

New Opportunities for ESA's Redu Ground Station



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ESA's Redu ground station in Belgium has been operated since 1 July 2007 by Redu Space Services (RSS), a company made up of SES Astra and Verhaert Space. The change is significant: RSS is not only operating the station, it is also explicitly tasked to bring in new business. A very healthy future beckons for Redu as the ESA Centre of Excellence for telecommunications, navigation, in-orbit testing services and in-orbit technology demonstration.

Introduction

Since 1968, ESA's Redu ground station, on the edge of woodland in the depths of the Ardennes countryside in Belgium, has tracked a wide range of satellites. Over the years and the succession of ESA missions, the team of engineers and technicians has seen the number of antennas grow and the activities encompass telecommunications, technology demonstrations and navigation satellites.

On 1 July 2007 a new phase began in Redu's history: a contract was awarded to Redu Space Services S.A. to operate the station. In addition to continuing the present maintenance and operation activities, the contract includes commer-

*ESA's Redu ground station in 2005.
Inset: Redu when it opened in 1968*

cial efforts to optimise the use of resources and to ensure a stable future for the station and its staff.

The contract introduces a new approach to operating a facility, increasing the managerial and technical responsibilities of the contractor for third-party activities, leaving ESA to concentrate on its core business. Instead of the previous approach of providing manpower, the contractor now provides individual services under the Agency's supervision. This approach is already typical in the business world, and it should yield increased flexibility and efficiency for both ESA and RSS.

Redu's History and Activities

Europe was taking shape in the 1960s, a process that began reaching into space as it set about developing and deploying satellites for science and technology missions. This involved building up a worldwide network of stations for monitoring and controlling the satellites and receiving data from them. The Redu site in the Luxembourg district of Belgium is in a natural basin of 19 hectares, well away from the radio interference of inhabited areas. As a mark of its first steps into space, the 'stop' sign at the entrance to the station requested vehicles to turn off their engines whenever a satellite was transmitting!

Today, the site includes 2500 m² of operations and administration buildings, a redundant power supply, fibre-optic connectivity, security, services, fire



detection/prevention, a canteen and utilities. A 15 m-diameter S-band dish and a 13.5 m Ka-band dish are the largest on the site. Seven 4–9 m S-, L-, Ku- and Ka-band antennas are used for testing satellite transponders, while eight others are used for tracking, telemetry & control and as backups for telecommunications satellites. These assets are maintained and operated by technicians supported by a Radio Frequency Laboratory and test and operational facilities.

Since 1 January 1968, when the station was declared operational, Redu has supported three basic elements: demonstration missions, telecommunication programmes and commercial activities. They included Europe's first scientific satellites (the ESRO, HEOS and GEOS series), first weather satellites (Meteosat-1 and -2) and first telecommunication satellite (Orbital Test Satellite, OTS).

The success of OTS, in 1978 led directly to the development of the European Communication Satellites (ECS) and the creation of Eutelsat. Eutelsat

became an intergovernmental entity to operate Europe's first regional satellite system on behalf of, at the time of privatisation in July 2001, the participating states. Under a 10-year agreement, ESA provided the first-generation satellites for Eutelsat, which became the owner of each one after the in-orbit testing performed by Redu. The ESA station also housed the control centre. The last ECS satellite was handed over in 1988 and operated until 1 December 2002, when the final command was sent from Redu to shut it down.

During this period, Redu also took control of Marecs-B2, providing the payload operations control centre for Olympus and supported telecommunications satellites for other entities.

Telecommunications and Navigation

Communications satellites are complex assemblies of hardware and electronics. Before reaching their final position in geostationary orbit, they have to endure very harsh treatment on the rockets that propel them into space. So checking that their performance has not suffered is important once they have arrived in orbit.

