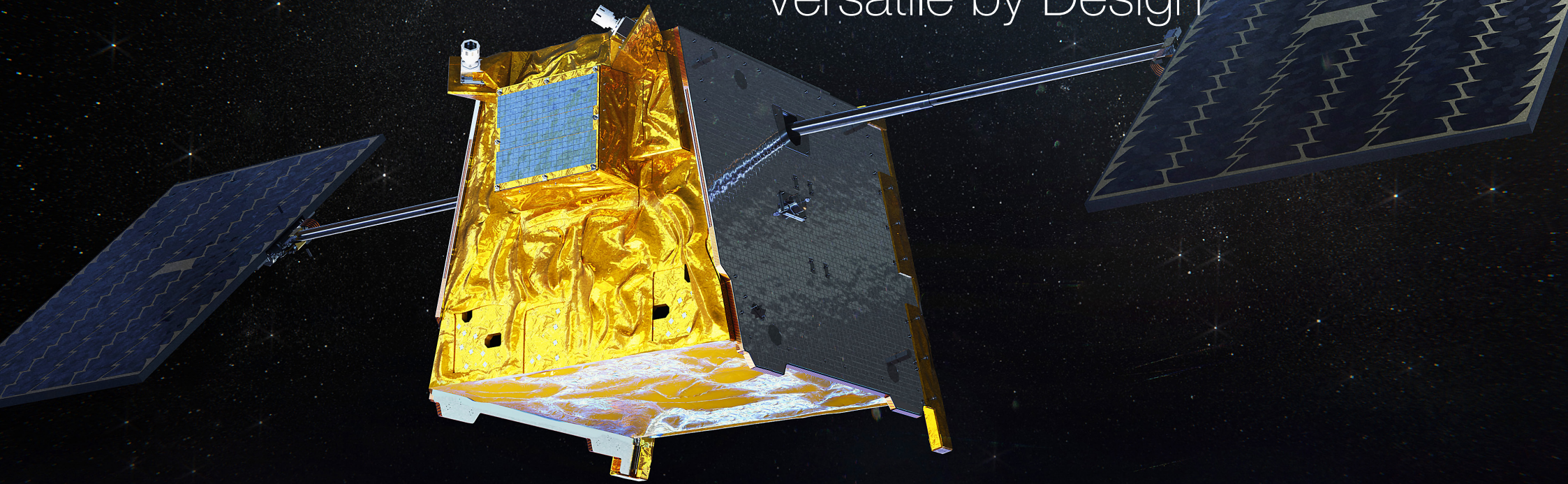


U.S. SPACE & DEFENSE

ARROW PLATFORM

Versatile by Design



YOUR MISSION ENABLER

Whatever your mission to solve global challenges on Earth from Space, we will get you on track-on time, on quality and on budget.

The future of Space is not what it used to be: Low-Earth orbit constellations complement large existing Space Systems. Constellations of small satellites are unlocking a wide new range of missions and opportunities for business. They are the new foundation for delivering high-frequency information and insights to cope with global or local challenges on Earth.

At Airbus, we're on a mission to facilitate access to Space and to provide affordable, powerful, smart and modular constellation spacecraft to enable high-performance Space applications for established or new Space entrepreneurs. We designed the ARROW platform based on OneWeb's heritage with one purpose in mind: to make your mission successful and allow you to deliver on your business case.

A versatile platform suited to carrying advanced payloads in a single mission or multi-mission concept

- Highly reliable, qualified bus and innovations from design to manufacture (automation, design to cost...)
- Platform designed for up to 200kg class satellites
- Up to 100kg class payload
- 7 years minimum lifetime at 500-km orbit and 5 years at 1,200km orbit
- Orbit flexibility thanks to full-electric propulsion
- Scalable solution, allowing optimum exploitation of small or large constellations
- Cost effective thanks to the use of COTS, integrated supply chain management and mass production scale factor
- Modular design to accommodate different types of payloads

ONE PLATFORM FOR ALL SPACE MISSIONS

One versatile platform capable of both delivering in-orbit demonstration and supporting complex missions with advanced payloads in mega constellation configuration, multi-mission concepts or technology demonstrations.

