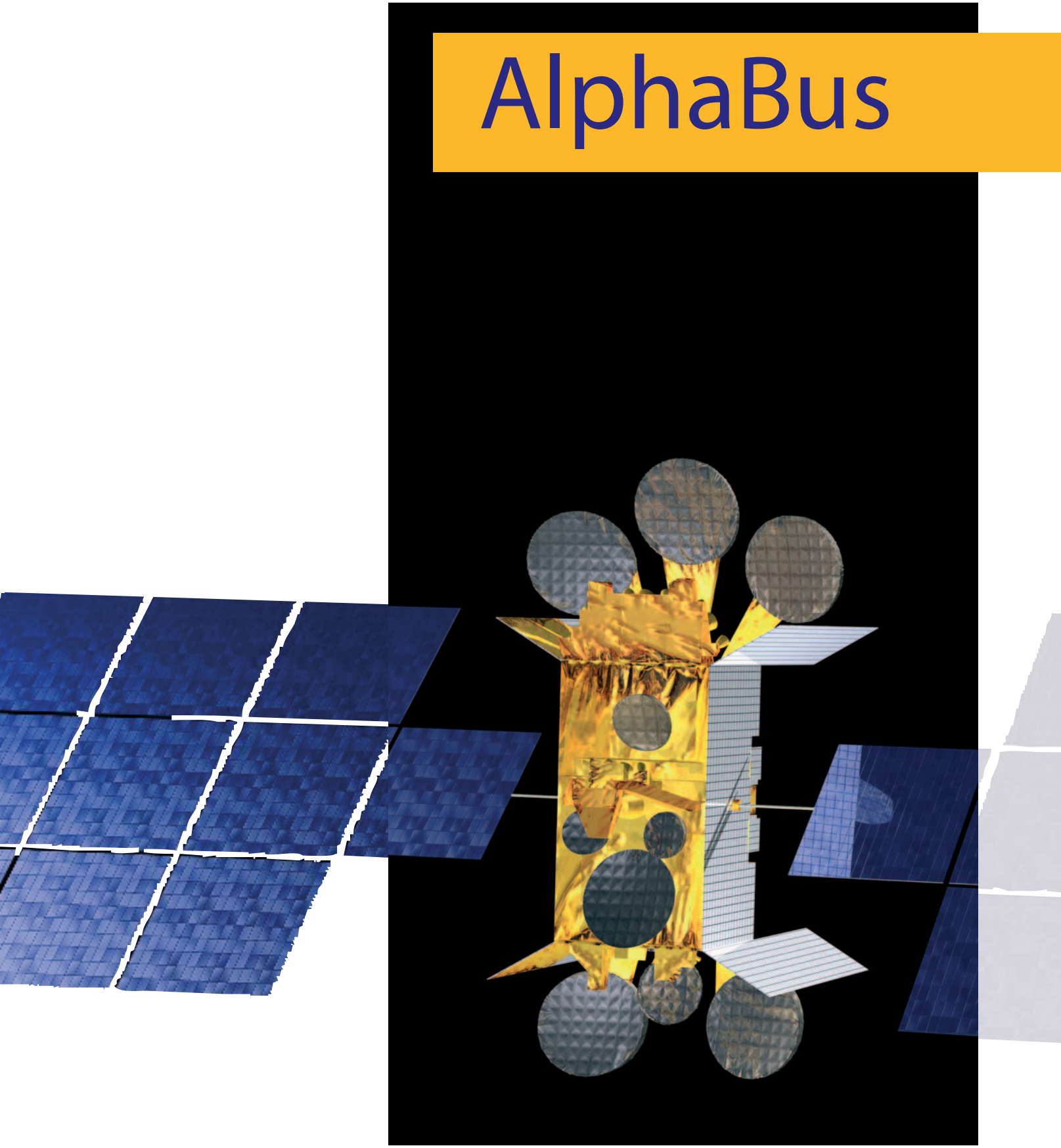
AlphaBus



– Europe's contender in the large satcom market

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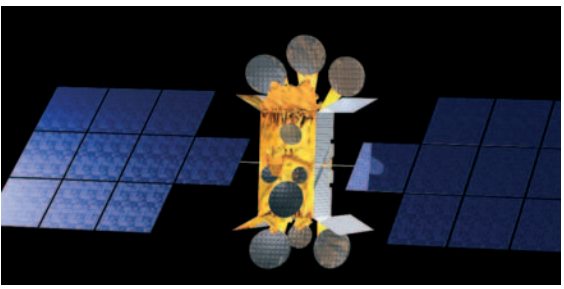
The Stakes

