

→ THE ESA ARTES PROGRAMME

From satcom products to services

cesa



- D/TIA manages the ARTES programme, the ESA Advanced Research in Telecommunications Systems programme
- The objectives of the ARTES programme are to:
 - maintain and improve the capability and competitiveness of industry of participating countries in the world satellite communications market in the present decade and beyond
 - contribute to the resolution of problems that affect the European Institutions and the European society at large
- D/TIA is also responsible for the ARTEMIS programme and the Redu Centre and its development

A healthy satcoms sector is necessary for a healthy space industry



- Satellite communications are the mainstay of space industry. In 2010, the sales in satellite communication systems represented more than 60% of the total activity of the European satellite industry, and more than 80% of the export sales of this industry.
- The satellite communications sector is a very dynamic and competitive global marketplace with worldwide competition; and satellite services and applications are the largest part in the value chain and a major driver of space technology and developments.
- ESA's Advanced Research in Telecommunications Systems (ARTES) programme transforms research and development investment into successful commercial products and services in the worldwide markets



The various ARTES elements form a flexible framework for activities across the full value chain, highly appreciated by the private and public partners.

ARTES offers varying degrees of support to projects with different levels of commercial maturity. For riskier or more innovative projects, ESA may provide more support. The closer to market, the more industry must coinvest.

Businesses within ESA member and cooperating states – whether small or large, new or experienced – can submit proposals to the ARTES programme.



A balanced combination of Generic Envelope Programme Elements,

ARTES 1:
ARTES 3-4:
ARTES 5.1 and 5.2:
ARTES 20:

Preparatory Commercial Products and Applications Telecom Technology Integrated Applications

and Specific Mission/System orientated Programme Elements

ARTES 8:
ARTES 11:
ARTES 7:
ARTES 10:
ARTES 21:

Alphabus/Alphasat Small GEO platform/mission EDRS Iris Satellite AIS

The ARTES programme today





Distribution of commitments in ARTES elements (2009-2011)

Product Development with ARTES







ARTES 1 supports studies of satcom systems, services, markets and new missions.

ARTES 1 has the following characteristics:

- a. Yearly Workplan based on a yearly Call for Ideas.
- b. ESA initiative, i.e. ESA defines work to be performed and technical performances to be achieved.
- c. 100% funded by ESA.
- d. No Letter of Authorisation is required from delegates.
- e. Open competition, restricted competition or direct negotiation.

Up to and including TRL 2

Proposal to C/M 2012:

- 4 years extension (2013-2016)
- 10 M€ per annum



ARTES 5.1 supports the development of technology for the longer term.

ARTES 5.1 has the following characteristics:

- a. Yearly Workplan based on a yearly Call for Ideas.
- b. ESA initiative, i.e. ESA defines work to be performed and technical performances to be achieved.
- c. 100% funded by ESA (like GSTP).
- d. Letter of support from delegates authorising one activity at a time.
- e. Open or restricted competition.
- f. No parallel contracts. A contract will be awarded only to the winner.

Proposal to C/M 2012:

- 4 years extension (2013-2016)
- 33 M€ per annum

ARTES 5.1 Scope



New technologies or techniques for satellite telecommunications in the long term (product in about 5 years) including:

- a. Space equipment or software
- b. Ground equipment or software
- c. System/Sub-system study/definition

Up to and including TRL 5 (Engineering Model).



ARTES 5.2 is to introduce new technology and techniques and to mitigate the risk in the development of a new product.

The Call for Proposal is on EMITS. It is AO 6000.

ARTES 5.2 has the following characteristics:

- a. Open Call for Proposal.
- b. Industry initiative, i.e. industry defines work to be performed and technical performances to be achieved.
- c. 75% funded by ESA.
- d. Letter of support from delegates authorising one activity at a time.
- e. Business case needed for the intended product.
- f. Direct negotiation.
- g. A proposal shall include a plan covering the ARTES 5.2 activity and the follow on activities for completing the development of the new product on ARTES 3-4.

Proposal to C/M 2012:

- 4 years extension (2013-2016)
- 17 M€ per annum

ARTES 5.2 Scope



New technologies or techniques for products for satellite telecommunications including:

- a. Space equipment or software;
- b. Ground equipment or software;

Up to and including TRL 5 (Engineering Model).





ARTES 3-4 demands a product to be the outcome.

The Call for Proposal is on EMITS. It is AO 5891.

Main characteristics:

- a. Open Call for Proposals + (ESA may issue ITTs for identified opportunities approved by JCB).
- b. Industry initiative.
- c. Letter of support from delegations authorising one activity at a time.
- d. 50% funded by ESA to ensure the interest of industry to commercialise the resulting product.
- e. Business case.
- f. Direct Negotiation.
- g. Product oriented.

Proposal to C/M 2012:

- 4 years extension (2013-2016)
- Inclusion of flight heritage (Atlas)
- 100 M€ per annum

ARTES 3-4 Scope



1. The scope shall be the development of a product (TRL 6).

2. The products shall be for satellite telecommunications including:

- a. Improvement or development of space equipment or software;
- Improvement or development of ground equipment or software;
- c. Development and demonstration of satellite communications applications.

