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ΓΕΝΙΚΗ ΓΡΑΜΜΑΤΕΙΑ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ ΚΑΙ ΤΑΧΥΔΡΟΜΕΙΩΝ

Request for Information (RFI)

Outline concept for end-to-end MILSATCOM solutions in response to national needs.

Date of Issue 16/07/2024

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1. INTRODUCTION AND CONTEXT

Space is an enabler for the digital transformation, but also for security and defence. Without security, there can be no future in Space. As highlighted in the EU Space Strategy for Security and Defence, space is a strategic domain. The gap between space and defence should be bridged, while flagship programs in space for security and defence purposes must be prioritized.

The General Secretariat of Telecommunications and Post of the Ministry of Digital Governance is the competent authority for space matters in Greece. The Secretariat has mandated the Hellenic Space Center to develop and implement the national space policy, strategy and plan.

The Greek Ministry of Defence (MoD) is closely collaborating with the Ministry of Digital Governance in all space programs and activities in order to cover national needs and requirements. The MILSATCOM services are directly linked to the security, autonomy and capacity building pillar of the national strategy for space. This strategy is pivoted around the following objectives[1]:

1. ***Strengthen national security and defence, especially with the utilization and development of space infrastructure.*** Ensure national autonomy in safety and security (e.g border control, disaster and crisis management) by developing autonomous capabilities to respond to national safety and security needs.
2. ***Development of the Greek space industry.*** Maximise the integration of Greek companies into the European industrial space landscape. The goal is to create a sustainable competitive Greek space industry.
3. ***Support space research and innovation.***

The related strategies are:

1. ***Development of a national MILSATCOM satellite.*** Achieving autonomous capabilities to respond to national and European military and governmental needs.
2. ***Ground infrastructure***. Utilising and further developing existing infrastructures: nationally owned stations (incl. optical communication stations).
3. ***User alignment (ministries)***. Supporting through space the development implementation and monitoring of sectorial policies.

SECURE CONNECTIVITY SOLUTIONS

The European Union is currently developing its next space flagship programme in the field of secure connectivity, IRIS[2]. In particular, is expected that space and terrestrial infrastructures are interconnected in order to provide:

- ***high speed broadband availability*** *throughout the territory of the European Union,* removing dead zones and ensuring cohesion across Member States;
- ***resilient, secure and cost-effective governmental communication services,*** that support protection of critical infrastructures, surveillance, external actions and crisis management, possibly including those based on quantum technologies.

[1] Greek National Law, 2020 N4727.

The European Secure Connectivity Initiative is expected to build on the Govsatcom component of the EU Space Programme (which will provide the initial core of the available services though the pooling and sharing of existing satellite capacity) and a new space segment (based on a multi-orbit constellation) will be developed to complement such preliminary services.

In parallel, multiple national programs focus on secure military satellite connectivity (MILSATCOM). Examples of such programs include but are not limited to SpainSatNG, SICRAL, Syracuse IV, Skynet and WGS.

MILSATCOM RFI

The purpose of this Request for Information (RFI) is to collect information from industry for an outline end- to-end MILSATCOM solution in response to national needs.

Important note: All information requested and provided in the frame of this Request will be used for information and planning purposes only and is not part of a procurement process. This Request does not bind the Ministries to any present or future procurement actions nor does it create any rights for respondents in relation to any present or future national procurements.

2. MISSION STATEMENT AND REQUIREMENTS

2.1. Mission Statement

The mission statement is:

To develop, manufacture, put in orbit and operate a MILSATCOM satellite capable of hosting primarily military communications payloads in response to national needs while promoting the development of national industry and utilising national assets to the best possible extend. The main objective is to deploy a GR owned high-end MILSATCOM satellite system which will be fully operated by the Ministry of Defence including the satellite, mission and network operations.

2.2. General Mission Requirements

The envisaged MILSATCOM solution is expected to comply with state-of-the-art MILSATCOM technologies including both passive defences (defences which allow the system to survive and operate through an attack) as well as possibly active defences. Indicative examples of passive defences examples encountered in literature[2]:

- Frequency Hopping Spread Spectrum (FHSS). Rapidly changing the transmission frequency by means of pseudorandom sequencing of the receiver/transmitter.
- Antenna Notching / Nulling: Antenna's designed to assure jamming resistance.
- On-board Processing: MILSATCOM system shall establish resistance to jamming and other forms of interference by demodulating and decoding the signal on the satellite before retransmitting for tactical support.
- Data Encryption: Data Encryption: Protection against cyber-attack by encryption of all TT&C data of the satellite system.

