



Ready to roll

Satellite Evolution Asia reviews the latest developments in the Galileo programme.

Photo courtesy of ESA

► In recent months, the central issue in the development of the Galileo satellite system was the green light given by Galileo Joint Undertaking (GJU) to the merger of the Eurely and iNavSat consortia to pursue their joint approach for the Galileo Concession.

As a result, the consortia are now free to complete the merger and, jointly with the GJU, proceed towards the final concession contract negotiations which will formalise the Galileo Public Private Partnership (PPP) by the end of this year. At the time this decision was taken in July, representatives from Eurely and iNavSat commented: "Our merged consortia bring together the highest levels of European technological expertise to deliver a European solution to this technical challenge. We believe this path will generate significant advantage to the people of Europe and the wider world. We are committed to a team solution, within the timeframe agreed with the GJU."

Commenting on the fact that the GJU seemed to be unable to select a winner, the two consortia had previously stated that the GJU could not select a preferred bidder as the two bids were too close to separate, considering their quality and complementary options. Both consortia expressed the opinion that the sole way to ensure a 'best value for money' approach for the public sector was to merge their respective resources and experience and to combine their complementary commercial approaches to the Galileo implementation. The founding members of Eurely and iNavSat are: AENA, Alcatel, EADS, Finmeccanica, Hispasat, Inmarsat, and Thales.

There is no doubt that the merger of the consortia will enable them to exploit numerous synergies offered by the combination of respective resources and competencies. By providing a unique European solution for Galileo, in fact, partners will be able to efficiently

manage the programme to the benefit of Europe, its individual Member States, its citizens and its stakeholders.

Despite the feeling of optimism, the tasks lying ahead for the unified consortium remain challenging ones. These include:

- Ensuring continuity between the current ESA driven In Orbit Validation and Full Deployment phases through the seamless involvement of all players;
- Improving the global reach of the Concessionaire and enhancing international partnerships to support the EC international agreements; and
- Delivering a great range of innovative solutions to address key issues for the concession: finance, insurance, risk sharing.

But while the tasks are challenging ones, the benefits for the companies involved have the potential to be remarkable. The market perspective for the downstream European industries is enhanced with the potential creation of thousands of jobs throughout Europe.

Meanwhile, the development goes on

While the Galileo programme has finally found a definitive settlement at an industrial level, the system is progressing in great strides.

Testing the satellites

The GTSB satellites are currently undergoing tests in the Netherlands and Italy. One of the two satellites arrived at the ESA-ESTEC test facilities in late July, while the payload of the other spacecraft is currently being tested in Italy. The payload of the GTSB-V2/B satel-

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lite, being developed by Galileo Industries, is just completing a first series of tests at the Alcatel Alenia Space facilities in Rome. In particular, the specially developed navigation payload has been subjected to a range of extreme temperatures in vacuum. This simulation of the space environment realistically validates the payload's performance in orbit. The campaign will continue with mechanical testing. The payload's functionality will have to be proven while exposed to strong vibration, high acoustic noise levels and shock, as encountered during launch. Whereas the mechanical investigations can be considered standard satellite testing, the first validation in the thermal vacuum environment had been awaited with special interest, as it has given early feedback on the in-orbit performance of the newly developed payload.

The GSTB-V2/B satellite features several new equipment technologies that are considered cornerstones in the development of the Galileo Navigation Payload. One of the most prominent and also most critical developments is the Passive Hydrogen Maser (PHM), an extremely accurate clock that has been developed under ESA contract. The PHM will be the first of its kind to be flown in space and have its performance tested in a realistic environment. The GSTB-V2/B PHM will be the most accurate atomic clock in orbit and will, with its breakthrough performance, open the door for a wide range of high precision navigation applications as targeted by the Galileo System. The higher timekeeping accuracy will enable better performance than current global navigation satellite systems. The results obtained during the first testing in a simulated space environment are very promising and constitute a major milestone in the validation of technology specifically developed for the Galileo System.

