CALL FOR INTEREST
For ATHENA FIDUS CIVIL MISSION EXPLOITATION

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1. INTRODUCTION

This document describes the Call for Interest to exploit ATHENA FIDUS civil mission, combining an effective fulfilment of Institutional satellite communication needs and promotion of a fast growth of Ka band usage in the national civil community.

2. THE CALL FOR INTEREST

The Italian Space Agency (in the following: ASI) is currently investigating the best way forward to exploit the capabilities of the civil transmission capacity on board of the Athena Fidus satellite, that will be launched first quarter 2014, and is expected to be operational second quarter 2014.

ASI is issuing this call for interest (in the following: CFI) to gather indications of interest from private satcom service providers, interested to exploit the above-mentioned capacity proposing to ASI suitable business models.

This CFI in no manner obligates ASI to pursue any contractual relationship with an entity that responds to this CFI. ASI further reserve the right to cancel this CFI at any time, if deemed to be in the best interest of ASI, and not to proceed with any further formal action, e.g. issuing a Request for Proposal.

Submitting an Expression of Interest (in the following: EOI) as an answer to this CFI does not constitute a bid. The answerer will not be bound by anything contained in his EOI submission. The information in the EOI will be used solely for ASI to complete its feasibility study and to prepare bid documentation if ASI decides to proceed with a formal RFP.

3. ATHENA FIDUS GENERAL DESCRIPTION

ATHENA-FIDUS is a Satellite Communication System, promoted by the Italian and French Space Agencies and Ministries Of Defence, for broadband communication services, aimed at military, governmental and civilian users. The system will support French and Italian specific communication missions in Ka band and EHF band (Italy only) based on a geostationary satellite embarking national payloads.

The Space Segment is based on a geostationary satellite operating in Ka (Civilian and Military Users) and EHF bands (Italian Military Users), with high transmission capacity. The Italian payload consists of dedicated repeater units and relevant antennas for the Civilian/Institutional and the Military Customers. The repeater includes completely decoupled input sections for Civilian and Military users with dedicated input and output filters and down-converters; the only shared equipments are TWTAs in their redundancy ring and the on-board Ultra-Stable Oscillator. The antenna farm includes two sidewall antennas (one 30/20

GHz antenna for the Civilian/Institutional users and one 44/30/20 antenna for the Military users) and two earth deck 30/20 GHz steerable antennas for Military users. The Italian Payload will be managed by two dedicated Mission Management Centres, both located in Italy, and interconnected between them and with the French Ground Control Segment, which includes the Satellite Control Centre (SCC) and the Telemetry, Command and Ranging (TCR) Station.

The ATHENA-FIDUS Satellite System will allow broadband communications services to Italian Institutional/Civilian users over the Italian National Coverage Ka band, through the use of dedicated transparent star and mesh communication channels. This architecture entails a high service provisioning flexibility thanks to the coexistence of single-hop mesh transponders and double-hop star transponders, all fully compliant with state-of-the-art low-cost ground segment technologies based on standard DVB-S2 and DVB-RCS, for the provisioning of both fixed and on the move communications.

The next table summarizes the Institutional/Civilian channels characteristics[1]:

Ch. #	U/link Center freq. (MHz)	D/link Center freq. (MHz)	Bandwidth (MHz)	EIRP density (dBW/MHz)	G/T (dB/K)	Communication connectivity
15+17	29600,00	19520,00	200	28,0	9	Star Return
16	29427,50	19887,50	75	32,5	10	Star Forward
18	29302,50	19762,50	125	32,5	10	Star Forward
3	29787,50	19987,50	75	30,0	9	Transparent mesh
4	29893.75	20093.75	75	30,0	9	Transparent mesh
19	29962,50	20162,50	50	32,4	9	Transparent mesh

The above characteristics are all supported over the national coverage depicted below:

[1] Payload performance will be assessed during In-Orbit Test (IOT) campaign (February 2014)

