



Company Profile



antwerpspace

An OHB Company

Satellite Communications

Antwerp Space is a leading company in Belgium, active in the field of satellite communications. It is part of OHB SE, a European Space and Technology group that currently employs over 2400 people.

The Antwerp Space's core business is in the delivery of satellite communication solutions and products for scientific, exploration and telecommunication missions, as well as their ground segment extension with products and systems. The company activities have been located in Antwerp since 1962, when it was founded as part of Bell Telephone.

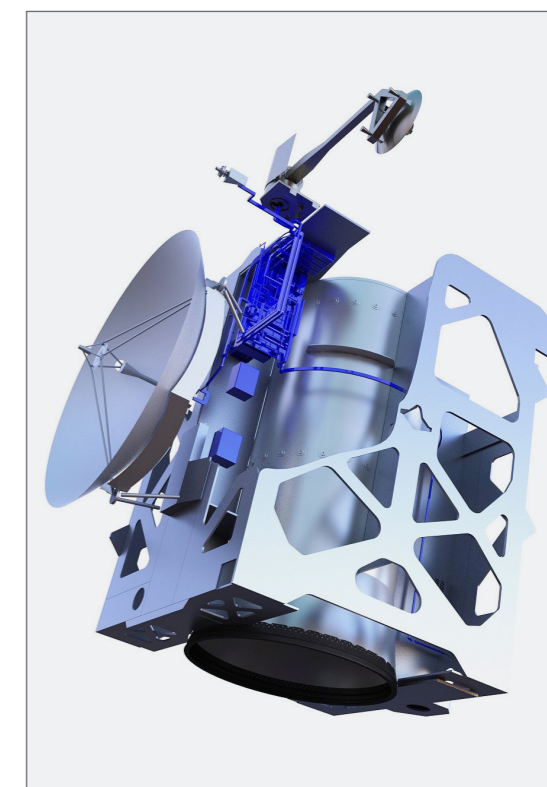
It serves the objectives of Satellite Prime contractors and Ground System integrators thanks to the technical expertise of its 70 highly skilled engineers and PhDs.

Antwerp Space operates both on the commercial and institutional markets, supporting space agency programmes, as well as industrial company projects worldwide.

Satellite Communication Subsystems

Antwerp Space designs, integrates and delivers complex Communication subsystems for ESA's Science and Exploration programs. These subsystems enable the communication link with the Earth, and ensure the Satellite telecommand reception, the return of satellite housekeeping and Science data which may include radio-science experiments data. The scope of activities includes the datalink studies as part of the mission definition, the specification of the subsystem, as well as its realisation, validation and delivery.

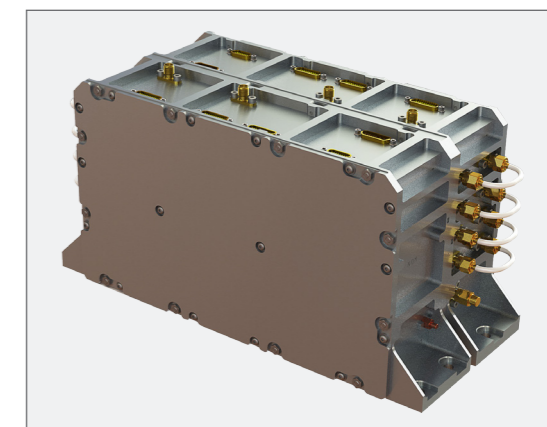
- ▣ Recent programs
 - Lunar Lander Phase B1
 - ExoMars 2018 Phase B
- ▣ Ongoing programs
 - Exomars Carrier 2020 Phase C/D
 - Juice Communication subsystem
- ▣ Planned programs
 - Several ESA Science & Exploration programs



RF & Communication Equipment

Antwerp Space develops and markets innovative spaceborne communication equipment, addressing the needs of commercial and institutional markets:

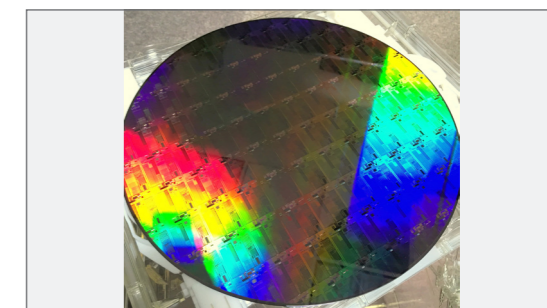
- ▣ Flexible radio-signal processing platform (SDR)
 - Typical applications: (TM/TC), modem, maritime security (AIS, VDES), Airborne security (ADS-B)
- ▣ Wide-band L-band modem, with advanced robust coding scheme (ARGO)
- ▣ Inter-satellite communication equipment, addressing a.o. satellite constellations



Telecom Payload Technology

To serve next generation Telecom payloads, **Antwerp Space** is running development and qualification of breakthrough technologies:

- ▣ Ka-Band Frequency Converter, based on in microwave photonics semi-conductor technology
- ▣ Advanced techniques for in-orbit interference detection and mitigation



Ground Station Equipment

Antwerp Space designs and develops high end equipment for satellite ground stations, with the focus on high performance demodulators and frequency converters. These products are used within ground stations world wide, for the reception of earth observation images, in satellite access networks and in the satellite control segment.

OMNISAT data acquisition system for Earth Observation

Started as true pioneer, with first installations in 1982, over 300 Omnisat units are in operation world wide

Main benefits of Omnisat:

- Top performance: Multi-mission and multi-channel, up to 975Mbps per channel, up to 4 independent channels
- Modular functionality on industrial PC: Signal reception, demodulation, front-end-processing, loop-back test & satellite signal simulation, real-time spectrum analyzer and constellation display, etc.



IBB (Integrated Base Band) for Telemetry, Telecontrol & Ranging

Some references

- Large satellite constellations like Globalstar and O3b
- KoreaSat5, RasCom, ATV (also EGSE)
- Used in testbenches for MTG, HAG1, etc.

Main benefits of IBB

- Top performance, even in difficult reception conditions (high Doppler, low signal/noise ratio): Fast acquisition time, high dynamic range, signal purity and ranging accuracy
- Flexible & reliable: Easy interconnection of TT&C building blocks via GUI, modular functionality on industrial PC (multiple RX/TX channels, RF functionality)
- Integrates L/S-band downconverters, leading to compact solution



BMD (Burst Mode Demodulator) for Satellite Communication Networks

Thanks to its excellent performance, our BMD is the Satlab certification reference!

Already in 2004 we delivered complete DVB-RCS hubs, with all key elements self-developed and interoperable with several 3rd party terminal suppliers.

Main benefits:

- Demodulates all bursts within 20MHz, symbol rate 64Ksps to 4Msps
- Handles patented distributed pre-amble for low Eb/No conditions
- Easily adaptable to other burst modes



SATCOM RF products

A broad range of high-end products covering C-, X- and Ku-band, for synthesized frequency converter, block upconverter and booster up to 40 Watt. Reference product for deep space Ka-band frequency conversion for ESA. Unique Ka-band converter for Ka-band earth observation (25.5GHz – 27GHz)



Satellite Ground Facilities

Antwerp Space has an extensive experience in designing, building and commissioning ground stations for TT&C and earth observation applications. Antwerp Space delivers the optimal solution by integrating own products together with the best selection of third party equipment.

Main realisations over the years:

- ▣ Upgrade of **Globalstar II** groundstations
- ▣ Delivery of key subsystems for **MTSat** groundstation
- ▣ Delivery of key subsystems for DVB-RCS networks
- ▣ Development of **generic EO station**, offered a turn-key solution to the market. It is fully automated self standing Earth Observation Satellite receiving station offering tracking, acquisition, demodulation, storage and image data forwarding.
- ▣ **Envisat** ground stations in Kiruna, Fucino and Frascati
- ▣ Delivery of stations to ESA for ERS-1, upgrade Meteosat TT&C station, CNES TT&C network, TT&C station for Swedish Space Corporation, ...



Secure Satellite Communication Networks

Antwerp Space has a robust experience in the definition and implementation of turnkey private and secured communication networks. A key realisation is the delivery of the communication networks in the Galileo programme. The Networks comply with stringent requirement on low latency, high continuity, high availability and security robustness.

