementation on a surface of <2cm
- Receiving of Mode A/C/S with RF signal strength/quality analysis
- Time stamp (raw data only) for multilateration
- High-resolution ADC with real-time signal processing; best-in-class aircraft tracking
- High sensitive front-end, jamming and ESD protection (only TT- SC1b) with ranges over 150 km (open space, 1dBi antenna)
- Simple module integration and configuration via UART interface and AT commands
- Multiple supported protocols, i.a. MAVLink, GDL90
- Scalable OEM solution with enormous customization potential (additional functions or interfaces on request)
- Firmware update capability (uC and FPGA)
- Low power consumption 3.3V/70mA
- Small outline: 16.0 x 13.0 x 2.65mm, ver. (a); 20 x13.0 x 2.65mm, ver. (b), weight < 1.5g
- Designed to meet MOPS defined in TSO-C199
- Evaluation kit available.

TT-SU2

TT-SU2 is a high quality and low price OEM ADS-B/GNSS receiver/UAT receiver series operating at 1090MHz and 978MHz. It is based on the proven FPGA-In-The-Loop™ technology, which is a unique combination of a pingle and FPGA. The patented solution allows high-speed RF data processing with significantly reduced number of electronic components.

Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.

`ADS-B` `MODE A/C/S` `GNSS` `UAT`

Features:
- Fastest ADS-B implementation on a surface of <4cm^2
- Receiving of ADS-B, Mode-A/C/S with RF signal strength/quality analysis
- Time stamp (raw data only) for multilateration
- Multiple supported protocols, i.a. RAW HEX, CSV, AERO, MAVLink, ASTERIX, GDL90
- Integrated high quality GNSS position source
- Receiving of UAT
- High-resolution ADC with real-time signal processing; best-in-class aircraft tracking
- High sensitive front-end, jamming and ESD protection (only version b) with ranges over 150 km (open space, 1dBi antenna)
- Simple module integration via UART interface and AT commands
- Scalable OEM solution with enormous customization potential (additional functions or interfaces on request)
- Firmware update capability (uC and FPGA)
- Designed to meet MOPS defined in TSO-C199

Application:
- SAA / DAA (Sense and Avoid / Detect and Avoid)
- UAS ground stations and high-density traffic surveillance
- UTM / U-Space construction (traffic surveillance network)
- Traffic-flow analysis and statistics
- Monitoring of 1090MHz band (signal integrity check)
- ADS-B/In/Out devices that meet the NextGen/SESAR philosophy
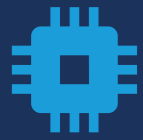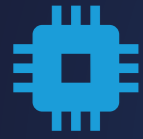
EVALs

- for quick integration

If you want to quickly try the possibilities offered by our modules, the evaluation set is certainly a product for you. Dedicated printed circuit board contains all necessary components to run the module.

All additional input/output pins and external power supply options are avaliable. In addition, together with the evaluation kit you can use our software Micro ADS-B which is described further

Product	EVAL-TT-SC1	EVAL-TT-SC1-EXT	EVAL-TT-SF2	EVAL TT-SG1	EVAL-TT-SU2
CARRIER FREQUENCY (mHz)	1090 (ADS-B)	1090 (ADS-B)	1090 (ADS-B) 868, 915 (FLARM) 4 GNSS concurrent	1090 (ADS-B) 3 GNSS concurrent	1090 (ADS-B) 978 (UAT) 4 GNSS concurrent
RX SENSITIVITY (dBm)	-84 (ADS-B)	-84 (ADS-B)	-85 (ADS-B) - 103 (FLARM) -167 (GNSS)	-88 (ADS-B) -167 (GNSS)	-85 (ADS-B) -95 (UAT) -167 (GNSS)
POWER SUPPLY (DC)	3.3	3.3	3.3	3.3	3.3
CURRENT CONSUMPTION (mA)	70	70	130	130	130
DIMENSIONS (mm)	60,5x41	60,5x41	70x29x1,5	70x29x1,5	70x29x1,5
WEIGHT (g)	25	25	25	25	25
ADS-B IN	☒	☒	☒	☒	☒
FLRAM (IN/OUT)	☐	☐	☒	☐	☐
UAT (IN)	☐	☐	☒	☐	☒
MODE A/C/S	☐	☒	☒	☒	☒
BUILD-IN GNSS	☐	☐	☒	☒	☒
TIMESTAMP (MLAT DATA SOURCE)	☐	☒	☒	☒	☒
GNSS			72-channel engine GPS/QZSS L1 C/A GLONASS L10F, BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN	72-channel engine GPS/QZSS L1 C/A GLONASS L10F BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN	72-channel engine GPS/QZSS L1 C/A GLONASS L10F, BeiDou B1I Galileo E1B/C1SBAS L1 C/A WAAS, EGNOS, MSAS, GAGAN
USB CONECTOR	☒	☒	☒	☒	☒

EVALs
- for quick integration

EVAL
TT-SF2

The evaluation kit provides a quick introduction to the TT-SF2 module. It is a high quality 1090 MHz band receiver with an integrated ADS-B (Automatic Dependent Surveillance - Broadcast) decoder, conforming to MOPSs specified in TSO-C199. The TT-SF2 module contains also internal GNSS module (Ublox), to utilize concurrent reception of up to three GNSS systems (GPS / Galileo together with BeiDou or GLONASS). Other key feature is implemented FLARM (EU: 868 MHz, USA: 915 MHz) band receiver/transceiver, FLARM is the traffic awareness and collision avoidance technology for General Aviation, light aircraft, and UAVs.

EVAL-TT-SF2 with the dedicated software allows the user to discover the module properties within a short time, paving the way towards quick prototyping. The software allows simple configuration of the module and data visualization in various modes, from raw data, through tabular and 3D views.

Features:
- Quick start with the OEM TT-SF2 module
- Designed to be powered by USB or an external 5V supply
- Two LED for USB communication and one LED for internal functions
- Virtual COM port with simple firmware update capability
- Extension header for external power supply and communication
- ESD protection
- All necessary components in the box (antenna, USB cable, etc.)
- Dedicated software available

Application:
- Evaluation board
- Wideband antenna (0-1dBi) 3m
- U.fl / SMA adapter 10.5cm
- USB cable 30cm
- 2 x Pinheader for extensions connector

EVAL
TT-SC1

The evaluation kit provides a quick introduction to the TT-SC1 module. It is a high quality 1090 MHz band receiver with an integrated ADS-B (Automatic Dependent Surveillance - Broadcast) decoder, conforming to MOPSs specified in TSO-C199.

EVAL-TT-SC1 with the dedicated software allows the user to discover the module properties within a short time, paving the way towards quick prototyping. The software allows simple configuration of the module and data visualization in various modes, from raw data, through tabular and 3D views.

Features:
- Quick start with the OEM TT-SC1 module
- Designed to be powered by USB or an external 5V or 3.3V supply
- Two LED for USB communication and one LED for internal functions
- Virtual COM port with simple firmware update capability
- Extension header for external power supply and communication)
- ESD protection
- All necessary components in the box (antenna, USB cable, etc.)
- Dedicated software available

Application:
- Evaluation board
- Wideband antenna (0-1dBi) 3m
- USB cable 30cm
- 2 x Pinheader for extensions connector

EVAL
TT-SG1

The evaluation kit provides a quick introduction to the TT SG1 module. It is a high-quality 1090MHz band receiver with an integrated ADS-B (Automatic Dependent Surveillance Broadcast) decoder, conforming to MOPSs specified in TSO C199. EVAL TT-SG1 with the dedicated software allows the user to discover the module properties within a short time, paving the way towards quick prototyping. GNSS source integrated.