However, precisely measuring the characteristics of a piece of communication equipment floating in space 36 000 km away is not easy. The techniques have little in common with those used in test chambers – they require ground stations designed for that



purpose and built with care. Since the mid-1970s, ESA has developed the tools and knowhow at Redu to test its own telecommunications satellites in orbit and offer the service to other organisations and private companies. This expertise is widely recognised in Europe. Redu's In-Orbit Test (IOT) facilities are also used to check that the performance of ground stations for major telecommunications operators meet requirements.

The Galileo project has found in Redu the expertise and facilities for IOT of its navigation satellites. Redu has already been involved in the in-orbit testing of the GIOVE-A experimental navigation satellite, and will host ESA's IOT facilities for GIOVE-B.

Redu's telecommunications background is being fully exploited for Artemis, ESA's Advanced Relay and Technology Mission Satellite, launched in 2001 to demonstrate new techniques, principally for data relay and mobile services. Redu is in charge of the Artemis Payload Mission Control Facility and of the 'PASTEL' unit for the optical link between Artemis and the Spot-4 satellite. ESA has been involved in industry activities such as the airborne laser optical link experiment with Artemis in December 2006.

Proba and In-Orbit Demonstrations

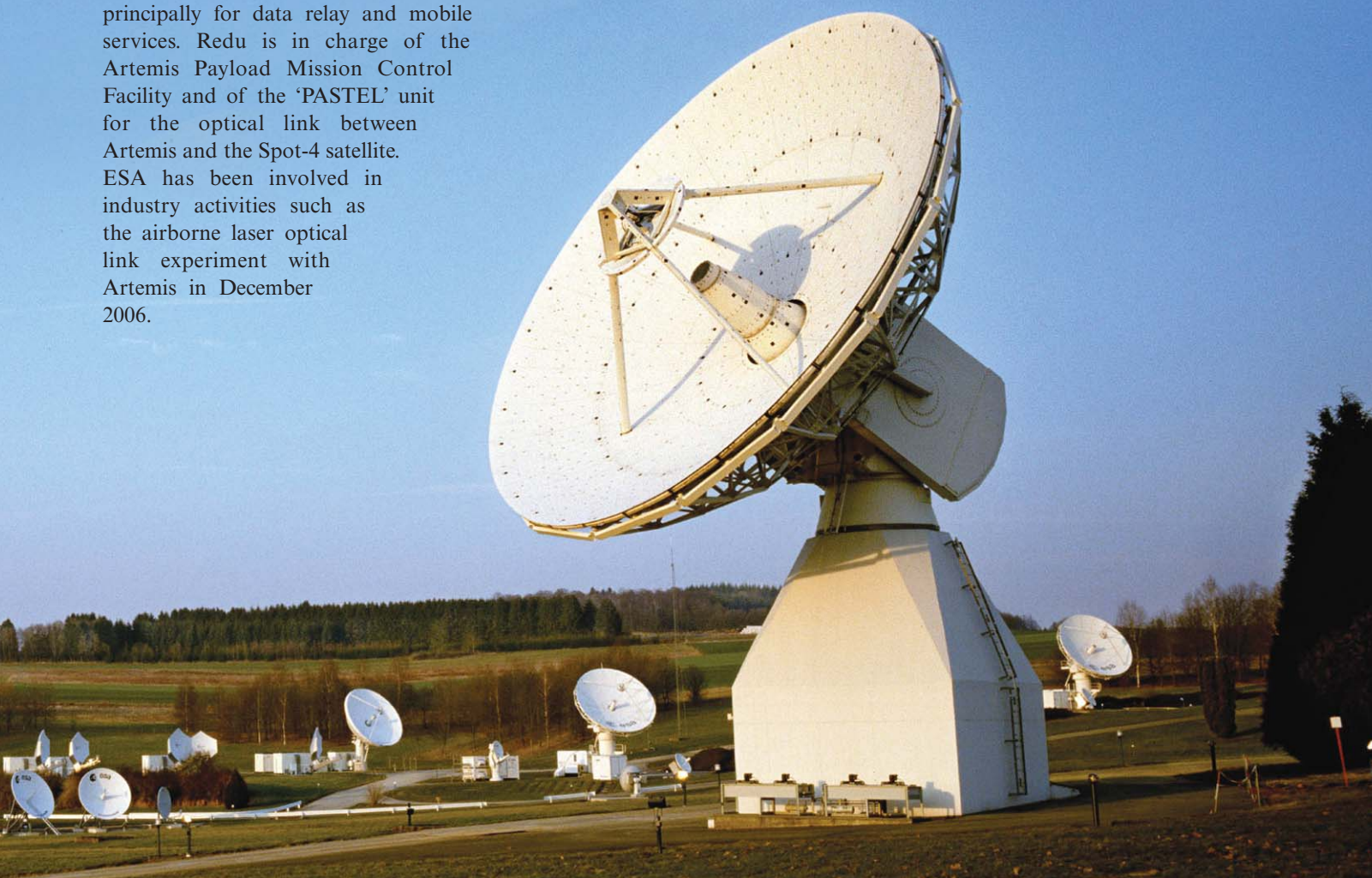
Redu's 15 m S-band antenna was added in the 1990s for commanding and tracking scientific missions. It is extensively used for ESA's Integral gamma-ray observatory, launched in 2002.