There is a considerable risk that today's downturn in global markets may annihilate Europe's heavily contested share of commercial satellite sales, and this in turn may destabilise the core manufacturing capabilities of European satellite industry. A concentrated European institutional research and development effort is therefore required to sustain industrial capabilities during the downturn and to reinforce Europe's commercial product line for future growth markets.

The best of Europe's satellite manufacturing industry is therefore currently involved in an institutional programme known as 'AlphaBus', designed to create a new competitive product for the global commercial satcom market. In shaping a new European perspective for large communication satellites, AlphaBus combines the business know-how of EADS Astrium and Alcatel Space with the institutional strengths of ESA and CNES. Together they will select state-of-the-art European equipment providers to complete the industrial consortium for this unique European communications platform, complementing the top-end range of both Alcatel's Spacebus and Astrium's Eurostar products. The selected suppliers will be engaged in long-term agreements with the prime contractors, leading to a stable industrial structure for the operational life and future improvement of the product.

This initiative differs from ESA's more classical stand-alone developments, being motivated by the acquisition of leading-edge technology and the aim of establishing a competitive European product to satisfy recurring market opportunities. This market-oriented approach is a key element of the AlphaBus programmatic setup, and fierce global competition will be a fact of life. The benchmark for AlphaBus is the recurrent cost of today's large telecommunication platforms. The Member States participating in the AlphaBus programme will be requested to fund it in relation to the capabilities of their national industries to provide state-of-the-art technology at competitive prices. In other words, the AlphaBus R&D funds will not be dispersed throughout Europe unless national industries are competitive or provide a unique source for enabling technology otherwise not available in Europe.



To stimulate the Europeanisation of AlphaBus, ESA has already begun an ambitious programme of pre-developments for the enabling technology. These contracts open the way for individual European equipment providers with unique expertise to be selected for the AlphaBus industrial team.

Having realised what was at stake for Europe in terms of the global satellite communications market, ESA and CNES elaborated a cooperation agreement in 2002 to create a common institutional framework for AlphaBus. The two agencies have already provided the preparatory funding envelope and initiated contracts with a joint industrial project team set up by EADS-Astrium and Alcatel Space to execute the early design effort for the AlphaBus production line. Likewise, ESA and CNES have also formed a joint AlphaBus project team, based in Toulouse (F). With CNES having secured the programme at national level in France, it is now up to the other ESA Member States to fund their appropriate share of the AlphaBus development programme within ESA.

A successful AlphaBus development programme will contribute to a sound structure for the European satellite manufacturing industry, avoid fragmentation of available institutional R&D funds, close the technology gap with US competitors, and provide a unique contender for acquiring an appropriate share of the global market for large telecommunication satellites.

The Market

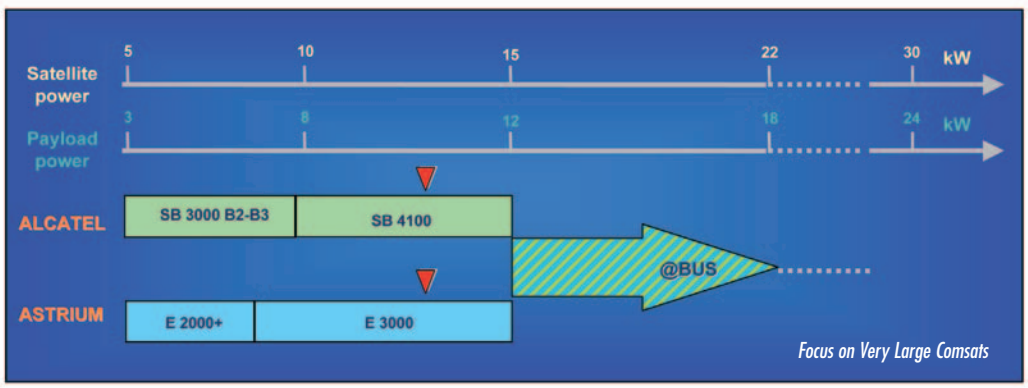
The AlphaBus initiative will result in a production line for a new platform that will be used by both EADS-Astrium and Alcatel Space - Europe's main competitors in today's volatile global market for commercial telecommunications satellites - to build communication satellites for the high-power payload market. In June 2003, the two companies made an unprecedented move at Le Bourget by publicly announcing a joint marketing strategy for AlphaBus. This commercial agreement covers the terms and conditions for a common marketing of the AlphaBus product, avoids mutual competition by recognising AlphaBus as the exclusive European response in the top-end sector of the market.