The software allows simple configuration of the module and data visualization in various modes, from raw data, through tabular and 3D views.

Features:
- Quick start with the OEM TT-SG1 module
- Designed to be powered by USB or an external 5V supply
- Two LED for USB communication and one LED for internal functions
- Virtual COM port with simple firmware update capability
- Extension header for external power supply and communication
- ESD protection
- All necessary components in the box (antenna, USB cable, etc.)
- Dedicated software available

Application:
- Evaluation board
- Wideband antenna (0-1dBi) 3m
- USB cable 30cm
- 2 x Pinheader for extensions connector

EVAL
TT-SC1-EXT

The evaluation kit provides a quick introduction to the TT-SC1-EXT module. It is a high quality 1090 MHz band receiver with an integrated ADS-B (Automatic Dependent Surveillance - Broadcast) decoder, conforming to MOPSs specified in TSO-C199.

EVAL-TT-SC1-EXT with the dedicated software allows the user to discover the module properties within a short time, paving the way towards quick prototyping. The software allows simple configuration of the module and data visualization in various modes, from raw data, through tabular and 3D views.

Features:
- Quick start with the OEM TT-SC1-EXT module
- Designed to be powered by USB or an external 5V or 3.3V supply
- Two LED for USB communication and one LED for internal functions
- Virtual COM port with simple firmware update capability
- Extension header for external power supply and communication)
- ESD protection
- All necessary components in the box (antenna, USB cable, etc.)
- Dedicated software available

Application:
- Evaluation board
- Wideband antenna (0-1dBi) 3m
- U.fl / SMA adapter 10.5cm
- USB cable 30cm
- 2 x Pinheader for extensions connector

EVAL
TT-SU2

The evaluation kit provides a quick introduction to the TT-SU2 module. TT-SU2 is a high quality and low price OEM ADS-B/GNSS receiver/UAT receiver series operating at 1090MHz and 978MHz. It is based on the proven FPGA-In-The--Loop™ technology, which is a unique combination of a multicore processor and FPGA.

The patented solution allows high-speed RF data processing with significantly reduced number of electronic components. Simultaneous miniaturization of the module and its OEM nature open a wide range of possible applications.

Features:
- Quick start with the OEM TT-SF2 module
- Designed to be powered by USB or an external 5V supply
- Two LED for USB communication and one LED for internal functions
- Virtual COM port with simple firmware update capability
- Extension header for external power supply and communication
- ESD protection
- All necessary components in the box (antenna, USB cable, etc.)
- Dedicated software available

Application:
- Evaluation board
- Wideband antenna (0-1dBi) 3m
- U.fl / SMA adapter 10.5cm
- USB cable 30cm
- 2 x Pinheader for extensions connector

Plug&Play

ADS-B (IN, OUT)

In this product group, we offer ADS-B receivers and ADS-B / FLARM transceivers. In sets, you will find all the necessary wiring and/or parameterization tools such as communication converters. Solutions start with the most compact and providing basic functionality, through middle-end solutions up to the top multisystem solutions.

The drone user at every level will find something for themselves in this products category. Short and clear instructions will help you how to quickly integrate into your existing drone system.
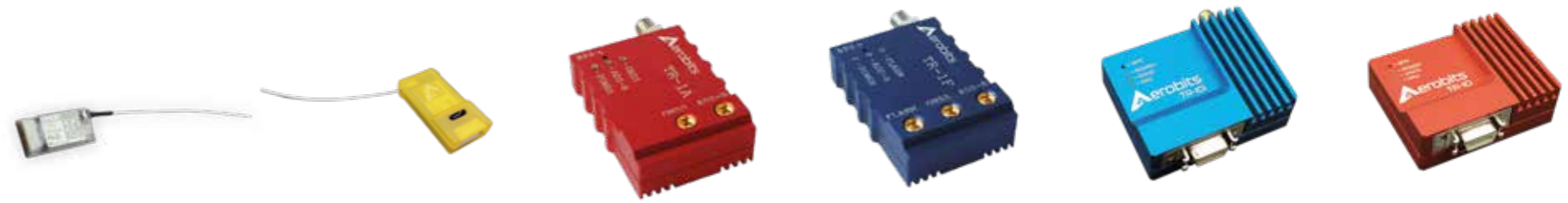
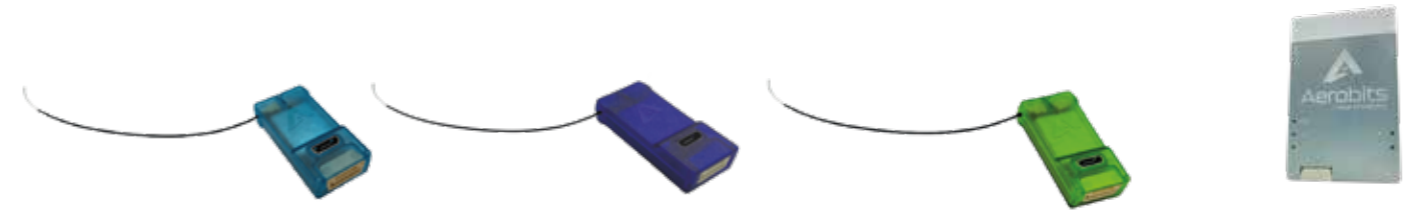| Product	Aero	Aero Pro	TR-1A	TR-1F	TR-10i (Interrogator)	TR-10 (Transponder)
DIMENSIONS (mm)	27 × 14 × 5.5	31.5 × 15.5 × 7.3	35 × 25 × 8.5	35 × 25 × 8.5	53.5 × 43.5 × 18	53.5 × 43.5 × 18
ADS-B IN	☒	☒	☒	☒	☒	☐
ADS-B (IN/OUT)	☐	☐	☒	☒	☒ (IN)	☒ (OUT) with external GNSS
FLRAM (IN/OUT)	☐	☐	☐	☒	☐	☐
BUILD-IN GNSS	☐	☐	☒	☒	☐	☐
BUILD-IN PRESSURE SENSOR	☐	☐	☒	☒	☒	☒
CARRIER FREQUENCY (mHz)	1090 (ADS-B)	1090 (ADS-B)	1090 (ADS-B) 3 GNSS concurrent	1090 (ADS-B) 868, 915 (FLARM) 3 GNSS concurrent	1090 (ADS-B) 1030 (INTERROGATION)	1090 (ADS-B) 1030 (INTERROGATION)
RX SENSITIVITY (dBm)	-84 ADS-B	-84 ADS-B	-88 ADS-B -167 GNSS	-85 ADS-B -93 FLARM -167 GNSS	-87dBm (1090MHz)	-72dBm (1090MHz)
WEIGHT (g)	2.8	5	20	20	60	60
MAVLINK	☒	☒	☒	☒	☐	☐
PROTOCOLS: CSV, GDL90, ASTERIX	☐	☐	☒	☒	☐	☐
MODE-A/C/S	☐	☐	☒	☒	☒	☒
TIMESTAMP (MLAT DATA SOURCE)	☐	☐	☒	☒	☐	☐

Trackers

UTM/U-space devices

This group presents UTM/U-Space dedicated solutions based on technology like LTE, BLE. U-space is a set of new services relying on a high level of digitalization and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of drones (UAS).

As the number of flights increases, U-Space services will provide coordination and oversight to make safe operations in reality. Airspace will be dynamically managed to improve through shared operational data. Our products are designed to support this extremely important process.