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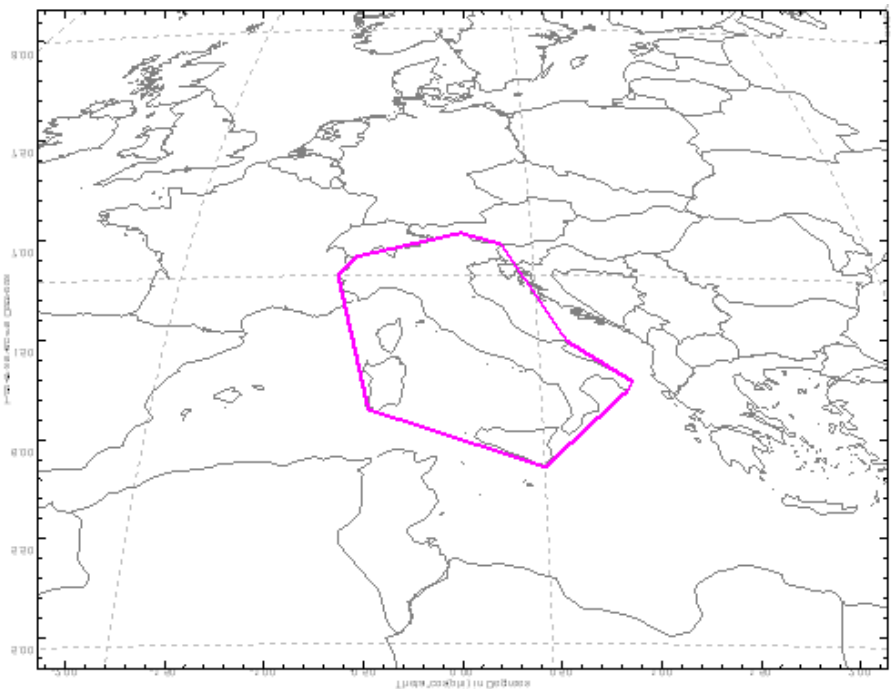

The Institutional/Civilian capacity will be managed through the use of a 9.3m Gateway Antenna Monopulse located in Italy (Lat. 41° 58’ 37” N - Long. 13° 36’ 05” E).

The Gateway manages the communications among the Satellite Terminals and between them and the external terrestrial networks, exploiting bi-directional satellite channels in star and mesh connectivity.

The main RF characteristics of the Gateway are the following:

- G/T: 36 dB/K at 25° El and clear sky conditions
- EIRP: 90 dBW (peak) at saturation in the 29-29.5 GHz Ka band

The RF Outdoor Equipment and RF Indoor Equipment are local and remotely controlled and monitored by means of centralized M&C facilities.

The Gateway is equipped with scalable and modular Carrier Class Hub designed to initially support standard DVB-S2 broadcast channel (i.e. Forward Link), based on QPSK, 8-PSK or 16-APSK modulation, LDPC + BCH FEC, TDM access and MPEG2 Transport Streams for carrying data with a configured rate up to 10 Msymbols/sec and 8 Return & Mesh DVB-RCS link carriers enabled at rate 4 Msymbols/sec max (based on a MF-TDMA access scheme, QPSK modulation, Turbo coding FEC, MPEG2 burst profiles).

The Carrier Class Hub will implement the following innovative software (main) functionalities ad-hoc designed for the ATHENA-FIDUS requirements:

- "System Fading Management" (SFM): allows to automatically combine all the fade mitigation techniques UPC "Uplink Power Control" and DRA "Dynamic Rate and coding Adaptation" on the return, mesh and forward links in order to always guarantee the maximum resources exploitation, the link closure at a minimum given BER/PER level, and to avoid satellite saturation (by considering the whole terminal population)
- "Blind Mesh": allows the Hub to operate without the need to receive the mesh channels
- Dynamic Multicast: allows a more optimized satellite bandwidth management, making available free bandwidth for more applications and services.

A Network Operating Centre (NOC) hosts the Customer Management Centre (CMC) and the Mission Control Centre (MCC) of the system.

The CMC is composed by:

- Communication Manager: realizes the remote management of the DVB-S2/RCS Gateway Base-Band and STs, M&C and RF Measuring Instruments functions.
- NMS & Security: monitors computers and network devices, it manages the user access identification and authentication on the same equipment and it performs an off-line virus check on the files, coming from external sources, to be introduced in the system.
- LAN & Network Services: guarantees reliable, efficient and secure data exchange between the machines residing inside and outside the NOC by means of network devices. It also provides value-added services for the data exchange by using Network Time Protocol Server and a Domain Name System Server

The MCC is composed by:

- Resource Manager: off-line facility able to support the operator in performing the planning and optimization of resources (e.g. Band and Power, services and , etc.).
- Carrier Spectrum Monitoring
- TM/TC handling
- Ground Communication Network (GCN)
- Resource Monitoring for remote Users.