Its main components are:

- ▣ **MDDN**: Mission data dissemination network
 - Delivery of the network elements ("MNEs") interconnecting the GMS sites
 - Delivery of the management function (GNMF i.e. Galileo Network Management Function)
- ▣ **SDDN**: Satellite Data Dissemination Network or GCS (Galileo Control Segment) network
 - Delivery of the network elements ("SNEs") interconnecting the GCS sites



Advanced Test Systems

Antwerp Space is specialized in SCOE (Specific Check-Out Equipment) with stringent requirements on wideband signal acquisition, high precision measurements and hard real time signal processing. Antwerp Space uses its proprietary SW platform for these SCOE. This platform is field proven by years of continuous operation with sustained customer satisfaction.



Main realisations over the years:

- ▣ MPCV EGSE Prime Contractor
- ▣ ExoMars Carrier Module EGSE Lead
- ▣ Meteosat Third Generation (MTG) **TT&C** SCOE
- ▣ Solar Orbiter **TT&C** SCOE
- ▣ **Globalstar** RF SCOE rack
- ▣ **Pleiades** EGSE (Images, DCU, TMI FEE)
- ▣ **Galileo** GSTB-V2 PTS & SMS
- ▣ Cryo SCOE for the **Herschel-Planck** mission

Antwerp Space provided most test benches for the **ATV** program ground test Facilities:

- ▣ ATV TDRS and ISS communication links, both the measurement environment and the simulation of the RF links, inclusive spread spectrum modems.
- ▣ ATV GPS receiver
- ▣ Baseband interface front end equipment providing simulation of interfaces and equipment
- ▣ TM/TC processing

Antwerp Space was a

- ▣ main contractor for the **Columbus** Attached Pressurized Module (APM) EGSE, for both the EFM and PFM.
- ▣ main contractor for the EGSE for the **SPOT Vegetation payload** embarked on SPOT 4

Building further upon its experience for delivery **SCOE**s, Antwerp Space also develops **RF Suitcases** which are used to test ground stations.

Competences

- ▣ System engineering:
 - Architectural study and definition phase for:
 - Satellite Ground station
 - (secure) communication networks
 - EGSE & SCOE
 - On-board Satellite communication subsystems
 - On-board Payload equipment
- ▣ Modem Design and development:
 - Definition of modem & coding algorithms
 - Definition of modem architectures for analogue and digital modulation schemes, spread spectrum modulation schemes, for continuous and burst mode
 - Extensive knowhow of Earth Observation standards like CCSDS
- ▣ Digital signal processing algorithmic development and PC platform (both Linux and Unix)
- ▣ Hardware design and development:
 - System On Programmable Chip (SOPC): FPGA design in VHDL, digital filtering, digital signal processing.
 - RF design and validation for demanding near earth and Deep Space applications
 - Design and development of state-of-the-art Photonic products
- ▣ Embedded Software design and development:
 - Real time applications like Proprietary schedulers on ARM / DSPs, Embedded, network connectable, microcontrollers
 - Non Real-Time Software design for monitoring and control
- ▣ Application Software design and development:
 - Alarm management, service provisioning, performance management, resource configuration
 - Automation of EGSE tests
 - Graphical User Interface
- ▣ Project management
 - Prime Contractor management of international program
 - Subcontract management (multiple international subcontractors)
- ▣ Product Assurance
- ▣ Integration and end-to-end validation and test



Facilities

- ▣ Antwerp Space Engineering lab facilities:
 - Antwerp Space has at its disposal a 500m² engineering lab environment for the hardware development, divided over the different hardware engineering disciplines:
 - Digital hardware development (logic state analysers, debuggers, high speed BER testers, vector signal generators, noise generators...)
 - Analog and RF hardware development (network analysers, spectrum analysers, oscilloscopes, up to 50GHz)
 - Network engineering (switches, routers, firewalls, ...)
- ▣ Antwerp Space Internal Production Capabilities:
 - Model shop for the production of small product volumes.
 - Assembly of prototype PBAs (including fine-line SMD)
 - Production of equipment and rack level cable assemblies
 - Production of cabling including, semi-rigid cabling
 - Rack and sub-rack integration
 - Module, equipment and rack mechanical design and construction
- ▣ Antwerp Space Clean Room
 - 100m² surface
 - Class 100000/ISO8
 - Allows for both production of space qualified equipment as integration of complete subsystems





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The Antwerp Space N.V. policy is one of continuous development and improvement, consequently the equipment may vary in detail from the description and specification in this publication.
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