Product	idME	idME+	IdME PRO	HOD
WEIGHT (g)	4	5	5	40
DIMENSIONS (mm)	31.5 × 15.5 × 7.3	31.5 × 15.5 × 7.3	32.0 × 16.7 × 7.5	58 × 38 × 9.5
ADS-B IN	☐	☐	☐	☒
NETWORK REMOTE IDENTIFICATION	☐	☐	☐	☒
REMOTE IDENTIFICATION	☒	☒	☒	☒ (via LTE)
FLRAM (IN/OUT)	☐	☐	☐	☒
BUILD-IN GNSS	☐	☒	☒	☒
BUILD-IN PRESSURE SENSOR	☐	☒	☒	☒
LTE	☐	☐	☐	Europe/Asia or Global
CARRIER FREQUENCY (mHz)	2400	2400	2400	1090 (ADS-B) 868, 915 (FLARM) 3 GNSS concurrent
RX SENSITIVITY (dBm)	☐	☐	☐	-84 ADS-B -104 FLARM
OUTPUT POWER (dBm)	+18 BLE	+18 BLE	+18 BLE +20 WI-FI	☐
MAVLINK	☒	☒	☒	☒

Direct Remote ID

concept
UTM/U-space devices

Aviation is an exciting and dynamic industry. The best evidence of this is the fact that we are ahead in the upcoming evolution of the drone world. New regulations regarding the identification of drones to which drone operators need to adopt have been issued, and they are just around the corner. Fortunately, AEROBITS has already got the solutions for that.

FCC

UAS pilot

UAS operator

WI-FI or Bluetooth device

EU member states registry

ISP connection

UAS operator

Authority

WI-FI or Bluetooth device

WI-FI or Bluetooth device

Cell data subscription

WI-FI or Bluetooth device
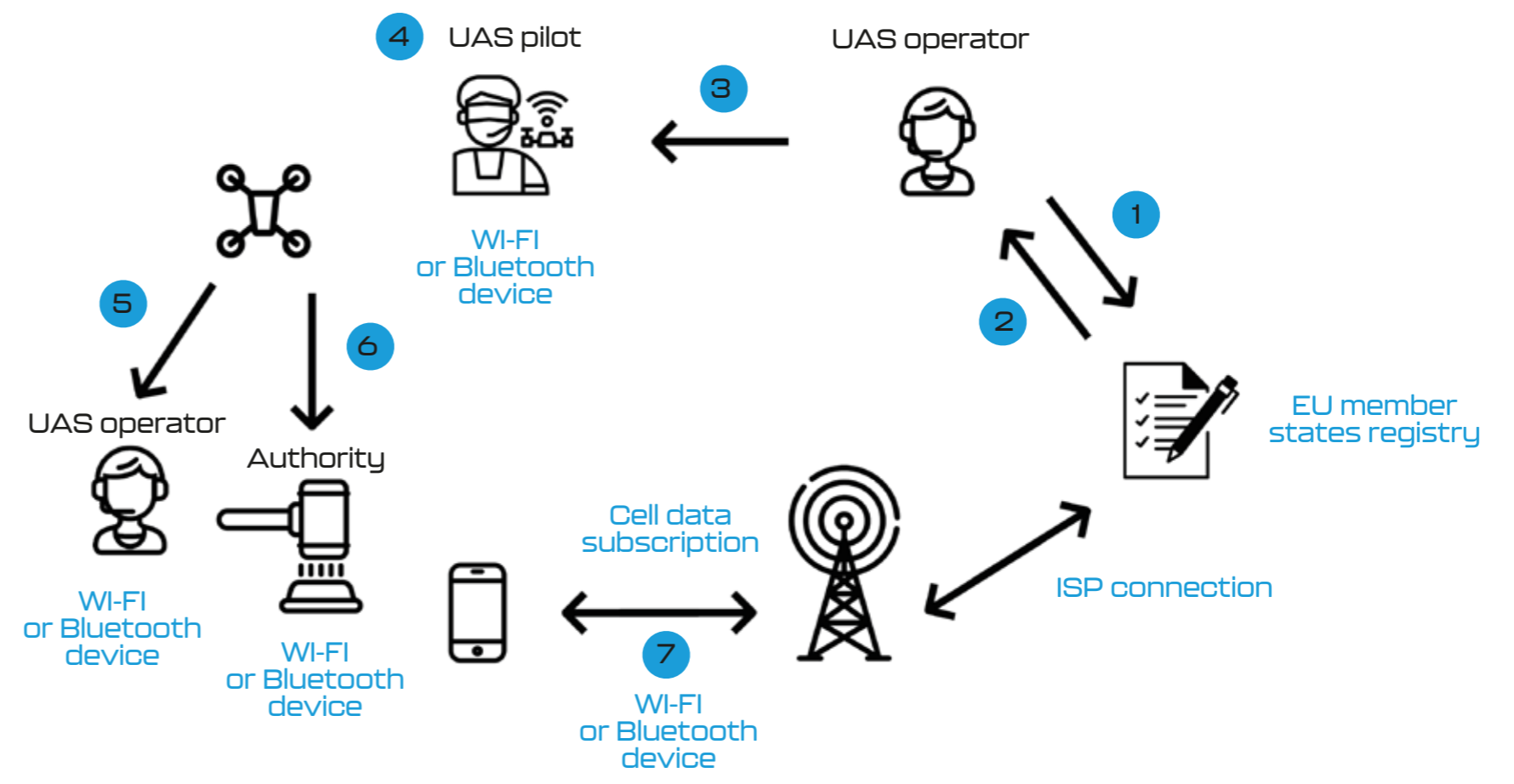
UAS Direct Remote ID (ASD-STAN)

1. UAS operator registers with his national authority
2. In return, he receives his registration number (OPRN)
3. He loads the OPRN in the UA remote ID system

4. In-flight, remote ID data is broadcasted
5. An observer close to the UA displays the data on his personal device
6. Authorities can check ID validity

Direct OEM

concept
UTM/U-space devices

At the moment we offer the smallest Remote ID solutions on the market that combines: WiFi, Bluetooth, GNSS and pressure sensor. Moreover we were the first company on the global market which officially launched remote id solutions. Now our group of idME Family include three products, and we are still developing this segment to extend our offer.

NEW

SOLUTION FOR PRODUCERS

New in the offer!
To meet the expectations of drone manufacturers, we have created a series of OEM modules equipped with Remote ID modules!

Main features:

- A unique solution for drone manufacturers
- idME PRO functionality: WI-FI, BLE, GNSS with pressure sensor
- Enables low-level assembly solutions for integrators
- Small outline

Versions available:

- with GNSS: TT-ID1G
- without GNSS: TT-ID1

Direct Remote ID

concept UTM/U-space devices

Our remote ID devices are compliant with the following standards:

- ASTM: global standard, supervised by ASTM
- ASD-STAN: European standard, standard published by EASA based on ASTM
- FAA Moc: American standard, FAA after ASTM approval published FAA Moc
- FCC: American standard for electronic devices sold in the US

The most significant advantages of AEROBITS Direct Remote ID devices are:

FCC

Small weight	Approx. 5 grams	
Small covering dimensions	31,5 x 15,5 x 7,3 mm	
Use of two technologies	BLE - Bluetooth Low Energy	WiFi - NAN and Beacon frames
Easy configuration	By using a micro USB slot	By using AT commands
Easy retrofit of existing drones	Existing drones on the market can be easily retrofitted by Direct remote ID devices	
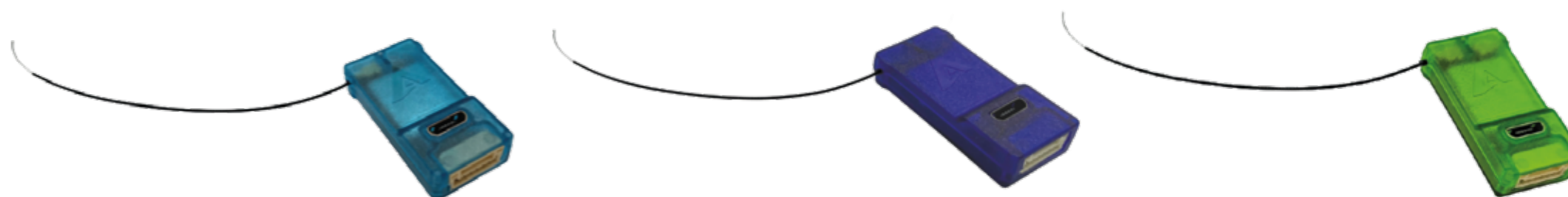
Direct Remote ID

current legal regulations

The main mission of AEROBITS is to develop safety in the airspace. Thanks to our products, our Customers can manage and monitor the airspace. AEROBITS has worked on identification technology for many years, having huge know-how and experience in this area. According to FAA division of Remote ID, our products fit in Direct Remote Identification regarding add-on modules and devices, which require from UAS to local broadcast of information about the airborne vehicle, so that this information can be received by other parties locally.