Airbus' expertise, experience and pioneering spirit delivers long duration LEO missions for commercial, institutional and military applications, enabling space-based services. We also propose a payload catalogue for Earth observation, communications, science or technology demonstrations.

COMMUNICATIONS AND CONNECTIVITY

TELECOM

A wide range of applications

- Global communications for defense, voice & data
- Low data rate communications: Internet of Things, M2M
- Maritime and aero applications
- Radio frequency sensing and tracking

EARTH OBSERVATION MONITORING, ANALYTICS AND SITUATIONAL AWARENESS

OPTICAL IMAGERY

High performance in terms of resolution and imagery

- Turnkey system for high revisit targets in high resolution (<1m) worldwide, accessible through a digital platform.
- Real time persistent Earth monitoring (Video) and on-board processing in high resolution
- Hyperspectral imaging system

RADAR IMAGERY

Unique global day/night, all-weather access

- Turnkey system for high-refresh radar imaging (3m) with dedicated maritime mode for ship detection
- Very high resolution (0.5-2m) SAR offering very high resolution over specific targets of interest for security and defense applications

An affordable solution with a reduced time to orbit

- OneWeb Satellites' undisputed experience in serial production of mega constellations: mass production lines are available in Europe and the USA to answer the growing demand for mega constellation, with production rates of as many as 15 satellites per week.
- A small stowed platform and payload size: the very compact spacecraft launch volume supports multiple-launch or ride-sharing compatibility for cost-effective constellations.
- Airbus' experience for orbit management, frequency allocation, ITU-compliant communications, collision avoidance and end-of-life disposal operations: a solution compliant with post-mission disposal regulation.

ONE-STOP SHOP FOR SPACE ACCESS

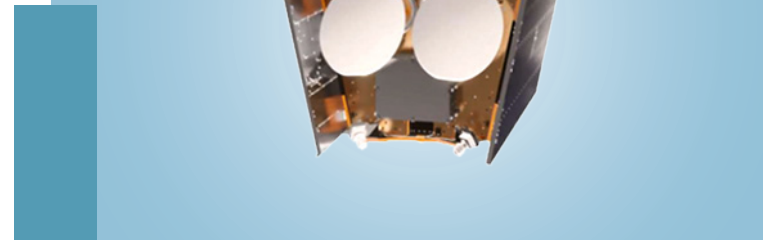
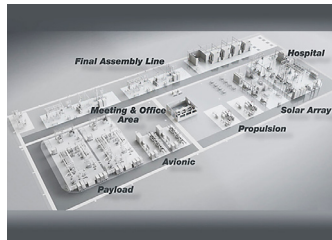
Airbus offers different solutions that comply with a variety of business models:

- MISSION-AS-A-SERVICE: an end-to-end solution including satellite launch, ground segment, payload integration, engineering support and operations.
- ARROW BUS CONFIGURATION: configuration of the ARROW platform to best fit your mission's requirements and integration of your payload.
- FULL SATELLITE SYSTEMS: delivery of a standard constellation product with payload catalogue options.
- Airbus can also develop a dedicated constellation with a customized payload design based on the required performance and operations.

AIRBUS TRUSTED PARTNER

- IODA, the In-Orbit Demonstration Service provided by Airbus with the European Space Agency, facilitates in-orbit validation of new satellite concepts and technology demonstration systems to prove and de-risk your new mission in LEO.
- In the Blackjack programme, Airbus will provide an architecture demonstration intended to show the military utility of global low-Earth orbit constellations and mesh networks of lower size, weight and cost. DARPA will use the ARROW satellite buses and pair them with sensors and payloads.

