Strategic Command
Defence Digital

SKYNET Ground User Acquisition Team: Request for Information (RFI) on Maritime Military Satellite Communications Terminals

Version: 1.1 Ref.No.: SATCOM GUAT 1102
19/11/2024

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Section 1 - Introduction

Introduction

1. Considering potential industrial innovation, the Ministry of Defence (MOD) is seeking to refresh and maintain an understanding of the current industry offerings in the sphere of Maritime Military Satellite Communications Terminals (MMSCTs).

2. To this aim, this (and potentially subsequent) Request for Information (RFI) is published to ensure that MOD has a clear and current understanding of the capabilities available within the MMSCT market.

Industrial Engagement Approach

3. All responses to the question set will be treated as commercially sensitive. Only Official or Official-Sensitive responses should be sent to the email address specified in Section 4 – How to respond to this RFI .

4. The MOD may wish to invite respondents of this Request for Information (RFI) to one-to-one sessions to discuss further details. The contents of individual responses (or lack of response) will not be considered in relation to any future procurement process and is for information only.

5. All descriptions of the SKYNET programme provided in this document are subject to change without notice or consultation. The MOD will not be held liable for any decisions or investments made based on the information contained in, or inferred from, this document.

6. Please note that it is the responsibility of the respondent to ensure that appropriate rights of distribution are in place for all information shared in response to this RFI.

RFI Security Information

7. The following security information should be read and understood before responding to this RFI:
   a) The security classification of this RFI is OFFICIAL.
   b) The security of the anticipated future procurement, delivery, and maintenance of Military Maritime SATCOM Terminal is of critical national importance. The highest level of classification of a future Military Maritime SATCOM Terminal project is expected to be OFFICIAL SENSITIVE and this will impact on any future competitive activity regarding this project. The Official Secrets Act and other relevant legislation will also inherently apply to the SKYNET programme. Effective security will need to be designed, implemented and assured throughout the life of the programme and must cover both the system itself, the impact of connected systems and the programmatic aspect of security.

Section 2 – Required Antenna Characteristics

8. The Royal Navy(RN) and Royal Fleet Auxiliary(RFA) fleets use satellite communications (SATCOM) to obtain Operational Advantage in performance of their day-to-day business.

9. The legacy and current SATCOM solutions, deployed by the RN and RFA fleet as part of the SKYNET system, employ military hardened, high availability and highly robust X-band MMSCTs to meet the range of complex military scenarios and exposed global maritime environments in which they operate.

10. These MMSCTs delivering sustained high capacity, differentiated communication by multiple simultaneous transmissions within a frequency band whilst operating in, overcoming and surviving:
    a) very high sea-states,
    b) high vibration and shock events,
    c) hostile communication denial attacks, and
    d) a complex and congested electromagnetic environment.
11. However, there is an enduring need to increase the degree and quality of maritime satellite communication, and within the SKYNET6 programme the Authority believes this may be achieved for the MMSCT aspects through:
    a) increased performance in resilient X-band frequencies,
    b) adoption of dual simultaneous (X & Ka) band systems,
    c) simultaneous duplex operation in left and right hand circular polarisation, or
    d) a combination of the above.
12. Consequently, the Authority would like to understand:
    a) What products are currently available from industry at high Technical Readiness Levels (8 or 9) (see Annex B for definitions of TRL)?
    b) What products are in late development with TRLs of 5, 6 or 7 that could be matured to deliverable products, preferably within 24 to 36 months.

Objective Requirements

13. Table 1 presents the Authority's objective requirements as a guide. Respondents should recognise that this is not an exhaustive list of requirements, nor should it be considered as mandatory requirement set. It is intended for guidance only regarding the Authority's areas of interest.
14. Objective requirements for two classes of MMSCTs are presented, described within the table as Medium and Large. These designations are simply intended to delineate between terminals of different size and RF performance.

Section 3 – RFI Questions

15. Respondents are requested to provide information and to answer the questions listed below.
    a) Please complete Annex A, Template A <u>for each</u> of your relevant MMSCTs that are currently available or at high Technical Readiness Levels (8 or 9) (see Annex B for definitions of TRL).
    b) Please complete Annex A, Template B <u>for each</u> of your relevant MMSCTs that are in late development with TRL 5, 6 or 7 that could be matured to deliverable products.
    c) For each MMSCT, please provide a commercial datasheet and supporting information that you believe would be of relevance to the Authority.