At the moment, AEROBITS fulfils the requirements of ASTM and ASD_STAN for the add-on version of Remote ID modules.

## Two standards: ASTM and ASD-STAN

1. ASTM International (USA), ASTM F3411-22 (last revision July 22) Aerobits is compliant with the MoC add-on certification to meet the FAA rule with idME+ and idME PRO.

2. ASD-STAN (EUROPE) Aerobits check the compliance of the UAS and add-on Direct Remote Identification function with the EC Delegated Act and implement Act requirements for idME+ and idME PRO.

Basic drone operation regulation (e.g., FAA Part 107, old UK CAA Part 722) — **Potential follow-up framework that either new or marged with overarching / previous regulation**

Improved procedural regulation and standards for advanced drone operation (EU) 2019 / 947, JARUS SORA, FAA OOP, etc.)

System requirements (e.g., (EU) 2109 / 945, FAA remote ID, EASA S.C. for Light UA (medium risk), (EU) 2021 / 664, Japan Level 4 certification system)

★ 2023 Highlights

2016   2017   2018   2019   2020   2021   2022   2023   2024   2025   2026   2027   . . .

☆ 1. SORA 2.5 public oonsultation   ☆ 2. Remote ID and U-space   ☆ 3. EU class certification
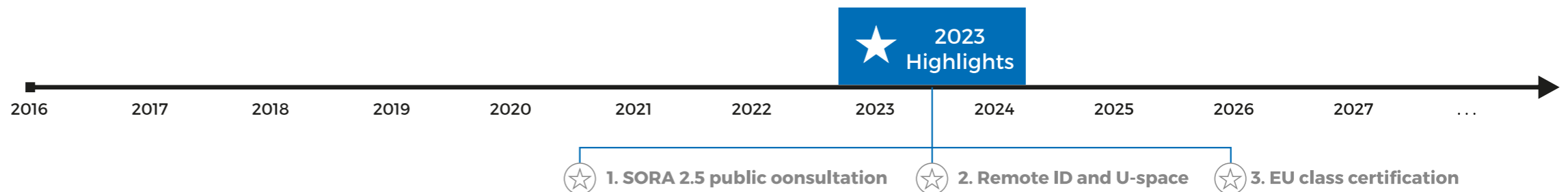
UTM/U-Space
based on Aerobits products