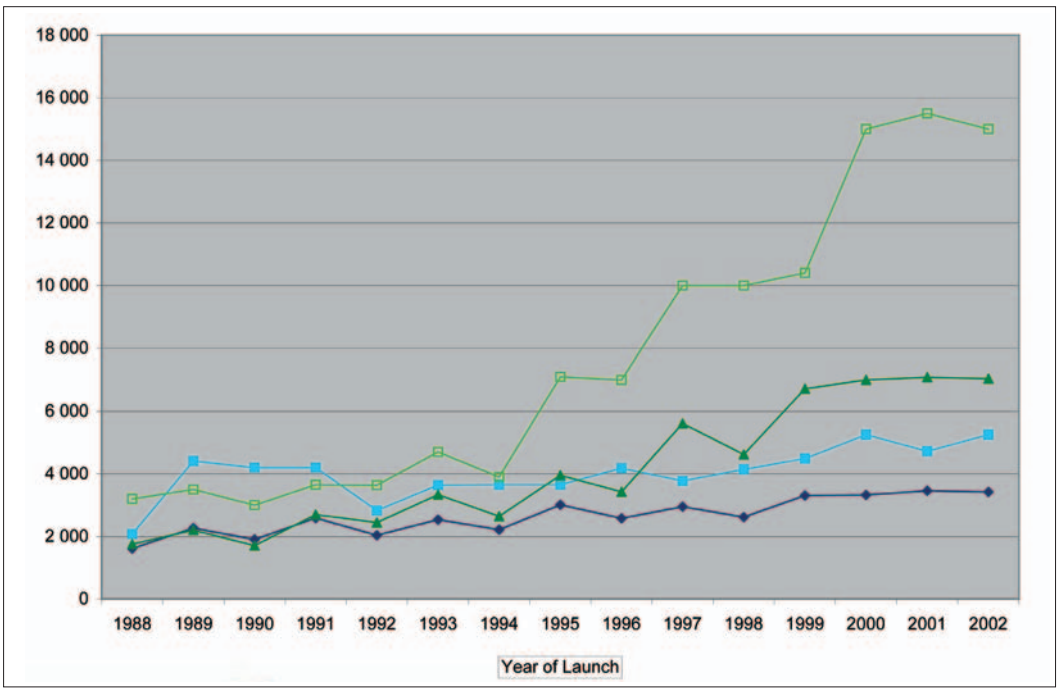
Before the market collapse in 2002, US companies such as Boeing, Lockheed Martin and Loral dominated the large-satellite sector of the telecommunications market. Only about one in twenty of the very large commercial telecommunications satellites launched in the boom period between 1999 and the end of 2002 was based on a European platform.

One way of categorizing the size of a platform is by the power-handling capability of its payload. US companies have enabling technologies for payloads with powers of up to 18 kW, whilst today's European platforms have payload powers of up to only 10 kW. This technology gap has given US products a competitive edge in the large satellite sector. Ultimately the physical dimensions of the platforms will limit the growth potential of the existing Spacebus and Eurostar product lines to about 12 kW. The AlphaBus provides the quantum leap needed to close the technology gap, to accommodate the higher payload power range, and to compete successfully on the global stage.