A pre-series User Segment (DVBS2/RCS), consisting of different DVB-S2/RCS classes of terminals to be used for various working scenarios on the Italian territory, will be available; in particular, in addition to the common star only typology, the following three terminals have been ad-hoc designed and engineered for the use of the ATHENA-FIDUS civil/institutional capacity, integrating prototype IDU (i.e. In-Door-Unit) units, supporting innovative software functions, with commercial ODU (i.e. Out-Door-Unit) devices and taking into account

stringent technical and ergonomic aspects (e.g. power, phase noise, sizes, weight, installation time, transportability, etc.):

- Engineered Mesh Fixed DVB-RCS terminal with both star and mesh capabilities, designed to operate from fixed location
- Engineered Mesh "Fly-Away" DVB-RCS terminal (i.e. "Campale") with both star and mesh capabilities, designed to be easily movable but operative from any fixed site
- Mobile Prototype IDU DVB-RCS terminal ("COTM") with star capabilities only, designed to operate in motion

4. BACKGROUND AND BOUNDARY CONDITIONS

The Athena Fidus civil mission has been conceived having primarily in mind the satcom needs of the national civil institutions. For this reason, part of the overall civil capacity has to remain available for those institutions that should require it, pre-empting other commercial use. This objective could be reached in different ways, e.g. either reserving part of the capacity out of the transaction with the service provider, or imposing to the service provider, as part of the relevant contract, a certain pre-emption scheme in favour of the national civil institutions and/or pre-determining the commercial conditions that the service provider is obliged to apply to the national civil institutions. In this CFI phase, a decision has not been taken yet, and ASI expects that the EOIs elaborate about this issue. Business models shall consider specific favourable offer, including priority for the usage, for provision of capacity to institutional users.

Generally speaking, ASI can take different business models into consideration. Some examples are mentioned hereafter, although ASI encourages in this CFI phase creative thinking, with the objective of a better tuning of the possible following RFP:

- "*Take or pay*" scenario, without ground segment (bulk capacity): the service provider commits to buy wholesale all the capacity made available by ASI, for the entire satellite life or for a determined period, and takes any responsibility of the ground segment required to implement the services.
- "*Take or pay*" scenario, with ground segment ("*dressed*" capacity): as above, but buying the ground segment services as well, as rendered trough the 9,3 mt. gateway specified at par. 3.
- "*Pay per use*", bulk or "*dressed*", with a base predetermined amount, and a floating quota, on request basis, at predetermined conditions, if available.

As a general evaluation criterion, preference will be given to the service providers offering the longer commitment in time.

No in-orbit spare is at moment foreseen for the Athena Fidus satellite. Therefore, ASI cannot offer any guarantee about a satellite catastrophic failure. However, the civil payload itself is designed with the proper on board redundancies, to cope with possible on board failures, during the satellite lifetime.

ASI has a fully owned company, ASITEL, with a specific mission in the field of the satellite telecommunication services. As a future perspective, ASITEL can become the basis of a Public Private Partnership, by selling out a quota of his share capital. Independent of that, ASITEL could be delegated by ASI to handle, in part or as a whole, the relationship with the selected service provider. In this CFI phase, a decision has not been taken yet.

5. CALL FOR INTEREST RECIPIENTS AND THEIR REQUIRED CHARACTERISTICS

This CFI is addressed to those stakeholders having a proven reputation in the field of satellite telecommunication services.

This implies that the EOI's have to clearly elaborate about the existence of the necessary prerequisites, namely:

- solid market references and experience in the field, at a worldwide level
- an economic and financial company profile compatible with the expected business size

6. STRUCTURE OF THE ANSWER TO THE CALL FOR INTEREST

Considering the pre-screening nature of this CFI, the EOI format is not considered compulsory, leaving to the answerers the freedom of elaborating about each issue, and bringing in creative ideas and suggestions about the way forward.

However, the following set of information is considered as a bare minimum to keep into consideration an EOI:

- Economical and financial company profile, including the results of the previous 3 fiscal years, list of the main customers, list of the main infrastructures
- Experience and background in similar projects/activities
- Current customer base
- Proposed business model(s), clearly specifying the level of commitment that can be subscribed
- First market assessment and relevant business plan elements (including a first evaluation of the operations and service commercialization costs)

7. CLOSING DATE

30 days after publication date of the present RFI on ASI WEB site

8. **CONTACT** OFFICER

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