

Opportunities for Advanced Research in Telecom Systems - ARTES/ESA – Framework

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Abstract In this talk we will try to give a brief overview of ESA's Telecommunication Programme, implemented through the ARTES framework. We will present specific and targeted activities and elements with an emphasis on those initiatives in which Greece is involved in the area of Telecommunications. It is realized that ESA's primary objective is the enhancement of the competitiveness of European Industry by promoting the use of satellites for advanced fixed, broadcasting, multimedia and mobile communications, data relay, search and rescue and aeronautical services. The Agency activities implemented through the so called ARTES - elements framework enables European and Canadian industry to implement and explore innovative concepts that result into high added value products and services. The elements are categorized as follows:

- **ARTES 1:** Is a major tool to set up the future strategy for telecommunications. It includes activities such as: strategic and market analysis, technology evaluation and system feasibility studies, Terrestrial systems evolution and convergence, development of relations with potential Users or new Countries. *Activities within ARTES 1 are fully funded by ESA. (GR)*
- **ARTES 3-4:** Is the element dedicated to the development, qualification and demonstration of communication products including: piece of equipment, platforms or payload of a satellite, terminals or networks integration. The development and implementation of commercially oriented equipment and systems is undertaken under this element and is based on the partnership with Satellite Operators, Industry, Service providers and users. ARTES 3-4 offers funding to industry for the design and development of satellite communication (satcom) products as well as to run pilots for satcom applications or services. *ESA will fund up to 50 per cent of the total cost of the proposed project.(GR)*
- **ARTES 5:** It concerns long term development of advanced technology and is ESA's main programme for preparatory research and development in satellite communications. It is basically concerned with the early stages of development of new and high risk promising technologies. It aims at ensuring the long – term competitiveness of European and Canadian industry with the development of cutting edge technology, which is beyond the current state of the art. ARTES 5 is composed of two sets of activities: the “*Competitive Workplan*” activities or *ARTES element 5.1* and “*Non-Competitive Industry Initiated*” activities or *ARTES element 5.2*. **Competitive workplan activities (ARTES 5.1) are 100% funded by the Agency. Non-competitive Industry Initiated activities (ARTES 5.2) are funded to a maximum level of 75% by the Agency. (GR)**
- **ARTES 7 – EDRS :** Is dedicated to the development and implementation of an European Data relay (EDRS) System. The programme will based on the consolidation of the technical and operational requirements of the potential users expressed I terms of : Coverage, capacity, per link, per system, availability e.t.c. A public-private partnership is envisaged for the operation of the system. The Architecture definition will address and define main aspects such as : Orbits served, Service Types, Capacity, Frequency Bands, Deployment Strategy, Feeder link system (Baseline Ka – band, other frequencies to be studied). **Payload :** It includes Ka band, optical, and S – band (in a later stage)

technologies. **Applications** : Ordering and Collecting data to/from earth observation satellite, other LEO platforms, aircraft and UAV sensors. The data relay services can address Commercial applications as well. Among others the International Space Station (ISS) may be one important data relay user.

- **ARTES 8 – Alphasat** : It is a specific element dedicated to the development and deployment of Alphasat. Alphasat is the satellite that, in partnership with Inmarsat, will incorporate the first unit of the Alphasat Platform jointly developed by Astrium and Thales Alenia Space. Alphasat incorporates innovative on-board processing technology and user services. The programme line has the following objectives:

Initiate ESA-funded pre-development contracts to secure enabling technology and to assist the emergence of "second-source" hardware suppliers able to match the market needs of the Large Platform.

Develop and qualify, together with CNES (Centre National d'Etudes Spatiales) and industry, a generic product line for AlphaBus based on ground qualification of development and engineering models.

Procure a flight-standard platform (proto-flight model) to facilitate early first flight opportunity (in frame of AlphaSat).

Consolidate a Large Platform Mission combining ESA-funded payloads with institutional and/or commercial payloads, allowing the in-orbit demonstration of a protoflight large platform. Launch expected time :2011-2012.

Activities are funded at 50%, 75% or 100% of their total cost by the Agency.

- **ARTES 10 – Iris: Satellite Based Communications for AirTraffic Management.:** Is dedicated to the development of a new Air-Ground Communication system for Air Traffic Management. It is the satellite-based solution for the Single European Sky ATM Research (SESAR) programme. By 2020 it will contribute to the modernisation of air traffic management by providing digital data-links to cockpit crews in continental and oceanic airspace. **IRIS Characteristics** : Aeronautical Mobile Satellite (Route) Service Band (AMS (R) S) consisting of *10 MHz in each direction within L-Band Spectrum*. ARTES 10 consists of three phases.:

1. **Phase One** was a Definition Phase which provided inputs to allow SESAR (Single European Sky ATM Research) to make an informed choice with regards to satellite capabilities.
2. **Phase Two** of the programme focuses on the development of a new satellite-based communication system including a new satellite communication standard. Performance will be validated end-to-end with a subset of the infrastructure required for the future European ATM System.
3. **Phase Three** will support in-orbit verification and certification of the pre-operational system, technical support to deployment of the full system, and preliminary work leading to an enhanced future role for satellites.

Activities are 100% funded by the Agency

- **ARTES 11 – Small GEO:** It is a specific element dedicated to the development and implementation of the Small GEO Platform currently developed by a consortia led by OHB System AG. This element addresses the lower mass segment of communications satellites smaller than 3000 kg. into Geostationary Transfer Orbit (GTO) or smaller than 1600 kg direct into Geostationary Orbit (GSO). It is a satellite that in partnership with Hispasat will fly the Luxor Platform developed by OHB and partners. It will incorporate advanced payload technology such as a DVB – S2 processor and active antennas. The design of the platform is modular, flexible and scalable to serve various payloads under 4 kW payload power and 400 kg payload mass. Launch is expected in 2011 – 2012.

Invitation to tenders or ITT's are issued through the year. **Funding** : Activities are at 50%, 75% and 100% of their total cost by the Agency.

- **ARTES 20 – IAP (ESA – Initiative -Integrated Applications Promotion).** Within this element there are two basic targets : **a).** To promote the use of space technologies beyond the areas investigated up to now and locate new wider user communities; **b).** to enforce higher visibility to the application of space technologies at large. The main objective of the Integrated Applications Promotion (IAP) programme can be summarized as ``connecting expert communities and combining technologies``.

The general approach aims at promoting :

- A wider range of users
- A much wider combination of systems
- A much wider range of actors, involved in the end to end service chain

Unlike other ESA programs developing new technologies and infrastructures, the IAP elements are focusing on the use of existing space assets and technologies leading to a better exploitation of the already developed space systems and know – how.

Identified Thematic Areas : Space for Safety – Space for Health – Space for Development – Space for Energy – Space for Transport. The two main elements of IAP are :

Element 1: Basic Activities (Awareness activities – Feasibility studies)

Element 2: Demonstration Activities

Funding : Basic activities initiated A). by the Agency are funded at 100% by the Agency and **B).** Basic activities initiated by a partner are funded 50% by the Agency. In any case work carried out by Universities and research institutes involved as contractors or subcontractors and justifying no further commercial interest in the product may be 100% funded by the Agency.

Projects under Demonstration Activities are funded at 50% by the Agency.

Greece is participating in the ARTES elements : 1, 3 / 4 , 5 and 20.