Strategic Command
Defence Digital

SKYNET Ground User Acquisition Team: Request for Information (RFI) on Serial Communications Devices

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Section 1 - Introduction

Introduction

1. The Ministry of Defence (MoD) is seeking to refresh and maintain an understanding of the current industry offerings for the provision of switching, multiplexing and encapsulation of Serial data protocols.

2. This (and potentially subsequent) Request for Information (RFI) has been published to ensure that MoD has a clear and current understanding of the capabilities available within the industry.

Industrial Engagement Approach

3. The MoD shall treat all responses to the question set as commercially sensitive.

4. Only OFFICIAL or OFFICIAL-SENSITIVE responses should be sent to the email address specified in Section 4 – How to respond to this RFI.

5. 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.

6. The MoD will not be held liable for any decisions or investments made based on the information contained in, or inferred from, this document.

7. 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

8. 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 any Serial Data equipment is expected to be up to UK OFFICIAL-SENSITIVE and this may impact on any competitive activity regarding future projects.

Section 2 – Required Equipment Characteristics

9. The UK MoD has an enduring requirement for communications that are at once, efficient, reliable, resilient and secure. As a result of this enduring need, the equipment that delivers them must also offer an extended lifetime with support from its manufacture or support agent (for example to 2040 or later).

10. The military-specific needs and derived technical characteristics means that certain communications protocols may be used after they have become obsolete in commercial communications systems. An example of this is serial data protocols.

11. The equipment that provides serial data communications must be capable of:
    a) Being installed into both conditioned and deployed environments;
    b) Reliable operation in challenging, military environmental conditions;
    c) Accepting, switching, multiplexing, converting and encapsulating into IP multiple serial protocols and vice versa;

d) Secure management and control;

e) An extended lifetime.

12. Consequently, the Authority would like to understand:

 a) Is separate equipment required for conditioned and deployed environments or can a single type meet both needs and still offer value for money?

 b) What products are currently available from industry at high Technical Readiness Levels (8 or 9) (see Annex B for definitions of TRL)?

 c) 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. Section 3 – RFI Questions presents the Authority's requirements as a guide. There are two sets of specifications:

 a) Table 1 provide a cardinal points requirement for equipment that may be installed and used in large, conditioned environments such as the UK's Satellite Ground Stations.

 b) Table 2 provides a cardinal points requirement for equipment that may be installed and used in deployed environments such as when fitted to mobile Satellite Ground Terminals (for example that represented by the Reacher terminal).

14. The cardinal points differ in their environment (e.g., heat, cold and shock) and amount of connectivity.

15. 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.

Section 3 – RFI Questions

16. 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 equipments 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 equipments that are in late development with TRL 5, 6 or 7 that could be matured to deliverable products.

 c) For each equipment, please provide a commercial datasheet and supporting information that you believe would be of relevance to the Authority.

	Category	Value
Size		Allows for installation into EIA-310 Revision E standards racks.
Data Rates Supported		Tributary Data Rates of between 300 bps and 19.2 kbps.
Protocols Supported		Support for at least 8 x and preference for 24 x TIA/EIA-422 standard via standard connector e.g. EIA/TIA 530.
		Asynchronous and synchronous serial data communication
		IPv4 and IPv6 capable
Environmental	Low Temperature Operation	+15C
	High Temperature Operation	+40C
	Drop and Topple	EN60068-2-31
	EMC	EU directive 2014/30/EU
	Shock	IEC 60068-2-27
Functions Supported	Multiplexing	Up to at least 24 serial tributaries multiplexed into a serial link.
	De-multiplexing	Up to at least 24 serial tributaries de multiplexed from a serial link
	Add/Drop Multiplexing	Identified tributary or tributaries can be de-multiplexed from a Serial Multiplex and the remainder re-multiplexed. Ability to mirror a given port’s traffic across multiple ports.
	Clocking Modes	Support for Sync and Async traffic. Support for 'standard' and 'counter' clocking modes
	Protocol encapsulation	Encapsulation of a serial multiplex, serial link, or serial tributary into a IP link
	Management and Control	Secure open-standard protocols preferred (e.g., SNMP V3). Support for setting DSCP on IP link. Protection for the confidentiality and integrity of any serial multiplex signalling and control
Availability	Envisaged MTBF	250,000 hours
Regulatory Compliance	EMC Directive	EU directive 2014/30/EU
	WEEE	EU Directive 2012/19/EU
	RoHS	EU directive 2024/232/EU

Table 1 Conditioned Environment Need

	Category	Value
Size		1U volume (e.g., ½ width 2U also acceptable)
Data Rates Supported		Tributary Data Rates of between 300 bps and 19.2 kbps
Protocols Supported		Support for TIA/EIA-422 standard via MIL-STD 38999 connector
		Asynchronous and synchronous serial data communication
		IPv4 and IPv6 capable
Environmental	Low Temperature Operation	-40C
	High Temperature Operation	+49C
	Drop and Topple	EN60068-2-31
	EMC	DEFSTAN 59-411 Land Class B or equivalent
	Shock	20G, 11ms pulse
Functions Supported	Multiplexing	Up to at least 4 serial tributaries multiplexed into a serial link
	De-multiplexing	Up to at least 4 serial tributaries de multiplexed from a serial link
	Add/Drop Multiplexing	Identified tributary or tributaries can be de-multiplexed from a Serial Multiplex and the remainder re-multiplexed. Ability to mirror a given port’s traffic across multiple ports
	Clocking Modes	Support for Sync and Async traffic. Support for 'standard' and 'counter' clocking modes
	Protocol encapsulation	Encapsulation of a serial multiplex, serial link, or serial tributary into a IP link.
	Management and Control	Secure open-standard protocols preferred (e.g., SNMP V3). Support for setting DSCP on IP link. Protection for the confidentiality and integrity of any serial multiplex signalling and control
Availability	Envisaged MTBF	250,000 hours.