Intermediate market projections based on the replenishment of existing in-orbit infrastructure and growth potential in the new multimedia and mobile markets forecast a recovery to 2001 levels from 2008 onwards. Today, commercial initiatives like iPSTAR-1 and Wildblue-1 are already beginning to cater for these future markets. These high-powered telecommunications satellites based on US platforms will provide direct-to-desktop broadband access, making advanced Internet services - IP voice telephone, video-conferencing – and multimedia applications like video-on-demand and interactive television, readily available in the 2003/2004 time frame. Consequently, European satellite manufacturers cannot afford to wait for a full market recovery before developing a new platform to compete with their US rivals. Operators require a rapid response to new market opportunities and are already contesting today's 30-month turn-around-times between satellite contract award dates and flight-readiness!

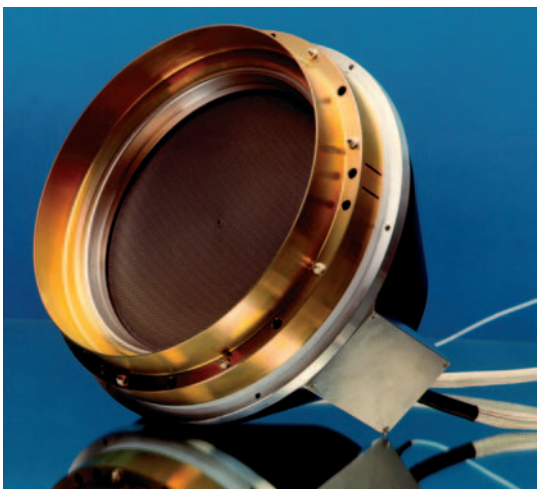
The AlphaBus development programme therefore needs to start today in order to allow the first commercial bids on the global satellite market towards 2005/2006. Decision makers need to be aware that the AlphaBus product line will have a life cycle covering the next twenty years. History proves that sole reliance on the capabilities of existing satellite product lines has never proved a reliable strategy for meeting future needs.





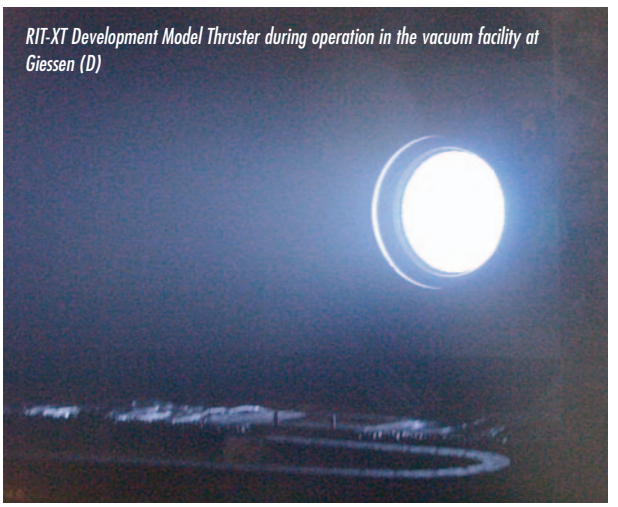
Evolution with time of mass (in kg) and power (in W) of comsat platforms (1988-2002) (Courtesy of Eurospace)

