

Call for Proposals: European Operations Node



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Applicable Documents

[1]	Project Terminology	m_project_terminology
[2]	User Requirements Document	g_user_requirements
[3]	Software System Specification	g_software_system_specification
[4]	Software Design Document	g_software_design_document

1. Project Background and Objectives

The ESA Education Office, in cooperation with the International Space Education Board (ISEB), is setting up a Global Educational Network for Satellite Operations (GENSO). GENSO aims to increase the return from educational space missions by forming a worldwide network of ground stations and spacecraft. This will fundamentally change the way that these missions are managed, dramatically increasing the level of access to orbital educational spacecraft.

Educational space missions are often hampered by the relatively small communication windows offered by their typically low orbits and local ground stations. GENSO is a software standard which allows each ground station on the network to communicate with non-local spacecraft and share data with the spacecraft controllers via the internet. This will allow for a near global coverage in communication for every educational satellite launched, greatly increasing the return from educational space missions and the opportunities for sending commands to the spacecraft.

The design and implementation work is being carried out by a distributed set of student and radio amateur teams worldwide and with over 80 educational spacecraft currently planned there is a very large demand for such a project.

GENSO aims to provide:

- Unparalleled near-global access to the mission operators of educational and radio amateur spacecraft
- Remote access for operators to real-time mission data, even in cases when their local ground station is experiencing technical difficulties
- Scheduling of remote uplink sessions via trusted ground stations
- Optional automatic remote control of all participating ground stations
- Downlink error-correction by comparing multiple data streams
- Definition of an optional standard solution for educational ground-segment hardware, designed to optimise return from GENSO at minimal cost
- Recommendations for future educational space hardware in order to enhance mission return utilising GENSO
- Close collaboration with the amateur radio community to support a common interface for applying for frequency allocation and coordination.

GENSO is expected to attract a large number of like-minded people and projects. This community will be a valuable resource, not only for increased access to spacecraft, but also for advice, technical support for ground and space hardware, object identification on busy launches, assistance during critical mission operations, and many other possibilities.

2. Current Status and Future Plans

Current Status

The project has been running for two and a half years and a proof of concept has been demonstrated. A review and consolidation of requirements and software system design has recently taken place and the software development team is aiming to release a first operable system in September 2009. Please refer to the applicable documents listed above for details of the user requirements, software specification and system design.

Since its conception by ESA in summer 2006 and endorsement in October 2006 by the International Space Education Board (ISEB), the project has been managed by the ESA Education Office. Two contracts are currently in place to support the development phase: the first with VEGA (SELEX Systems Integration Limited) for system engineering support and technical management; the second with FH Technikum Wien for IT infrastructure to the GENSO Project Collaboration Platform. The former ends in May 2010 and the latter in November 2010.

Students from more than ten universities around the world are currently participating in the software system development and testing, supported by radio amateurs from AMSAT. A description of the project can be found at <http://www.genso.org>.

Project Timeline

January - June 2007	Preliminary Design and Development Phase
July 2007	Preliminary Design Review
July - November 2007	Implementation Phase
December 2007- August 2008	Initial Test Phase and Continued Development
September 2008 - June 2009	Consolidation of requirements and software design
September 2009	First software release
October 2009 - March 2010	Enhanced Development and Testing Phase
April 2010	Second software release

Future Plans

Once the system is ready for release, a six-month Enhanced Development and Testing Phase is envisaged to prepare the second release in April 2010. During this phase, a handover of responsibility will take place from ESA and its contractors to the GENSO user community, represented by the European Operations Node. Additional Operations Nodes are planned to be subsequently set up in the USA and Japan and possibly elsewhere, in order to improve system latency, reliability and user support. However, the European Node will be the central site, at least in the initial stage of operations.

This handover phase is intended to be a bridge between the initial development phase fostered by ESA and the ISEB and a self-sustaining phase where GENSO is run by and for its user community, namely those institutions and individuals concerned with educational and amateur radio satellite communications. The purpose of this call for proposals is to identify a body or consortium of bodies which represents this user community and has the desire and capability to take on the role of European Operations Node.

In parallel to the handover, an International Steering Committee (ISC) will be established, to which the Operations Nodes will report. ESA and its ISEB partners will be represented on this committee and will continue to offer support and guidance to the project. The ISC will meet regularly to

define a roadmap and objectives for GENSO and review its status and progress.