Table 1: Guide to Objective Requirements

		Terminal Type	
		Medium	Large
Size	Maximum antenna assembly dimensions: Diameter x Height (m) (including radome and mounting)	2.3 x 2.4	3.1 x 2.9
Environmental	DEFSTAN 08-123 compliance	DEFSTAN compliance is required but justification of compliance through equivalent standards (such as MIL-STDs) may be accepted.	
EMC	DEFSTAN 59-411 compliance		
Certification	Wideband Global SATCOM (WGS)	Certified or certifiable	
RF frequency band performance	X-band linear EIRP (dBW) (approximate)	≥+60	≥+66
	X-band G/T (dB/K) (approximate)	≥16	≥19
	Ka Mil band linear EIRP (dBW) (approximate)	≥+65	≥+68
	Ka Mil band linear G/T (dB/K) (approximate)	20	24
	Dual simultaneous circular polarisation	Objective requirement	
	Single circular polarisation	Threshold requirement	
Availability	When operating continuously over a 90 day mission	99.99%	
Pointing and Tracking	Operation in sea state (X/Ka)	8/6	8/6
	Tracking loss (dB)	As per MIL-STD-188-164C	As per MIL-STD-188-164C

Section 4 – How to respond to this RFI

16. Please be aware that the MOD is not seeking promotional material or sales pitches for unproven technologies in response to this RFI.
17. Responses to this RFI should be sent directly to mailbox: UKStratComDD-CM-Skynet-GUAT@mod.gov.uk.
18. The closing date for RFI responses is: **13th December 2024**
19. Thank you for your interest in this RFI

Annex A – Terminal Characteristics Template

20. Please complete Templates A or B for each of your relevant terminal product. Where a supplier has multiple products, each should be detailed within a separate copy of the applicable template, even if this would cause some duplication of response.

RFI Response Template A - MMSCTs that are currently available or at high Technical Readiness Levels (8 or 9).		
Response Category		**Response**
Name	Product name	
Organisation	Supplier Name	
	Supplier commercial contact details	
TRL	Is the current Technical Readiness Level (see Annex B for TRL definitions to be applied) of this terminal product assessed as TRL 8 or TRL 9?	
	Please provide justification for the claimed Technical Readiness Level.	
Size	What are the overall assembly dimensions (including radome): Diameter x Height (m)?	
	Is the terminal a single or dual antenna system?	
Weight	What is the (single) antenna assembly ‘all in’ weight (including radome and cooling if required) (kg)?	
RF performance	X-band linear EIRP (dBW)?	
	X-band G/T (dB/K)?	
	Ka Mil band linear EIRP (dBW)?	
	Ka Mil band G/T (dB/K) if supported/	
	Dual simultaneous or single circular polarisation?	

Certification & Compliance	SKYNET 5 Satellite Certification (Yes/No)?	
	WGS Certification (Yes/No)?	
	MIL-STD-188-164C compliant?	
Military Environmental	Provide details of the standards against which the terminal has been qualified for climatic operations.	
	Temperature	
	Humidity	
	Solar radiation	
	Vibration	
	Shock	
	EMC	
Sea State	What is the maximum sea state in which the system is specified to operate?	
	What is the maximum sea state that the system is specified to survive?	
Availability	What is the specified Operational Availability (Ao) over a continuous 90 day mission?	
Commercial	Provide rough order of magnitude cost (per MMSCT system).	
	Are there any commercial or licencing that place restrictions on supply of the product to UK MOD?	

Supporting or additional information:

RFI Response Template B - MMSCTs that are in late development with TRL 5, 6 or 7 that could be matured to deliverable products.		
Response Category		**Response**
Name	Product name	
Organisation	Supplier Name	
	Supplier commercial contact details	
TRL	What is the current Technical Readiness Level (see Annex B for TRL definitions to be applied)	
	What is the expected development duration to achieve a TRL 8 or 9 product?	
	What are the most significant challenges that might delay or prevent the product achieving TRL 8 or 9?	
Size	What are the specified overall assembly dimensions (including radome): Diameter x Height (m)?	
	Is the terminal specified as a single or dual antenna system?	
Weight	What is the specified (single) antenna assembly 'all in' weight (including radome and cooling if required) (kg)?	
Specified RF performance	X-band linear EIRP (dBW)	
	X-band G/T (dB/K)	
	Ka Mil band linear EIRP (dBW)	
	Ka Mil band G/T (dB/K) if supported	
	Dual simultaneous or single circular polarisation?	

Certification & Compliance	SKYNET 5 Satellite Certification (Yes/No)?	
	WGS Certification (Yes/No)?	
	MIL-STD-188-164C compliant?	
Military Environmental	Provide details of the standards against which the terminal has been qualified for climatic operations.	
	Temperature	
	Humidity	
	Solar radiation	
	Vibration	
	Shock	
	EMC	
Sea State	What is the maximum sea state in which the system is specified to operate?	
	What is the maximum sea state that the system is specified to survive?	
Availability	What is the specified Operational Availability (Ao) over a continuous 90 day mission?	
Commercial	Provide rough order of magnitude selling price (per MMSCT system).	
	Are there any commercial or licencing that place restrictions on supply of the product to UK MOD?	