From technology development to industrialisation of products



ARTES 5.2 -> ARTES 3-4 Development of a new product



Fundamentally this is one activity and ESA will seek AC/IPC approval for the complete activity

CM2012 Perspective







Continuation of the successful ongoing elements:

- ARTES 1 Phase VI
- ARTES 3-4 Extension (Phase II), including Atlas Flight Heritage
- ARTES 5.1 and 5.2 Phase II
- ARTES 7 Global EDRS network
- ARTES 10 Iris-Phase 2.1 Continuation
- ARTES 20 Phase II
- ARTES 21 SAT-AIS Programme Implementation

Two new elements:

- ARTES 14 Next Generation Platform (NeoSAT-bus)
- ARTES 33 Commercial PPP (PARTNER)

Continuation of existing Core ARTES Elements

• ARTES 1: Telecom Strategy

- Excellent engine for new system and concepts, initial development of new technologies
- More pro-active build-up of workplans to achieve a "fair return" (open call for ideas, more discussion with MS Industry and Delegations)
- 10 M€ per annum, stable

• ARTES 5.1: Core Telecom Technology Competitive Workplan

- Long-term Telecom Technologies
- 100% ESA funding
- 33 M€ per annum, slightly increased
- ARTES 5.2: Core Telecom Technology Industry-Initiated
 - Started in 2008
 - Co-funded 75% ESA funding
 - 17 M€ per annum, slightly increased

Continuation of existing Core ARTES Elements

• ARTES 3-4: Core World Competitiveness – Telecom Products

- Co-funded 50% ESA funding
- Industry-Initiated
- Vital for all industry
- Increase volume by 15-20%
- Funding in large MS consumed faster than average
- Expand into flight heritage build-up, beyond qualification





A Flight Heritage initiative for Core Satcom Innovative Items





Today's ESA TIA tools to support Satcom innovation:

- •Artes 1/5/3-4: from idea/concept to development of satellite "product" on ground
- •PPPs: "Big bang" approach with sizable satellite development programmes
 - Small GEO, Alphasat
 - Technology Demonstration Payloads (TDPs): piggy backing on PPP satellites and usually experimental as opposed to close to operational conditions

but yet not so many flight opportunities

Need to fill the gap with an adequate programmatic tool

Atlas basic principles 1/2



- Atlas will be industry driven and operated on an Open Call basis (as part of ARTES 3-4 Call)
- Candidate innovative items can come from previous ESA funded activities (current ARTES 5 / 3-4) or other sources (eg item supplier's own R&D, national programmes, others)
- **3.** Regular consultation with Satellite operators and industry to advertise the programmatic tool and prepare for opportunities

Atlas basic principles 2/2



Initial set of funding rules:

- In all cases, the co-funding principle is maintained in order to ensure the motivation from the stakeholders and the worthiness of the item flown.
- 2. Funding from ESA shall not be greater than 50% to 75% of the total cost, depending on maturity, risk and readiness to market.

Atlas implementation



Atlas will be part of ARTES 3-4 with modified rules allowing flexible funding schemes





ARTES 7 (EDRS / GlobeNET)



EDRS programme (ARTES 7)



- 1. The main objectives of the EDRS programme:
 - Provide ESA with the necessary data relay and related services
 Priority will be given to the provision of services to the GMES users (Sentinels 1-A/B and 2-A/B)
 - b. Foster the development of the satellite data relay services market
 - c. Support the standardisation of DRS technology to become a world standard
- 2. EDRS is implemented as a PPP with Astrium Services:
 - a. ESA covers the **technological risk** related to the development of the EDRS infrastructure
 - b. EDRS Service Provider covers the **service provision risk**
 - Commited to operate EDRS system and provide services to GMES-Sentinel system with high quality of service (in orbit redundancy) and according to a Service Level Agreement
 - Extend utilisation of data relay services through commercialisation towards other interested user communities

EDRS Technical Concept currently under implementation





EDRS as service platform



- High percentage of capacity devoted to GMES
- Limited geographical coverage
- Limited security:
 - O-ISL data encryption (EDRS-A + C)
 - TT&C encryption on EDRS-C
 - Complete system security is a must for certain user communities

Evolution of Service Portfolio = Evolution of Infrastructure



- Additional capacity to serve more customers – worldwide
- Enhanced Near Real Time Services (e.g. European Independence, Disaster Management, etc).
- New Services e.g.
 - UAV to Satellite communication
 - Galileo Time Stamp
- Evolution of the technology for OISL (and Ka-Band ISL)

- Additional node and additional orbital position are mandatory
- GEO-GEO Link

- New Technologies/Product Evolution
 - Accommodation
 - Robustness
 - Reliability
 - Mass & price

Global EDRS Technical Concept Increase of Capacity, GEO-GEO Optical Link for Near Real Time Service, Disaster Management and Independence