#LTE
#ADS-B
#FLARM
#RemoteID
#Bluetooth

TR-1A

GNSS   ADS-B in/out

TR-1F

ADS-B   FLARM
in/out   in/out

TR-1F

ADS-B   FLARM
in/out   in/out

IdME

GNSS
Bluetooth

HOD

GNSS
ADS-B in
LTE in/out
FLARM in/out

OGS station

ADS-B in
FLARM in
GNSS
LTE
RemoteID

Air Traffic
Surveillance Systems

Multi-GNSS

ADS-B

FLARM

HOD

GNSS
ADS-B in
LTE in/out
FLARM in/out

LTE/GSM

MQTT, CSV, Asterix Cat21
(ADS-B, FLARM)
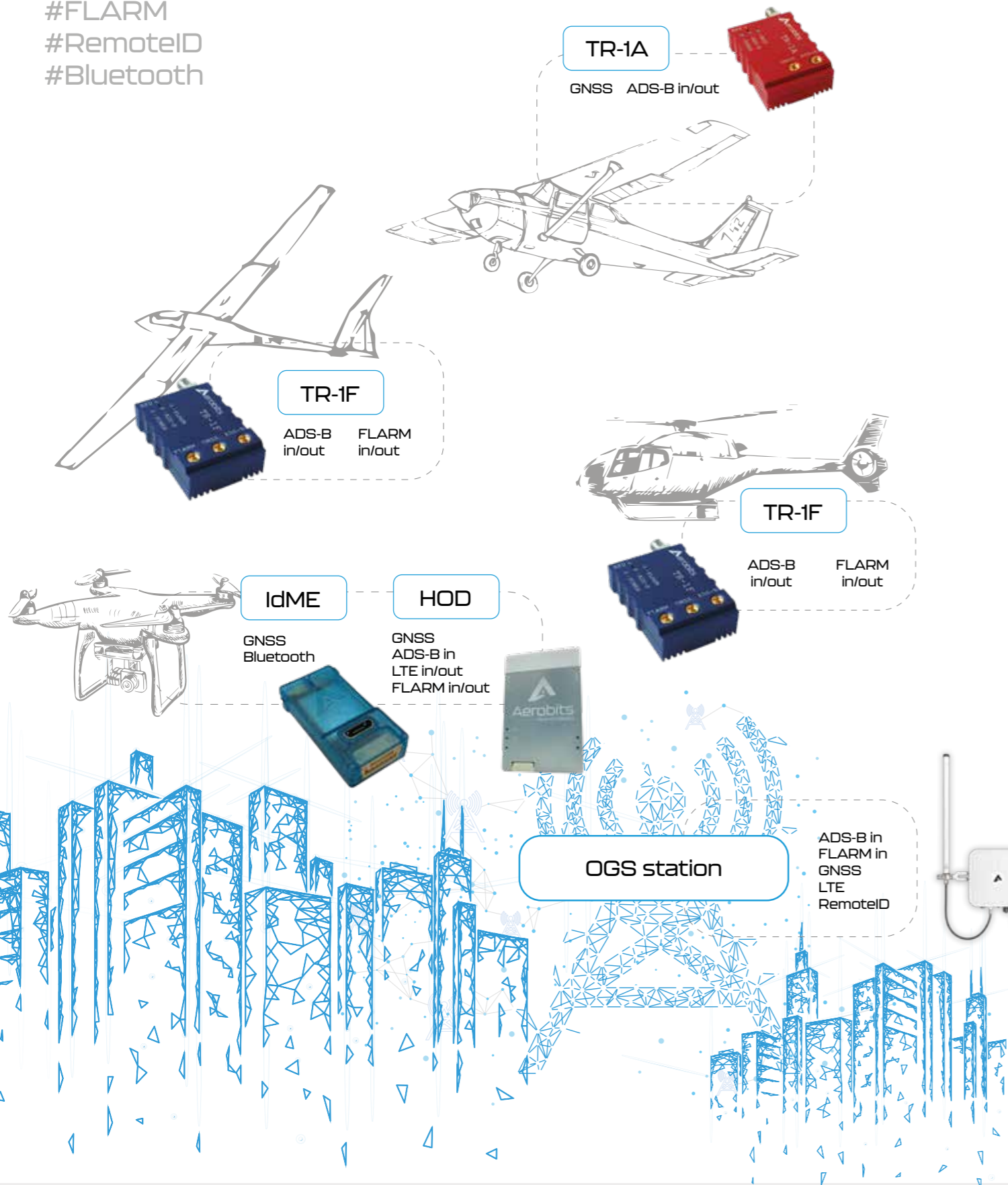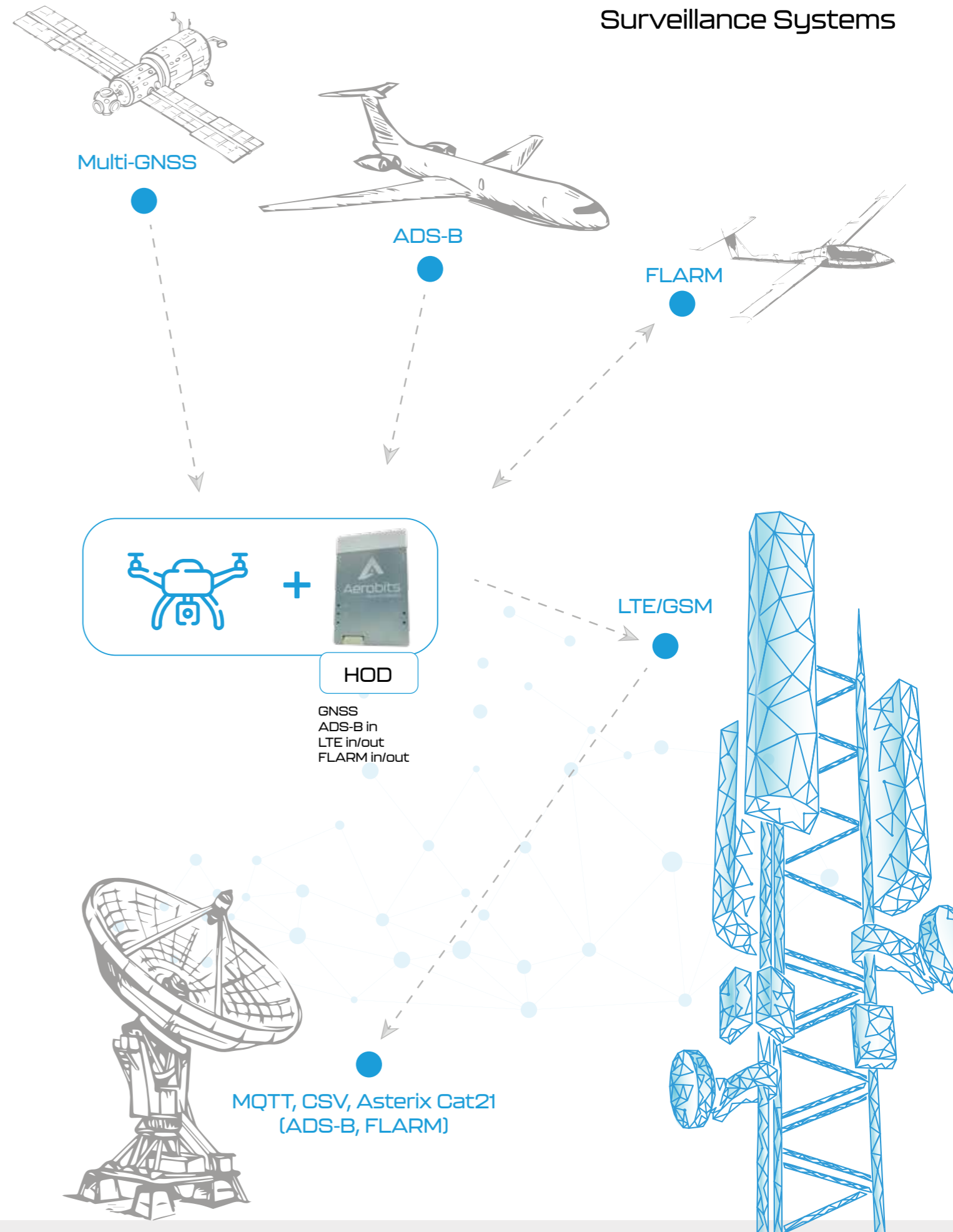
Plug&Play

idME

idME is designed to meet requirements of remote drone identification and localization in ASTM/ASD-STAN standard.

Using the BLE broadcast technology the device provides surveillance and drone operator identification capability based on any modern mobile devices such as smartphone or tablet.

idME can be easily connected to Pixhawk controller via JST connector. For full operation, a position source (along with other parameters) is required, which is obtained directly from the MAVLink protocol.

`REMOTE- ID` `BLE`

FCC **FAA MoC** **F3211-19** **CE**

Features:
- Requires position source via MAVLink
- BLE broadcast technology compliant with ASTM and ASD-STAN
- Interfaces: UART, USB
- Supports Bluetooth 4.0 and 5.2
- Free Android application available

Application:
- UAS >250g/open & special category
- U-Space/UTM
- Police/Special forces
- E-identification

Aero

Aero belongs to the class of the smallest ADS-B receivers on market and has been developed for civil and commercial Unmanned Aircraft Systems. It is especially dedicated to UAS controllers supporting the MAVLink protocol.

Aero operates on 1090MHz and allows tracking air traffic (equipped with ADS-B technology) in the vicinity of 100 km from UAS. The goal is to ensure a safe separation between manned and unmanned aircraft. Aero opens the way to the implementation of the Detect and Avoid algorithms, supporting the integration of UAS into the airspace.

`ADS-B`

Features:
- Real-time aircraft tracking on 1090MHz
- Designed to meet MOPS DO-260B
- Implemented MAVLink and AERO protocol
- High sensitive front-end with range up toHigh sensitive front-end with range up to 100km (300km with external 1dBi antenna)
- Programming via AT commands
- Patented FPGA-In-The-Loop technology with the capability of receiving thousands of frames per second
- Small power consumption and ultra-low weight design
- Simple plug&play integration with MAVLink devices

Application:
- On board ADS-B traffic monitoring
- Implementation of Detect and Avoid algorithm

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idME+

idME+ module is equipped with a high-quality multi-GNSS receiver and a barometric altitude sensor. Thanks to internal GNSS, it becomes an independent device from the autopilot – it only requires a power connection to function.

Using the BLE broadcast technology, the device provides surveillance and drone operator identification capability based on any modern mobile device such as a smartphone or tablet idME+ can be easily connected to Pixhawk controller via JST connector. Small outline and low power consumption allow it to be used in ultra-lightweight drones.

`REMOTE- ID` `GNSS` `PRESURE SENSOR` `BLE`

FCC **FAA MoC** **F3211-19** **CE**

Features:
- Standalone device
- Capability to work with MAVLink devices
- Compliant with ASTM, ASD-STAN, FAA Moc, FCC
- Interfaces: UART, USB
- Supports Bluetooth 4.0 and 5.2
- Free Android application available
- Integrated GNSS source and pressure sensor Simple plug&play integration

Application:
- UAS >250g/open & special category
- U-Space/UTM
- Police/Special forces
- E-identification

ETSI

Aero Pro

Aero Pro belongs to the class of the smallest ADS-B receivers on the market and has been developed for civil and commercial Unmanned Aircraft Systems. It is especially dedicated to UAS controllers supporting the MAVLink protocol. Aero Pro operates on 1090MHz and allows tracking air traffic (equipped with ADS-B technology) in the vicinity of 100 km from UAS. The goal is to ensure a safe separation between manned and unmanned aircraft. Aero opens the way to the implementation of the Detect and Avoid algorithms, supporting the integration of UAS into the airspace.