The tests included simultaneous transmission on three Galileo carrier frequencies (L1, E5, and E6 bands) where, besides the PHM, two Rubidium atomic clocks can be selected in combination with the onboard signal generation unit to produce representative Galileo signals. The recent data and experience gained with the GSTB-V2/B test campaign are being directly transferred into the development of the Galileo System since Galileo Industries is also the Prime Contractor to ESA for the development and roll out of the Galileo infrastructure.

The completed GSTB-V2/B satellite will weigh 485 kg. Its modular design consists of two cubes, one dedicated to the payload and the other, known as the platform module, to the spacecraft's control and operations subsystems. The overall external dimensions (excluding the deployable solar arrays) will be 1m x 1m x 2.4m. The solar arrays will generate about 940 Watts of power. The spacecraft is designed for a lifetime of three years in the Galileo orbit (24,000km).

The other Galileo satellite, GSTB-V2/A, is being developed by Surrey Satellite Technology Limited of the UK. The spacecraft test campaign is continuing in the ESA ESTEC Test Centre, where thermal balance and thermal vacuum testing have been completed.

The service centre

Meanwhile, LogicaCMG has been awarded a contract to develop a prototype version of the Galileo Service Centre, which will form the heart of the commercial operation of Europe's three billion Euro satellite navigation programme.

“The Service Centre will provide the interface to Galileo users and service providers, in particular in relation to commercial issues,”

said Eric Gellée, Director of FDC (France Développement Conseil). “It is therefore a crucial element in ensuring wide commercial uptake of the Galileo services and those of the European Geostationary Navigation Overlay Service (EGNOS), Galileo's precursor.”

The LogicaCMG contract is part of a wider programme called the ‘Galileo Reference Mission’ that was awarded to FDC of France by the Galileo Joint Undertaking. This initiative addresses what the Galileo system provides users in terms of mission, services and signals. These functions are deemed fundamental for applications development and receiver manufacturers.

Steve Smart, Director Space and Satellite Communications at LogicaCMG said: “LogicaCMG is recognised as a world leader in mobile telephony applications, a critical market for Galileo's positioning services. The Service Centre will be at the heart of integrating Galileo's services into mass-market applications such as road pricing, traffic information, local shopping details or a child locator. We have supplied similar solutions that have made other programmes operationally successful - the Skynet 5 military communications satellite project is a recent example.”

Thales to secure Galileo

Galileo Industries and the European Space Agency (ESA), both in charge of the global architecture of the future European satellite navigation system, have chosen Thales' advanced security expertise to specify and design the security policy for Galileo.

Intended for civilian and commercial users as well as government applications, Galileo must ensure optimum security at all levels to achieve complete and reliable service. Security requirements include communications security, which entails protecting networks and signals; authentication and access control for each level of service; data confidentiality and integrity control; and attack prevention.

Thales operates on each Galileo segment whether it be space, control, mission or user terminals. A multi-domestic organisation integrating French, German and UK Thales subsidiaries provides cutting-edge expertise for each of these segments.

Thales will provide its know-how in communications security technologies for IP networks, dedicated links, and satellite systems, as well as its skills in terminal and data security including encryption, authentication and access control. Driven by its dual technological strategy in information systems security, Thales is the ideal partner for the future European satellite navigation system.

Commenting on the selection of Thales, Yves Perreal, Chief Security Officer at Galileo Industries said: “As the system is used for civilian and government applications, processes that optimise data and communications security are required. Thales' expertise in defining and developing effective security architectures was a decisive factor in the choice made by Galileo Industries and ESA for this strategic aspect of the project”.

Conclusion

Following the green light given by Galileo Joint Undertaking (GJU) to the merger of the Eurely and iNavSat, the development of the Galileo satellite programme has finally entered its most interesting phase: the actual development of the ground and space system. *Satellite Evolution Asia* will follow future development of the system until its deployment in 2008 and beyond. Watch this space! ■