Regulatory Compliance	EMC Directive	EU directive 2014/30/EU
	WEEE	EU Directive 2012/19/EU
	RoHS	EU directive 2024/232/EU

Table 2 Deployed Environment Need

Section 4 – How to respond to this RFI

17. Please be aware that the MoD is not seeking promotional material or sales pitches for unproven technologies in response to this RFI.
18. Responses to this RFI should be sent directly to mailbox: UKStratComDD-CM-Skynet-GUAT@mod.gov.uk.
19. The closing date for RFI responses is: 22/11/2024
20. Thank you for your interest in this RFI

Annex A – Serial Characteristics Template

21. Please complete Templates A and/or B for each of your relevant product. Where a supplier has multiple products, detail each within a separate copy of the template even if this would cause duplication.

RFI Response Template A - Products 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	
Maturity	What is the current Technical Readiness Level (see Annex B for required TRL definitions)	
	What is the expected development duration to achieve a TRL 8 or 9 product?	
Commercial	Are there any commercial or licencing that place restrictions on supply of the product to UK MoD?	
Size		
Data Rates Supported		
Protocols Supported		
Environmental	Low Temperature Operation	
	High Temperature Operation	
	Drop and Topple	
	EMC	

	Shock	
Functions Supported	Multiplexing	
	De-multiplexing	
	Add/Drop Multiplexing	
	Clocking Modes	
	Protocol encapsulation	
	Management and Control	
Availability	MTBF	
Regulatory Compliance	EMC Directive	
	WEEE	
	RoHS	

Supporting or additional information:

RFI Response Template B - Products that are in late development at TRL 5, 6 or 7 that could be matured into deliverable products.		
	Response Category	**Response**
Name	Product name	
Organisation	Supplier Name	
	Supplier commercial contact details	
Maturity	What is the current Technical Readiness Level (see Annex B for required TRL definitions)	
	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?	
Commercial	Are there any commercial or licencing that place restrictions on supply of the product to UK MoD?	
Size		
Data Rates Supported		
Protocols Supported		
Environmental	Low Temperature Operation	
	High Temperature Operation	
	Drop and Topple	
	EMC	
	Shock	
Functions Supported	Multiplexing	
	De-multiplexing	

	Add/Drop Multiplexing	
	Clocking Modes	
	Protocol encapsulation	
	Management and Control	
Availability	MTBF	
Regulatory Compliance	EMC Directive	
	WEEE	
	RoHS	

Supporting or additional information:

Annex B – Technical Readiness Definitions

<table>
<tr><th rowspan="2">TRL</th><th rowspan="2">Definition</th><th colspan="4">SYSTEM</th></tr>
<tr><th colspan="2">Description</th><th colspan="2">Supporting Evidence</th></tr>
<tr><td>9</td><td>Actual technology system qualified through successful mission operations.</td><td colspan="2">Actual application of the technology in its final form and under operational conditions. Technology proven in-service. Successful operational experience.</td><td colspan="2">ISRM reports, User validation. May be linked to FOC.</td></tr>
<tr><td>8</td><td>Actual technology system completed and qualified through test and demonstration.</td><td colspan="2">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.</td><td colspan="2">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.</td></tr>
<tr><td colspan="2" rowspan="2"></td><th colspan="2">HARDWARE</th><th colspan="2">SOFTWARE</th></tr>
<tr><th>Description</th><th>Supporting Evidence</th><th>Description</th><th>Supporting Evidence</th></tr>
<tr><td>7</td><td>Technology prototype demonstration in an operational environment.</td><td>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.</td><td>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)?</td><td>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.</td><td>Critical technological properties are measured against requirements in a simulated operational environment. Full integration.</td></tr>
<tr><td>6</td><td>Technology system / sub-system model or prototype demonstration in a relevant environment.</td><td>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.</td><td>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?</td><td>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.</td><td>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]</td></tr>
<tr><td>5</td><td>Technology component and/or basic technology subsystem validation in relevant environment.</td><td>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.</td><td>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?</td><td>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.</td><td>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.</td></tr>
<tr><td>4</td><td>Technology component and/or basic technology subsystem validation in laboratory environment.</td><td>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.</td><td>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.</td><td>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.</td><td>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.</td></tr>
<tr><td>3</td><td>Analytical and experimental critical function and/or characteristic proof-of-concept.</td><td>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.</td><td>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?</td><td>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.</td><td>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.</td></tr>
<tr><td>2</td><td>Technology concept and/or application formulated.</td><td colspan="2">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.</td><td colspan="2">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.</td></tr>
<tr><td>1</td><td>Basic principles observed and reported.</td><td colspan="2">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.</td><td colspan="2">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</td></tr>
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