EADS ST (D) - Liquid Apogee Motor undergoing sea level testing



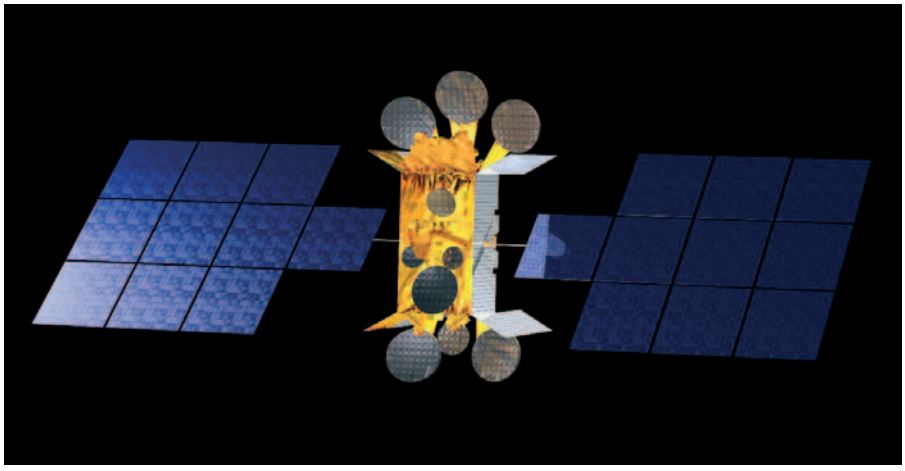
EADS ST (D) - RIT XT Ion Engine

Saft Li-Ion G5 battery cell



RIT-XT Development Model Thruster during operation in the vacuum facility at Giessen (D)

The Platform



The AlphaBus payload power range of 12 to 18 kW, corresponding to a solar array power of between 15 and 25 kW, positions it squarely in the attractive market niche for large satellites dominated by today's US products. The platform's physical dimensions, with a width of 3 m and height of 7 to 8 m, mean that it can derive maximum benefit from powerful launchers in the Ariane-5 category with their 5 m fairings and the economies of scale being offered. Its launch mass will vary from 5.5 to 8 metric tons. Ariane-5 compatibility is seen as a sound policy given that more than 90% of Ariane-4's launches were devoted to telecommunications satellites.

Adapted to handle antenna farms of up to 10 to 12 transmit and receive antennas, the platform can easily accommodate from 100 to 250 transponders. It can also handle high-power mobile missions servicing, for instance, future 3G-type handsets from geostationary orbit and requiring antennas of up to 7.5 m diameter.

This new generation of geostationary telecommunications platform will require a number of specific technology improvements. The ESA-funded pre-development contracts mentioned above cover such items as novel electric-propulsion technology based on plasma and ion thrusters, deployable radiator panels, active fluid loops and heat pipes for heat dissipation, new solar-array technology, a more powerful apogee boost motor, new lithium-ion batteries, fibre-optic gyroscopes, RF sensing technology, accelerometers and a new generation of star trackers. These developments will give AlphaBus growth potential beyond 20 kW payload powers.

The designs for the first commercial AlphaBus missions will stay close to their Eurostar and Spacebus heritage. This is normal commercial practice in order to increase customer confidence in a new product and to maintain target price levels. The new enabling technologies will be steadily introduced into the AlphaBus product line in accordance with the type of mission being supported, the payload power needed, and last but not least the requirements of the commercial customer.

The ESA-CNES R&D programme will help to establish the industrial production line for Alphabus, and ESA will also serve as a 'first customer' in procuring the protoflight model.

The Next Steps

2004 will be a key year for concluding the legal and programmatic framework between ESA, CNES and Industry. The ESA programme is covered by the ARTES-8 element of the Programme Declaration for Advanced Research in Telecommunications Systems (ARTES), as agreed at the Edinburgh Ministerial Council in November 2001. ARTES-8 covers the large-platform mission element, and its implementation has today been phased into two main streams.

A first step in 2003 will enable the development of the AlphaBus production line, including the procurement of the protoflight model. The availability of a protoflight model of AlphaBus will ensure a rapid response to a mission opportunity arising either through an institutional roadmap emanating from the next Ministerial Council planned in 2004-2005 or through a commercial flight opportunity.

The AlphaBus preparatory phase will be completed in mid-2004. The main development phase needs to start in 2004 to align the first commercial bids with the expected market recovery. The selection process for equipment providers to be included in the industrial consortium for the AlphaBus development phase will start at the beginning of next year.

The Europeanisation of AlphaBus is a key objective and ESA is actively promoting the programme to all Member States. The national industries selected to participate will not only benefit from institutional R&D funding, but will also have access to long-term agreements for recurring commercial flights. Those States that decide to participate will enjoy fair access for their industries to the equipment competitions, the evaluation of which will be overseen by ESA, together with the industrial prime contractors and CNES.

If everything goes according to plan, the AlphaBus Programme will unite European industrial prime contractors and suppliers in an industrial consortium capable of becoming a European leader on the world market for large, high-power telecommunications satellites. esa