The device has the option of update via USB through connection to the computer. Additionally, this provides an option to visualize air traffic on Aerobits APP. Aero Pro has been designed to meet ETSI EN 303 213-5-1 V1.1.1 (2020-03) standard.

`ADS-B`

Features:
- Real-time aircraft tracking on 1090MHz
- Designed to meet MOPS DO-260B
- Implemented MAVLink, CSV, GDL90, ASTERIX protocols
- USB port with simple firmware update capability
- High sensitive front-end with range up to 100km (300km with external 1dBi antenna)
- Programming via AT commands
- Patented FPGA-In-The_LoopTM technology with the capability of receiving thousands of frames per second
- Small power consumption and ultra-low weight design
- Simple plug&play integration with MAVLink devices
- Dedicated software available

Application:
- On board ADS-B traffic monitoring
- Implementation of Detect and Avoid algorithms

IdME PRO

idME Pro is the most advanced Remote ID with WI-FI and BLE technology equipped with a high-quality multi-GNSS receiver and a barometric altitude sensor. Designed to meet requirements of remote drone identification and localization in ASTM/ASD- STAN standard. Using the BLE broadcast technology the device provides surveillance and drone operator identification capability based on any modern mobile devices such as smartphone or tablet. It is a standalone device that requires only power supply to operate.

idME PRO can be easily connected to Pixhawk controller via JST connector.

`REMOTE- ID` `WI-FI` `BLE` `GNSS` `PRESURE SENSOR`

FCC **FAA MoC** **F3211-19** **CE**

Features:
- Standalone device
- Capability to work with MAVLink devices
- Compliant with ASTM, ASD-STAN, FAA Moc, FCC
- Interfaces: UART, USB
- Supports Bluetooth 4.0 and 5.2
- Free Android application available
- Supports WI-FI (NaN, Beacons) frames

Application:
- UAS >250g/open & special category
- U-Space/UTM
- Police/Special forces
- E-identification

Plug&Play

The HOD

The Hook-On-Device (HOD) for UAS and other aircraft (such as helicopters) to transmit their own position data. Thanks to its low weight, the HOD can be attached to any aircraft.

It contains an LTE modem and a SIM card. The device transmits its current GNSS position via LTE to the UAS Traffic Management (UTM) system. The device is capable of receiving FLARM and ADS-B from surrounding air traffic and sending this data additionally to its own position to the UTM system. The UAS operator receives the UAS own position and the position data of other relevant air traffic in the vicinity via the web based UTM tracker. At the same time, the HOD transmits its position via FLARM (flight alarm). In this way, the aircraft also becomes visible to other airspace users in the vicinity who use FLARM.

`ADS-B IN` `LTE` `FLARM IN/OUT` `GNSS`

Features:
- Connectivity: 4G LTE Cat1, GNSS, ADS-B, FLARM
  - wide band/multi- constellation/1090 MHz/868MHz
- LTE modem to track aircraft via LTE
- Internal antennas: Built-in LTE antenna can be activated optionally
  External antennas: LTE, GNSS, FLARM and ADS-B antennas
- Compatible with all FLARM systems in aircraft and UAS
- Licensed FLARM transceiver (0.025 Watt output power)
  - broadcasting its own position
- Barometric sensor on board
- Simple plug&play integration
- Programming via AT commands
- Dimension: 58 mm x 38 mm x 9.5 mm

Application:
- On-board traffic monitoring
- Position broadcasting
- Implementation of Detect and Avoid algorithms
- UTM/U-Space
- UAS Tracking

TR-1F

TR-1F belongs to the generation of the smallest transceivers on market and supports two technologies: ADS-B and FLARM. It has been developed to support civil and commercial Unmanned Aircraft Systems as well as General Aviation. The device operates on 1090MHz and 868 MHz and allows receiving and transmit ADS-B and FLARM data with defined 0.25, 0.5 or 1 Watt output power for ADS-B and 0,025 Watt for FLARM.

`ADS-B` `GNSS` `PRESSURE SENSOR` `FLARM` `IN / OUT`

Features:
- Real-time aircraft tracking on 1090MHz and 868 MHz band
- Patented FPGA-In-The-Loop technology with the capability
- of receiving thousands of frames per second
- Integrated high quality GNSS position source and barometric altitude sensor 0.25, 0.5 or 1 Watt RF output power for ADS-B
- Licensed FLARM transceiver (0.025 Watt output power)
- Implemented MAVLink and AERO protocol
- Low-power consumption and low weight design
- Simple plug&play operation
- Programming via AT commands
- Designed to meet MOPS DO-260B (except the output power)
  Dimension: 35.0 x 25.0 x 8.5mm

Application:
- On-board traffic monitoring
- Position broadcasting
- Implementation of Detect and Avoid algorithms

TR-10i (Interrogator)

Developing our offer to meet the needs of the aviation industry is our priority. That's why we are so excited to inform you that currently, we are finishing our new product TR-10i, which is a low-power (10 Watt) Mode A/C/S Interrogator with ADS-B IN capability (optionally). This device will be dedicated to small UAVs to increase safety and security in the airspace.

`ADS-B` `PRESSURE SENSOR` `MODE A/C/S` `INTERROGATOR`

Features:
- Mode A/C/S interrogations (predefined from settings)
- ADS-B IN capability (optionally)
- USB Type-C for quick module parametrization
- Many additional interfaces for simple integration with the flight controller
- Designed with: ED-102A, ED-73F, ED-14G

Application:
- Output power: 10W (1030MHz)
- Input sensitivity: -87dBm (1090MHz)
- Power supply: 9-36V
- Dimension: 53.5x43.5x18.0mm
- Weight: 60g

TR-1A

TR-1A belongs to the second generation of the smallest ADS-B transceivers on market and has been developed for civil and commercial Unmanned Aircraft Systems.
The device operates on 1090MHz and allows receiving and transmit ADS-B data with defined 0.25, 0.5 or 1 Watt output power. The transceiver does not require external devices to operate. It is equipped with a high-quality multi-GNSS receiver and a pressure sensor.

`ADS-B` `GNSS` `PRESSURE SENSOR` `FLARM` `IN / OUT`

Features:
- Real-time aircraft tracking on 1090 MHz band
- Patented FPGA-In-The-Loop technology with the capability of receiving thousands of frames per second
- Integrated high quality GNSS position source and barometric altitude sensor 0.25, 0.5 or 1 Watt RF output power
- Implemented MAVLink and AERO protocol
- Low-power consumption and low weight design
- Simple plug&play operation
- Programming via AT commands
- Designed to meet MOPS DO-260B (except the output power)
- Dimension: 35.0 x 25.0 x 8.5mm

Application:
- On-board traffic monitoring
- Position broadcasting
- Implementation of Detect and Avoid algorithms

TR-10 (Transponder)

Developing our offer to meet the needs of the aviation industry is our priority. That's why we are so excited to inform you that currently, we are finishing our new product TR-10, which is a low-power (10 Watt) Mode A/C/S Transponder with extended squitter capability (optionally). This device will be dedicated to small UAVs to increase safety and security in the airspace.

`ADS-B` `PRESSURE SENSOR` `MODE A/C/S` `TRANSPONDER`

Features:
- Mode A/C/S replies (predefined from settings
- ADS-B Out capability with external GNSS source (optionally)
- USB Type-C for quick module parametrization
- Many additional interfaces for simple integration with the flight controller
- Designed with: ED-102A, ED-73F, ED-14G

Application:
- Output power: 10W (1090MHz)
- Input sensitivity: -72dBm (1030MHz)
- Power supply: 9-36V
- Dimension: 53.5x43.5x18.0mm
- Weight: 60g

Ground Infrastructure

Ground Infrastructure category includes solutions which allow to build or prototype UTM and ATM networks, based on ADS-B and FLARM technologies. With use of LTE and/ or PoE technologies it is possible to design a network for each use case.