The One Platform for Enabling All Space Missions

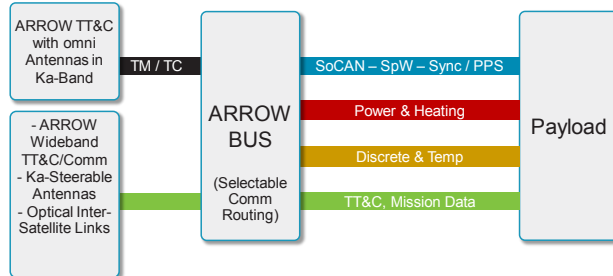


ARROW is Airbus' innovative, responsive, versatile and affordable platform for high-performance Space applications, collection and tracking of RF sensing data, Earth observation, M2M, IoT, low-data-rate communications and messaging, as well as in-orbit demonstration.

New Approaches from Design to Manufacture and Launch

The ARROW platform has been further developed from the OneWeb satellite bus design leveraging innovative manufacturing approaches tailored for serial production of small (Up to 200Kg-class) satellites at significantly lower costs than other systems with comparable capability.

Functional Block Diagram



ARROW Avionics Functional Block Diagram
(includes wideband TT&C/Comm package)

Customers are able to operate their payload independent of the platform.

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A Game Changer in the Design and Manufacturing of Small Satellites for Constellation Purposes

Scale: pioneering high-volume spacecraft production with unprecedented production rate of 15 satellites per week.

Price: low recurrent unit price thanks to the use of COTS components and sub-system and scale production factor.

Quality: proactive supply chain management. Applying large-scale production, assembly and test approaches from other industries including advanced levels of automation.

Cycle Time: shortening customer acquisition timelines to just a year.

Modularity: designed to accommodate multiple mission configurations, from nano to medium class payloads and long duration LEO missions. Full orbit flexibility thanks to full-electric propulsion. Standard payload deck and standard interfaces.

Flight proven: first OneWeb satellites already launched successfully. Compatible with all launchers.

Reliability: high reliability standards qualified in the OneWeb programme. Five years minimum lifetime in LEO orbit (at 1,200km).

Regulation: compliant with post-mission disposal regulations.

Did You Know...?

ARROW takes full advantage of hundreds of spacecraft being produced in the OneWeb Satellites production lines in Florida, USA and Toulouse, France. Each factory is configured to output fully assembled and tested satellites from each line per day.

At a Glance

Payload Power/Dissipation	Orbit Average Power (OAP) 210W; 700W for 5 minutes; >1kW for 30 sec.
Payload Mass	Up to 100kg
Available Payload Volume with Thermal Regulation	Minimum of 48x52x52cm (stowed box)
Total Spacecraft Mass	Up to 200kg
Mission Data	Uplink 28kbps; Downlink 50kbps (low rate)/480kbps (high rate)
Pointing Knowledge	0.07deg (1σ)
Pointing Control	0.08deg (1σ)
Slew Rate	0.5deg/s (roll/yaw); 1.5deg/s (pitch)
GPS Accuracy	Position 10m; Velocity 0.02m/s; time 50ns (1σ)
Design Life	>7 years (500km orbit); >5 years (1,200km orbit)
Launch Vehicles	Arianespace Soyuz, Ariane 6, Virgin Orbit Launcher One, others proposed
Nominal Orbit	500-1,500km circular polar orbit; can be adapted in altitude/inclination
Batteries	Li-ion
Bus Voltage	22-38V non-regulated
C&DH	Redundant Bus @125kbps (SoCAN) and 1Mbps (SpaceWire)
Encryption	AES 256
Payload Electrical and Data Handling Interfaces	Power Lines (0.5-5A); Thermal Sensor Lines; SoCAN Bus; SpaceWire Bus 1 Sync (1kHz) Line; 1 PPS (1Hz) Line
TT&C Up/Down Link Bands	10Ka telemetry Freqs/8Ka Command Freqs
Propulsion	Electric (Xenon HET)
Max Delta-V	>800m/s
Reliability (non-payload)	0.96 @ 5 years
Wideband TT&C/Comm Option	Optional Ka-band Mission Data Link (1.6Gbps) w/2 Steerable Antennas (15kg/40W reqd)