The expertise acquired from controlling the ECS satellites made Redu the ideal site for routine operations of ESA's small, low-cost Proba satellites. Proba-1 validated new spacecraft autonomy and 3-axis control and data system technology. Its main payload is the novel CHRIS imaging spectrometer, provided from an announcement of opportunity to scientists. Launched on 22 October 2001, its mission was initially planned to last 2 years but its 5th birthday and its success in

providing Earth observation data to the scientific community were celebrated at Redu in 2006. Operations continue. The Proba-2 technology and solar mission will follow in 2008, with the Proba-3 first demonstration of formation-flying in 2011. Others will follow, with Redu as their natural centre for in-orbit demonstrations.

Commercial Activities and Evolution

From its opening in 1968, Redu was part of ESA's ESTRACK Network, linked to the ESOC Mission Control Centre in Germany and under the responsibility of the Director of Operations. Today's activities and the link with commercial entities led to the overall responsibility





ESA is looking for strong cooperation with RSS to create synergies and to ensure a good future for the station and its staff. Redu now has a good opportunity to expand, to develop and promote applications serving society. The station's future no longer depends entirely on ESA programmes, but can also be built on new commercial ventures.

Conclusions

Approaching its 40th birthday, Redu is facing the new challenge of responding to the evolution of the telecommunications and navigation markets from public to private companies. The new contract also marked the end, on 1 July 2007, of an almost-25 year contractual engagement with Vitrociset, who had been in charge of maintenance and operation during that time. ESA is thankful to Vitrociset and recognises not only a long and professional involvement in the ground station but also its cooperation in ensuring the quick and full takeover of the station personnel by RSS.

for the station being transferred on 1 January 2007 to the Director of Telecommunications and Navigation.

As a result of a number of ESA internal reviews, which analysed Redu's programmatic situation, the state of investments, its cost structure and the projected range of activities into the mid-future, the decision was taken to aim for increased commercial use at the same time as satisfying ESA's needs. Several major European operators and service companies answered the Call for Opportunity.

Finally, the contract was awarded to Redu Space Services S.A., a joint

venture between SES Astra TechCom Belgium S.A. and Verhaert Space N.V, the Belgian company that provides the Proba platforms. The contract allows RSS to offer new commercial services from Redu, thereby increasing usage of the ESA facilities and optimising the resources in place for the common benefit of ESA and the operator. Redu remains an ESA station, under clear conditions for both parties. This contract is a real opportunity to increase usage by many commercial customers under a no-discrimination basis, thereby increasing the economic value of the station for the region.