Active Defences (defences designed to intercept, disrupt, or otherwise thwart an attack before it can affect communications) Manoeuvre: satellite shall be designed with the ability to out-manoeuvre- incoming

[2] Harrison, Todd. *The future of MILSATCOM*. Center for Strategic and Budgetary Assessments, 2013.

physical attacks (see MIS-03). Respondents are called to submit additional unsolicited active defence solution information.

The responders should not be limited by the above general examples.

2.3. Main Mission Requirements

MIS-01 Provide secure MILSATCOM services over the EMEA region for the Hellenic and Allied Armed forces using X-band, Ka-MIL, Q/V in the GEO orbit.

The end-to-end system will consist of:

- Primarily a Digital Transparent Processing (DTP) communication payload capable of:
  - Up to 8 Gbps throughput forward traffic.
  - Up to 8 Gbps throughput return traffic.
  - Up to 500MHz in X-band.
  - Up to 500MHz in Ka -MIL band.
  - Q/V/Ka-MIL band feeder link.
  - Multibeam Steerable coverage over the EMEA as a minimum.
  - Ka-MIL spot beams with less than 0.8º beamwidth. Similar spot beam footprint sizes expected for X-band.

  Describe the processing method utilized on the satellite, such as analog RF, signal digitization and filtering, and whether demodulation / remodulation and packet switching may be supported. Describe the waveforms that would be supported on the typical platform configuration.

- Ground and user segment and control, including primary and back-up:
  - Satellite and Mission Control Center.
  - Network Control Center.
  - Antenna sites.
  - A mix of up to 150 low/medium/high end terminals, of all types (Fixed, mobile, aero/UAV, maritime, satcom on-the-move/SNG), with demonstrated interoperability between -Air -Land -Sea communication services and multiband X and military Ka – band capabilities.
  - state-of-the-art methods for bandwidth optimization for high efficiency, availability and user mobility management, including seamless beam switching.

MIS-02 Describe the capability of the satellite to support state-of-the-art antijamming techniques. Describe the antijamming capabilities of both the satellite (e.g. geolocation, beamforming) as well as the ground and user segment (e.g. TRANSEC, NETSEC, COMSEC, frequency hopping, LPD/LPI, protected waveforms, spread spectrum, interleaving). Any other active or passive defence capabilities to be also described.

MIS-03 Describe the system capabilities for neighborhood detection to increase satellite's resilience to threats. Any other active or passive defence systems on the space (e.g.

satellite maneuver), ground (e.g. hardened ground stations) and user segments available to be identified.

MIS-04 Provide training for satellite inflight operations, network design and operations, and payload operations to the national operator.

MIS-05 Provide a solution for the Launch services including multiple launcher options, timeplan, insurance and cost.

MIS-06 Provide services for the Early Orbit Placement (LEOP) and the in-orbit testing (IOT) of the satellite.

MIS-07 Provide a full cost analysis from development to operations. Detail up to three indicative solution scenarios with associated ROM cost and lead times. Include a ROM cost breakdown between the space (incl. satellite, insurance and any other associated cost), the ground hub (incl. SOC, MOC, NOC and any other associated costs) and the user segments (user terminals and any other associated costs).

MIS-08 Provide a full cost analysis for back-up satellite operations solution including location, antenna sites and technical infrastructure and man effort.

MIS-09 Provide a full cost analysis for in orbit support services for the entire satellite lifetime.

MIS-10 Comply to national, European and international law and regulations (e.g. ITU), and propose ITU filings for the MILSATCOM system at various orbital locations covering the area of Greece/Europe, Africa, Middle East (EMEA) taking under consideration the existing entries of ITU MIFR (Master International Frequency Register). Based on the solution scenario proposed and taking into account satellite and ground segment technical characteristics (i.e antenna design, EIRP, G/T, Power Spectral Density, Channel BW, earth station diameter) as well as the proposed operating frequency bands, transmission and reception link budgets and protected wave forms utilized, provide an analysis on coordination requirements with existing satellites operating in the overlapping bands and in the same/close to coverage area as in the scenario proposed in the neighbourhood of 39degrees East (+/- 3 degrees).