Supporting or additional information:

Annex B – Technical Readiness Definitions

TRL	Definition	SYSTEM			
		Description		Supporting Evidence	
9	Actual technology system qualified through successful mission operations.	Actual application of the technology in its final form and under operational conditions. Technology proven in-service. Successful operational experience.		ISRM reports. User validation. May be linked to FOC.	
8	Actual technology system completed and qualified through test and demonstration.	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true technology and integration development. Examples include developmental test and evaluation of the system in its intended platform to determine if it meets design specifications. All functionality tested in simulated and operational scenarios.		Results of testing the system in its final configuration under the expected range of environmental conditions in which it will be expected to operate. Assessment of whether it will meet its operational requirements. What problems, if any, were encountered? What are/ were the plans, options, or actions to resolve problems in-service? Usually linked to ISD.	
		HARDWARE		SOFTWARE	
		Description	Supporting Evidence	Description	Supporting Evidence
7	Technology prototype demonstration in an operational environment.	Prototype near or at planned operational system. Represents a major step up from TRL 6 by requiring demonstration of an actual system prototype in an operational environment (e.g., in an aircraft, in a vehicle, or platform in the field). The operational environment may be defined as that which exposes the technology to the physical, electrical, environmental and security interfaces that will be experienced in service.	Results from testing a prototype system in an operational environment. Who performed the tests? How did the test compare with expectations? What problems, if any, were encountered? What are the plans, options, or actions to address the delta of where the technology is now and that required for ISD (the next level)?	Level at which the program feasibility of a software technology is demonstrated. This level extends to operational environment prototype implementations where critical technical risk functionality is available for demonstration and a test in which the software technology is well integrated with operational hardware/software systems.	Critical technological properties are measured against requirements in a simulated operational environment. Full integration.
6	Technology system / sub-system model or prototype demonstration in a relevant environment.	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include field testing a prototype in a high fidelity laboratory environment or in a simulated operational environment operating under proposed protocols.	Results from field testing of a prototype system that is near the desired configuration in terms of performance, weight, and volume. How did the test environment differ from the operational environment? Who performed the tests? How did the test compare with expectations? What problems, if any, were encountered? What are the plans, options, or actions to resolve problems before moving to the next level?	Level at which the engineering feasibility of a software technology is demonstrated. This level extends to laboratory prototype implementations on full-scale realistic problems in which the software technology is partially integrated with existing hardware/ software systems.	Results from laboratory testing of a prototype package that is near the desired configuration in terms of performance, including physical, logical, data, and security interfaces. Comparisons between tested environment and operational environment analytically understood. Analysis and test measurements quantifying contribution to system-wide requirements such as throughput, scalability, and reliability. Integration of [illegible]
5	Technology component and/or basic technology subsystem validation in relevant environment.	Fidelity of technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so they can be tested in a simulated environment. Examples include high fidelity laboratory integration of components, and basic field trials to prove capability concepts.	Results from testing a laboratory based system are integrated with other supporting elements in a simulated operational environment. How does the "relevant environment" differ from the expected operational environment? How do the test results compare with expectations? What problems, if any, were encountered?	Level at which software technology is ready to start integration with existing systems. The prototype implementations conform to target environment/ interfaces. Experiments with realistic problems. Simulated interfaces to existing systems. System software architecture established. Algorithms run on a processor(s) with characteristics expected in the operational environment.	System architecture diagram around technology element with critical performance requirements defined. Processor selection analysis, Simulation/ Stimulation (Sim/Stim) Laboratory build-up plan. Software placed under configuration management. COTS in the system software architecture is identified. Integration plan.
4	Technology component and/or basic technology subsystem validation in laboratory environment.	Basic technological components are integrated as sub-systems to establish that they will work together. This is relatively low fidelity compared with the eventual system. Examples include integration of ad-hoc hardware in the laboratory.	System concepts that have been considered and results from testing laboratory scale models. References to who did this work and when. Provide an estimate of how hardware and test results differ from the expected system goals and (re)assess the way forward.	Basic software components are integrated to establish that they will work together. They are relatively primitive with regard to efficiency and robustness compared with the eventual system. Architecture development initiated to include interoperability, reliability, maintainability, extensibility, and scalability issues. Emulation with current/ legacy elements as appropriate. Prototypes developed to demonstrate different aspects of eventual system.	Advanced technology development, stand-alone prototype solving a synthetic full-scale problem, or standalone prototype processing fully representative data sets. Assessment of architecture and how it will be integrated.
3	Analytical and experimental critical function and/or characteristic proof-of-concept.	Active R&D is initiated. This includes analytical studies and laboratory studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.	Results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. References to who, where, and when these tests and comparisons were performed. What are the plans to address the delta of where the technology is now and that required for ISD – are they viable?	Active R&D is initiated. The level at which scientific feasibility is demonstrated through analytical and laboratory studies. This level extends to the development of limited functionality environments to validate critical properties and analytical predictions using non integrated software components and partially representative data.	Algorithms (or software components) run on a surrogate processor in a laboratory environment, instrumented components operating in laboratory environment, laboratory results showing validation of critical properties.
2	Technology concept and/or application formulated.	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.		Publications or other references that outline the application being considered and that provide analysis to support the concept. Applied research activities, analytic studies, small code units, and papers comparing competing technologies.	
1	Basic principles observed and reported.	Lowest level of technology readiness. Blue skies scientific research begins to be translated into applied research and development (R&D). Examples might include paper studies of a technology's basic properties.		Published research that identifies the principles that underlie this technology. References to who, where, when. Early lab model of basic concept may be useful for substantiating the TRL level	