Products vary from small single PC computers, through Omni-directional system to state-of-the art Sector Antennas for best performance with minimum effort to install and run the system.

Short and clear instructions will help you how to quickly integrate into your existing system whether it is for drone integration, air traffic monitoring or supplementary systems such as BNK projects.
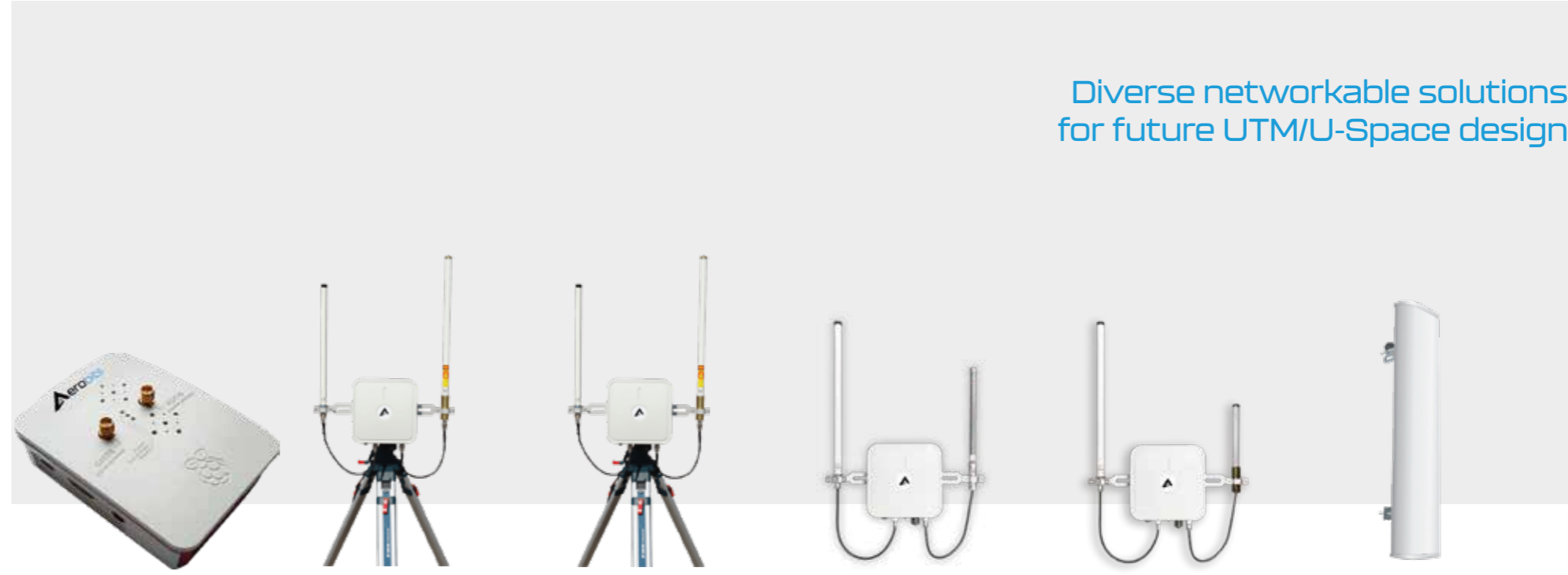
Product	Aero RPi Hat	Mobile Ground Station	Mobile Ground Station BLE	Omni-directional Ground Station	Omni-directional Ground Station BLE, WI-FI	Sector Antenna
WEIGHT (g)	300	5000	5000	1500	1500	13000
DIMENSIONS (mm)	85.6 × 56.5 × 17	130 × 175 × 45	170 x 170 x 100	170 ×170 × 100	170 x 170 x 100	1290 × 290 × 134
ADS-B (IN)	☒	☒	☒	☒	☒	☒
LTE	☐	☒	☒	☒	☒	☒
REMOTE ID	☐	☐	☒	☐	☒	☐
VIEW	Omni-directional	Omni-directional	Omni-directional	Omni-directional	Omni-directional	Sector
OVERAL ADS-B SENSITIVITY; ANTENNA GAIN INCLUDED (dBm)	-88 (antenna 1dBi)	-90 (antenna 5dBi)	-90 (antenna 5dBi)	-90 (antenna 5dBi)	-90 (antenna 5dBi)	-100 (antenna 13dBi)
OVERAL FLARM SENSITIVITY; ANTENNA GAIN INCLUDED (dBm)	☐	-112 (antenna 8dBi)	☐	-112 (antenna 8dBi)	☐	-119 (antenna 13dBi)
FIXING	Mobile	Mobile	Mobile	Fixed	Mobile	Fixed
FLARM IN	☐	☒	☐	☒	☐	☒
GNSS	☒	☒	☒	☒	☒	☒
TIMESTAMP (MLAT DATA SOURCE)	☒	☒	☒	☒	☒	☒

Aero RPi Hat

The product integrates Micro ADS-B and GNSS technologies with the most popular single board computer in the world. This allows easy access to data collected by the TT-MC1 module.

Aero RPI Hat offers the possibility of receiving and decoding ADS-B and Mode-A/C/S. The integration of GNSS technology allows marking frames with an accurate timestamp for multilateration purposes. It is possible to connect Dongle LTE/GSM via a USB port.

`ADS-B` `MODE A/C/S` `GNSS`

Mobile Ground Station

The MGS-01 station combines LTE, GNSS, ADS-B and FLARM technologies in a very convenient form. It has been designed to allow quick and easy assemble.

Packed in a very nice and sturdy case, comes with all necessary cables and antennas for straightforward installation which takes less than 5 minutes.

It is a perfect solution if you are conducting many VLOS/BVLOS operation in different places where safety is critical.

`ADS-B` `FLARM` `GNSS` `LTE` `MODE A/C/S` `Mobility`

Mobile Ground Station BLE

The MGS-01 station combines LTE, GNSS, ADS-B and FLARM technologies in a very convenient form. It has been designed to allow quick and easy assemble.

Packed in a very nice and sturdy case, comes with all necessary cables and antennas for straightforward installation which takes less than 5 minutes.

It is a perfect solution if you are conducting many VLOS/BVLOS operation in different places where safety is critical.

`ADS-B` `GNSS` `LTE` `BLE` `MODE A/C/S` `Mobility`

Features:
- Powered via standard USB connector or via POE
- Based on TT-MC1a 1090MHz receiver
- Integrated GNSS with additional USB connector
- Precise time-stamping of raw frames
- Integrated temperature and air quality sensor
- Availability in different configurations
- Total power consumption - approx. 3.7W

Application:
- Ground stations
- UTM/USpace proof of concepts
- Data collecting

Features:
- Perfect for remote operations
- ADS-B range ca. 350 km and FLARM ca. 15 km (dependent on correct positioning)
- LTE connectivity
- Easy installation
- All necessary components in the box (mounting kit, GNSS and LTE antennas, cables etc.)
- Durable and watertight construction designed to work in harsh environment
- Dedicated software available for visualization

Application:
- Perfect solution for local airfields
- U-Space and UTM systems
- Ground Network air traffic surveillance systems
- Easy to pack
- Can be powered from 5V power supply i.e. power bank

Features:
- Single piece sector antenna for ADS-B
- High gain antenna for airspace monitoring perfect for U-Space applications
- ADS-B range ca. 500 km, BLE 4,5 km
- LTE connectivity
- Easy installation
- All necessary components in the box (mounting kit, GNSS and LTE antennas, cables etc.)
- Durable and water tight construction designed to work in harsh environment
- Dedicated software available for visualization

Application:
- Airports and critical infrastructure
- Nationwide traffic management systems (manned and unmanned)
- Perfect solution for local airfields
- U-Space and UTM systems
- Network based Remote Identification (central monitoring)

Omni-directional Ground Station   For small air traffic

OGS station is an ADS-B and FLARM Omni-directional receiver station with multi-constellation GNSS sensor to provide best accuracy. LTE connectivity allows usage in all LTE/3G rich environments without the need for any additional cabling to send data. It has been designed to allow quick and easy assemble enclosed in IP67 case for high weather condition resistance.