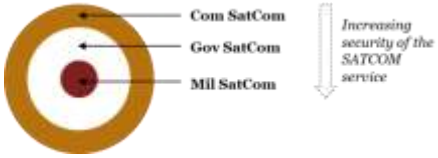
MIS-11 Demonstrate feasibility of critical technologies enabling the utilisation of national industry and research institute capabilities. Utilize national assets and infrastructures as much as possible. Provide a gap analysis of the Greek industry, research capabilities and national assets in the view of the mission concept. Maximize to the greatest extend possible the involvement of GR based industry, identify local synergies and possible capacity building plans.

MIS-12 Offer option to lease capacity of operational MILSATCOM systems, to mitigate possible mission long lead time.

2.4. Secondary Mission Requirements

MIS-13 Identify and describe in detail potential collaborations based on hosted payload schemes to (e.g. Public Private Partnerships, rights to sell excess capacity etc.).

MIS-14 Provide on a secondary basis GOVSATCOM/COMSATCOM services over the EMEA region for national and European partners. Propose scenarios for secondary payloads that could be integrated with the European Union Secure Connectivity initiatives using optical communication technologies.



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MIS-15 Indicate the capability of the satellite to actively withstand incoming physical attacks, for instance by avoidance manoeuvres or other means. Advise on possible satellite maneuver designs for counter acting physical attacks e.g. number of manoeuvres in the lifetime of the satellite, degrees per manoeuvre, types of manoeuvres. Advise on rising weights and corresponding costs, compared to standard solutions.

3. RISK SHARING AND SYNERGIES

There are risks associated to the project. Those risks are associated with the mission itself but also to the space and ground segment to be developed on time to perform the service. A dedicated chapter of the concept submitted will be devoted to an analysis of the risks and to the actions that the company will undertake to mitigate them and to the actions.

4. INDUSTRIAL ORGANISATION

In your submission, you are requested to provide information on the companies and their capabilities identified for the development of the space and ground segment as well as those that may be called to perform the service itself. The promotion of the development of national industry and utilisation of national assets (e.g. infrastructures, laboratories, stations) needs to be highlighted. Information regarding the percentage of Greek engagement needs to be clearly stated.

5. SUBMISSION AND EVALUATION

5.1. General

Please send the responses to this RFI to at the latest by End of September 2024.

Respondents are asked to prepare submissions using the provided templates (see Annex A), completing all relevant fields. Proprietary information submitted in response to this RFI should be clearly marked.

Respondents are asked to fill in the overview solution table, provided in Annex B, by indicating the corresponding checkboxes of the matrix and providing the technical highlights of the relevant field of each solution scenario, as described in MIS-07. Responses should not exceed 30 pages. Additional information on your company or references can be provided as an annex. The proposals will be shared with other Ministries.

5.2. Technical Clarifications

Technical clarifications can be requested via email from the following points of contact (PoC):

PoC	Affiliation	email
Col. Dimitrios Biskas	Ministry of Defence	d.mpiskas@hndgs.mil.gr
Mr. Alexios Spyridon Konstandinidis Tsavisis	Ministry of Defence	s.konstantinidis@hndgs.mil.gr
Ms. Marilena Ampelikioti	GSTP/ Ministry of Digital Governance	m.ampelikioti@mindigital.gr
Dr. Dimitrios Christopoulos	Hellenic Space Center/ Ministry of Digital Governance	dimitrios.christopoulos@hsc.gov.gr

5.3. Submission coordinates

RFI responses shall be submitted in two physical copies mailed to the following two addresses, as well as electronic copies emailed to the below email addresses:

MINISTRY OF DEFENCE

HELLENIC NATIONAL DEFENCE GENERAL STAFF

SPACE DIRECTORATE

Leof. Mesogion 227-231

15561, Cholargos

Colonel Dimitrios Biskas

tel: 2106573524

e-mail: d.mpiskas@hndgs.mil.gr

MINISTRY OF DIGITAL GOVERNANCE

General Secretariat of Telecommunications & Post

11 Fragoudi Str. & Al.Pantou

10163 ATHENS

TEL:210 9098900-903

E-MAIL: ggtt@mindigital.gr

5.4. APPENDIX A: Submission template

Please use the following template to present your outline concept, which should not exceed 30 pages. Additional information on your company(s) or references can be provided as an annex.