3. Description of Tasks: European Operations Node

The opportunity described in this document represents a unique possibility for an institution such as a university, or a consortium of interested parties, to form a partnership with ESA and the ISEB. The selected proposer(s) will play a prestigious role in the GENSO project and will become established as a highly visible and important contributor to the educational satellite community.

The operational GENSO system will have the potential to contribute to the definition of new standards (e.g. modulation techniques) that could have an impact on future hardware design in both space and ground systems. For this reason, the evolutive maintenance is considered as an integral part of the operational system, through an open source project for the ongoing development of the GENSO System Technology.

#1 Platform Infrastructure

Set up and maintain the platform infrastructure necessary for the operation of the network and official instance of the GENSO System Technology. This will include:

- Operation and maintenance of server infrastructure, to be provided by ESA on a long-term loan basis
- Database backups
- Security administration and firewalls
- Administration of internet domains and web component

#2 Network Administration

Manage the GENSO network application and administrate the central Authentication Server (AUS) and database for worldwide use. This will be on a 'best-effort' basis and will include:

- Administration of central authentication server (AUS) and database
- Network management
- Drafting and implementation of suitable operational policies and user agreements
- Registration / authorisation / moderation of users and entities on the network
- Ensuring reliability, availability, maintainability and safety of the system
- Measurement of usage and performance

#3 User Support

Assure the quality of the user experience and offer assistance with problems. This will include:

- Establishment of methods to collect and process user requests e.g. help desk, ticket system, forums and FAQs
- Transmission of user feature requests to development team for implementation
- Focal point for promotion of the network and its use to potential new members

#4 Open Source Development Project

Coordinate the ongoing open source development project, leading to future releases (i.e. new official versions) of the GENSO System Technology with new functionalities, improved performance, etc. This will include:

- Providing a platform for the development environment with associated collaboration tools
- System engineering support and technical management to the open source project
- Definition of ‘work packages’ or projects for developers, e.g. suitable to be executed by students as university theses or by volunteers as hobby projects
- Execution of testing phases prior to issue of new releases

Note 1: For this task, the successful proposer(s) will join the team led by ESA and SELEX Systems Integration Limited, eventually taking over full responsibility in May 2010.

Note 2: The IT infrastructure to the collaboration portal for the open source development will be executed by FH Technikum Wien, under ESA contract, until November 2010. Prior to expiration of this contract, the ISC will decide how to secure the necessary infrastructure in the future. One option will be to bring it under the responsibility of the European Operations Node.

4. Responding to the Call for Proposals

The Call is primarily intended for universities and higher education establishments in the ESA Member States and Cooperating States¹.

Given that GENSO offers significant scope for student research projects, it is envisaged that the role of European Operations Node would suit a university with research interests in the space domain and graduate students with software skills.

It is not excluded that proposals may come from consortia where the tasks are allocated to different partners or subcontracted to relevant experts. Likely partners include radio amateur associations and those bodies which have already participated in the development phase of the project.

It is desirable that proposers have good international connections or established partnerships with educational establishments outside Europe. While industrial or commercial links may also be of interest, it should be noted that GENSO is for educational use and is not intended to bring commercial benefits.

Proposals should be submitted to genso@esa.int and should include:

- Description of your motivation, why you would like to become the GENSO European Operations Node and what advantages you could bring
- Your understanding of the task and how you plan to execute it
- Background experience, including description of institution and facilities and connections to other relevant projects or industry
- Brief CVs of team members and time available for work on GENSO
- Scope for student participation; research- and education-related benefits
- Outline of funding situation, sponsors and external support
- Promotion strategy and communication channels

¹ ESA has 18 Member States: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal Spain, Sweden, Switzerland and the United Kingdom. Canada takes part in some projects under a Cooperation Agreement. Hungary, Romania and Poland are participating in the Plan for European Cooperating States (PECS), while other countries are in negotiation with ESA about joining this initiative.

Timeline

17 July 2009	Call opens
23 August 2009	Call closes
7 September 2009	Announcement of selected proposal; preparation of agreement with ESA
Sept / Oct 2009	Finalisation of release 1
	Handover period begins
mid October 2009	Kick-off workshop for operational phase at ESTEC
	Establishment of ISC and signing of agreement with European Operations Node
End March 2010	First annual review
	Release 2 and official network inauguration
May 2010	End of contract with SELEX Systems Integration Limited
November 2010	End of contract with FH Technikum Wien
March 2011	Second annual review