`ADS-B` `FLARM` `GNSS` `LTE` `MODE A/C/S`

Omni-directional Ground Station BLE   For small air traffic

OGS station is an ADS-B and BLE/Wi-Fi RemoteID Omni-directional receiver station with multi-constellation GNSSsensor to provide best accuracy. LTE connectivity which simple setup of the MQTT broker allows usage in all LTE/4G rich environments without the need for any additional cabling to send data.

`ADS-B` `FLARM` `BLE` `LTE` `GNSS` `MODE A/C/S`

Sector Antenna   For big air traffic

This antenna is a station based on sector antenna technology. ADS-B and FLARM transceivers used in the drone technique have relatively small RF transmitting power. Efficient tracking of such objects requires the design of highly sensitive receivers. The antenna technology is helpful in this case, which allows for significant improvement of input sensitivity.

Sector antennas allow to increase the operation range of ADS-B/FLARM signals in selected directions several times. This product is easily networkable using LTE connectivity and is optimized to work in a harsh environments. Apart from drone technology, the antenna can be used in manned traffic surveillance, ADS-B.

`ADS-B` `FLARM` `GNSS` `LTE` `MODE A/C/S`

Features:
- High gain antenna for airspace monitoring perfect for U-Space applications
- ADS-B range ca. 400 km , FLARM ca.40 km (dependent on correct positioning), BLE 4,5 km
- LTE connectivity
- Easy installation
- All necessary components in the box (mounting kit, GNSS and LTE antennas, cables etc.)
- Durable and water tight construction designed to work in harsh environment
- Dedicated software available for visualization

Application:
- Nationwide traffic management systems (manned and unmanned)
- Perfect solution for local airfields
- U-Space and UTM systems
- Ground Network air traffic surveillance systems

Features:
- Single piece sector antenna for ADS-B and 2,4 GHz idME (remote ID)
- High gain antenna for airspace monitoring perfect for U-Space applications
- ADS-B range ca. 400 km, BLE 4,5 km
  LTE connectivity
- Easy installation
- All necessary components in the box (mounting kit, GNSS and LTE antennas, cables etc.)
- Durable and water tight construction designed to work in harsh environment
- Dedicated software available for visualization

Application:
- Airports and critical infrastructure
  Nationwide traffic management systems (manned and unmanned)
- Perfect solution for local airfields
- U-Space and UTM systems
- Network based Remote Identification (central monitoring)

Features:
- Single piece sector antenna for FLARM and ADS-B
- High gain antenna for airspace monitoring perfect for U-Space applications
- ADS-B range ca. 450 km and FLARM ca.70 km (dependent on correct positioning), BLE 4,5 km
- LTE connectivity
- Easy installation
- All necessary components in the box (mounting kit, GNSS and LTE antennas, cables etc.)
- Durable and water tight construction designed to work in harsh environment
- Dedicated software available for visualization

Application:
- Airports and critical infrastructure
- Nationwide traffic management systems (manned and unmanned)
- Perfect solution for local airfields
- U-Space and UTM systems
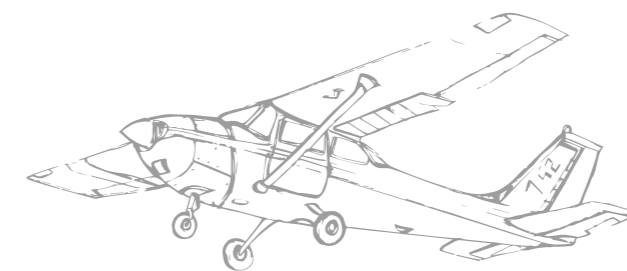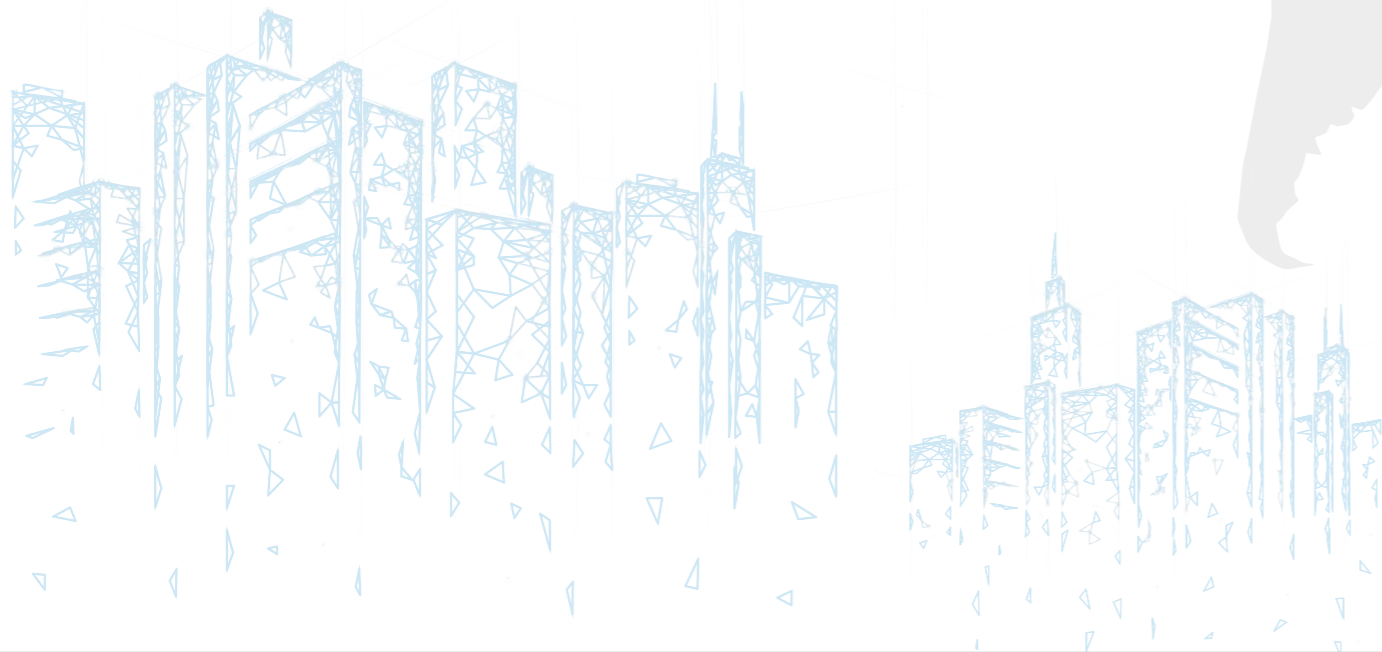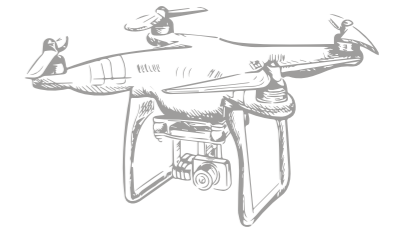- Ground Network air traffic surveillance systems

Our current
global reach

We are honored to provide products
and support to our customers.

345 clients
54 countries
6 continents