PROPOSAL ADDRESSING TECHNICAL AND BUSINESS ASPECTS		
1.	Concept/service title	Title of the concept being proposed
2.	Overview of the mission	Objectives of the mission and service.
3.	Technical description	Description of the mission profile / concept of operations, based on the state-of-the-art in the MILSATCOM technology domain. Preliminary conceptual design of the space segment and ground segment, system level description, status of development, main equipment lists with TRL[3] levels and a list of any technology developments needed with a due date. Compatibility constraints with launcher options to be identified. Description of on-going activities, both system and technology, including technology development plans (where applicable). Indication of use of COTS (where applicable). Schedule / development plan of the system including details on the earliest delivery date of a service for the selected hypothetical scenario.
4.	Related heritage, patents, publications.	A list of relevant contracts, deployed systems with their performance and any other related heritage.
5.	Level of mission cost and level of support/ funding	Provide a full cost analysis from development to operations. Information on present or previous funding for the development. Provide a list of potential funding schemes.
6.	Service options	Describe the service concepts you could propose. This section should describe the conditions, provide a range of prices (ROM[4]) and contain the key main features of a service contracts to be offered to public and private users.
7.	Major risks	Describe any major risks associated with the development, the envisaged risk sharing and propose mitigation measures.
8.	Partnership	In case a partnership with other (e.g. public or private) to participate to the operations is envisaged please describe.

[3] http://sci.esa.int/sci-ft/50124-technology-readiness-level/
[4] Rough Order of Magnitude

9.	Industrial participation	Provide a list of the companies and institutes you would involve as partners or suppliers in the development of the space and ground segment and explain in which way they would continue to participate beyond service to government.
BUSINESS ASPECTS RELATED TO FUTURE SERVICES		
10	Target customers/ market for future services and associated business case	Provide information on the addressable market size, types of customers, and competitive advantage of the service beyond the service performed for the government. That information must be included in a high- level business case.
11	Level of service	Describe the type of service, service performance and level(s) of service provided with associated ROM price.
12	Planned entry into service	Outline a first planned commercial service beyond the government service (if applicable).
SUBMISSION AUTHOR DETAILS		
1	Lead author	
2	Organisation & address	

5.5. APPENDIX B: Summary Table

		Total ROM Cost			
		150-200m€	**200-300m€**	**more than 300m€**	**indicative value**
GEO satellite size	up to 1 tone				*[kgs]*
	1-3 tones				
	3 tones and above				
Total Power	up to 4 kW				*[kWs]*
	4 - 12 kW				
	more than 12 kW				
Propulsion	Chemical				
	Electric				
	Hybrid Chemical / Electric				
Frequency Bands (Feeder link)	Q/V				
	Ka-mil				
	X-band				
Frequency Bands (User link)	X-band				
	Ka-mil				
	X-band & Ka-mil				
Coverage Area	Greece / Cyprus (Athens/Cyprus FIR)				*provide combined scenario (antennas, coverage areas)*
	Middle East / Red Sea				
	N. Africa / Mediterranean				
Comms Payload - Antenna Configuration	single, wide beam				*number of beams, min beam size diameter [km], EIRP (dBW), G/T, (dB/K) at beam peak/edge, availability*
	multi-spot beam (3 to 6 beams)				
	steerable spot beam(s)				
	reconfigurable Phased Array (Anti-jamming/Geolocation, emphasis on receive antenna)				
Comms Payload - Transponder	Bent-pipe				*processing bandwidth [MHz], number, type and power of active transponders,*
	Digital Transparent Processing				

Space Segment Redundancies	payload (TWTAs/SSPAs, I/O rings, etc.)				*spec redundancy ratio*
	satellite bus (EPS, TT&C, etc.)				
Satellite Control Center (TT&C)	primary (GR)				identify locations
	back-up (identify location)				
Mission Control Center	primary (GR)				identify locations
	back-up (identify location)				
Network Control Center (incl. Baseband Hub)	primary (GR)				identify locations
	back-up (GR)				
Antenna sites	primary (GR)				identify locations
	back-up (identify location)				
Operations Training - Knowledge transfer	Satellite Operations				
	Network Operations				
	Mission Operations				
Support Services	Back-up satellite operations				Provide Cost
	In-orbit support services				Provide Cost
User segment (mix of low/medium/high - end terminals)	50 terminals				spec. number
	50-100 terminals				
	100-150 terminals				
	frequency hopping capabilities				
Optical Communications (Optional)	Inter-Satellite Links (any orbit)				
	Space - to - earth (e.g. GR based OGS)				
Start of Service (from contract signature est. 2025)	less than 2 years				*exp. SoS year*
	2 - 3 years				
	more than 3 years				
Satellite Lifetime	8 - 15 years				Nbr of years
	15-20 years				
	above 20 years				
Indicative % of the overall contract value allocated for economic operators established in Greece.					%