Programme Proposal: GlobeNET



- Proposed envelope: 200 M€
- The initial vision
 - Global network
 - Real-time secure services
- Concentrate on the most attractive customers
 - Optical
 - Ka (UAV/military)
- Laser Communication Terminal for LEOs and GEOs (next generation)
- Independent from any geopolitical constraints
- Secure the worldwide standard
- **PPP with Astrium Services is continued**
- Baseline: additional node implemented as Hosted Payload



ARTES 10 Iris Programme: Satellite communications for Air Traffic Management

The Iris programme as of today

- The Iris programme aims at supplying a validated satellite-based communication solution for the European Air Traffic Management System (EATMS)
- Requirements to be determined by SESAR JU; ESA needs to adapt to the calendar of the European Commission
- ESA current workplan of activities implemented with two alternative options:
 - (1) design purpose-built system
 - (2) modify Inmarsat's system
 - + 3 studies of operations/business case

iris

AUSTRIA 6.6% BELGIUM UNITED KINGDOM 4.2% 15.2% SWITZERLAND 0.1% CZECH REPUBLIC 9.3% SPAIN 14.3% FRANCE 14.9% PORTUGAL 0.8% NORWAY. 2.0% GERMANY LUXEMBURG 2.0% 0.4% IRELAND 1.3% ITALY 28.9%





Convergence on 2 requirements levels -> precursor with Inmarsat



PERFORMANCE (i.e. technical requirements)



Iris Programme Proposal



Proposed Envelope: 80 M€

- While developing the long term ultimate solution (validation on ground), ESA needs to guarantee existing European industry/operator can compete with upcoming short term solution (Iridium) through the introduction of precursor services based on Inmarsat evolved SwiftBroadBand system.
- > This solution will associate Inmarsat into the Iris programme.
- No space segment required for this period.



ARTES 14 Neosat Next Generation Platform



More than 80% of the satcom market on the 3-6 tons segment

- European Industry enjoyed a strong position in the global accessible 3-6 tm market thanks to R&D efforts on E3000 and SB4000 product lines
- Strong competition anticipated during the next 20 years, with more aggressive non European competitors (US, China, India, ...)
- Need to develop a new product available by the end of the decade, targeting a 30% competitiveness improvement
- Joint initiative from Astrium & Thales Alenia Space to develop maximum common building blocks based on an agreed single set of requirements at European level
- In the expected lifetime and market share this can represent ~ 150 satellites
- Strong interdependence between European technology, equipment suppliers and primes (80% of parts of the European P/F procured from ESA member states)



- Capture 50% of the market in the 2018 2030 period
- Generate 25 B€ of satellite sales
- 7 B€ of revenues for platform equipment suppliers in the same period.
- A unique opportunity for the European equipment suppliers:
 today 80% of the European satellite platform equipments are procured from industries from ESA member states

NEObus (ARTES 14) Programme Proposal



- **Programmatics:**
 - 300 M€ for first platform PFM (sub-element 1)
 - In a second sub-element, in-orbit qualification and demonstration through the build-up and launch of a satellite system by 2018 (not for this C/M 2012)
 - Same model as Alphabus / Alphasat
 - Partnering with CNES for platform

Already 42 M€ placed with Primes

- Principle of fair contribution: guaranteed return of 1
- Selection of subcontractors based also on commercial requirements



ARTES 33

Industry-initiated Telecommunication PPP

(PARTNER)

Introduction Rationale for ESA Telecom PPPs



1. What is a PPP?

- a. The Public-Private Partnership is a "business driven" venture funded through a partnership between a public/governmental authority and a private sector company.
- b. PPP provides partners with a better value for money and transfers risks to the entity that is best positioned to manage it
- 2. Why PPP is a suitable model for ESA telecom projects?
 - Private sector (Operators / Service Providers) tend to be risk averse:
 PPP helps to bring into market innovative satcom products /system concepts and services by including them in an operational commercial mission (based on a business case).
 - ESA deals mainly with the Technology Innovation Risk
 - Private Sector deals mainly with Market Risk



Two types of ESA Commercial PPP models are implemented:

a. **ESA originated**: This is the case when **ESA offers assets** that enable a business case for Industry. The partnership produces added value for ESA MS Industry and other stakeholders. An Announcement of Opportunity is issued for each PPP.

Examples: Alphasat, Small GEO, EDRS

Industry originated: Operators/Service providers approach ESA in order to **de-risk their business case** (mainly technological risk) when introducing innovative services and/or system concepts

Example: Hylas-1

ESA PPPs provide a unique opportunity to kick-start new services/satellites/platforms for the benefit of European industry that would ^{European Space Agency} otherwise not happen.

PARTNER (ARTES 33) implementation



- Proposed Envelope: 130 M€
- Dedicated ARTES element for Industry-initiated PPPs
- Simplified procedure to implement PPPs (sub-elements into ARTES 33)
- 1 common sub-element to support PPP preparatory actions
- Operator is not selected by ESA under competition, but an open announcement of opportunity is opened to everybody
- Industrial team is constructed by the proponent
- Concrete PPP proposal presented to JCB: Full EP Small GEO



THANK YOU

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