Serapis Tasking Form

Tasking Form Part 1: *(to be completed by the Authority's Project Manager)*

To:	Lot 4 QinetiQ Plc	From:	Dstl

Any Task placed as a result of your quotation will be subject to the Terms and Conditions of Framework Agreement Number:

LOT 4 DSTL/AGR/SERAPIS/AII/01

VERSION CONTROL

29/09/22: Part 2 updated in response to DSTL commercial CQs received 29/09/22

REQUIREMENT

Proposal Required by:	April 2022	Task ID Number:	AII117
The Authority Project Manager:	[REDACTED]	The Authority Technical Point of Contact:	[REDACTED]
Task Title:	DCEAT WP4.6 Operational Agility - Generation After Next (GAN) Intelligent Spectrum Sensing and Gaming		
Required Start Date:	April 2022	Required End Date:	March 2025
Requisition No:	RQ0000008251	Budget Range	£300k Year 1 - FY 22-23
			£600k Year 2 - FY 23-24
			£600k Year 3 - FY 24-25

TASK DESCRIPTION AND SPECIFICATION

Serapis Framework Lot	☐ Lot 1: Collect ☐ Lot 2: Space systems ☐ Lot 3: Decide ☒ Lot 4: Assured information infrastructure ☐ Lot 5: Synthetic environment and simulation ☐ Lot 6: Understand

<u>**Abstract**</u>

This research work supports the requirements of the "Deployed Communications Evolving Against the Threat" (DCEAT) programme. This is to be achieved by conducting research at the lower Technology Readiness Levels (TRLs 2-4) to develop
- new capabilities,
- new tools,
- new simulations,
- new prototypes, and
- new experiments

to allow the Generation After Next (GAN) communications systems to stay ahead of the threat and to sustain effective command and control (C2) and communications in a denied, degraded, intermittent and low-bandwidth (DDIL) environment.

This task is focussed on exploring **spectrum, sensing** and **other contextual information** to deliver **operational resilience** by exploiting **radio agility** through the use of **in-bearer gaming techniques**.

This is a CV call to create the Task force that will be help define the research needed. Being a member of the task force does not preclude you from contributing to the research.

DCEAT Programme Background and Drivers

The strategic framework document *Global Britain in a competitive age; The Integrated Review of Security, Defence, Development and Foreign Policy*[1] outlines the following four overarching and mutually supporting objectives:

1. *Sustaining strategic advantage through science and technology.*
2. *Shaping the open international order of the future.*
3. *Strengthening security and defence at home and overseas.*
4. *Building resilience at home and overseas.*

To support this framework The Defence Command Paper, *Defence in a competitive age*[2] highlights that

The electromagnetic environment, of which cyber is a part, is a fundamental aspect of the modern battlespace. Our adversaries are increasingly active across it and rely on it. We must be able to understand, exploit and secure advantage in this environment.[Paragraph 7.14]

The ambitions and challenges expressed in this command paper are also reflected in the Ministry of Defence's (MOD's) *Science and Technology Strategy 2020*[3]. A key challenge expressed in this document is

> ***Multi-domain Command & Control, Communications and Computers (C4)*** - *develop the capability for multi-domain integration and ability to coordinate effects globally enabling us to execute joint operations against adversaries with well-integrated and resilient capabilities.*

The strategy highlights that it is essential that

- *we continue to invest in cross cutting S&T that offers disruptive potential, but where we have not yet identified exploitation routes.*

and that

- *Technologies vital for the generation after next of capabilities are those beginning to emerge now and in the near future. In some areas, particularly digital, they are evolving at a rapid pace. With our ability to understand our future context and therefore back those promising technologies, we will ensure we are ready and prepared to integrate them into our future capabilities.*

C4 "*is a broad, complex and technically challenging area characterised by rapid advances in technologies*"[4]. The C4 environment, however, is the connective tissue that provides the information needed to make decisions and support mobility in a global, and often infrastructure-less, environment. Therefore, fundamental S&T work is required to meet the future challenges of multi-domain C4. The aim of the DCEAT programme, which emerged from the Integrated Review, is to drive the development of resilient deployed communications systems that can stay ahead of the threat, respond rapidly to new threats and exploit new technologies into MOD spiral developments.

The research outcomes from the DCEAT programme will enable MOD to rapidly develop and field technologies that are fit to operate in the contemporary and future battlespace and that will sustain effective C2 in a DDIL environment, from deep ocean to space.

The future challenges in a C4 environment that DCEAT will aim to address include the need for:

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[1]   "Global Britain in a competitive age: The Integrated Review of Security, Defence, Development and Foreign Policy", March 2021, CP 402, ISBN: 978-1-5286-2453-4, available at this link.

[2]   "*Defence in a competitive age*", March 2021, CP 411, ISBN: 978-1-5286-2462-6, available at this link.

[3]   *"Science and Technology Strategy 2020"*, October 2020, V1.2, available at this link.

[4]   "*Defence and Security Industrial Strategy: A strategic approach to the UK's defence and security industrial sectors*", March 2021, CP 401, ISBN 978-1-5286-2496-1, available at this link.

- new techniques and technologies that mitigate against rapidly emerging communications threats,
- radio systems to operate in a DDIL environment due to spectrum congestion and/or interference,
- resilient and robust communications systems (i.e low probabilities of detection, interception and exploitation),
- connectivity to all mobile/static platforms (underwater, land, sea, air and space),
- communications links that can support communications ranges from beyond line of sight (BLoS) to short range,
- communications capacities from low to very high data rate systems,
- global operations, often in an infrastructure-less environment,
- conducting operations that range from disaster relief, peacekeeping and surveillance to military engagement,
- interoperability with national and international partners,
- low signature networking,
- new architectures and protocols,
- systems that are application aware, and
- satisfying convergence of systems and networks.

The research within the DCEAT programme is structured along the following inter-dependent headline work streams:

- Materials S&T
- Advanced waveform development
- Advanced antennas and transceivers
- New and novel bearers
- Operational agility

The aim of the research to be conducted under this statement of requirement (SoR) is to enhance the **operational agility** delivered through GAN communications systems.

Background to Requirement

The current generation of deployed military communications systems have limited resilience in terms of their Awareness, Intelligence, Robustness and Agility (AI&RA), which restricts their ability to cope with the full range of Electronic Warfare (EW) threats. These threats may range from unsophisticated/non-integrated EW threats in subthreshold operations, characterised by a congested and contested Electromagnetic Environment (EME), to highly sophisticated/highly integrated EW threats, including Electronic Surveillance (ES) and Electronic Attack (EA), in above threshold operations, characterised by an EME that is being actively denied and degraded.

A key complicating factor in establishing and maintaining resilient deployed communications is that communications systems must perform within a dynamic military (and often civil) operational environment, which is influenced by military doctrine and strategies, the mission goals and the physical environment (e.g. terrain, land use) and this environment may change during a mission.

To address the resilience needs of GAN deployed military communications capabilities, the key technology-based behaviours and features need to be identified so that the S&T work to be conducted under the DCEAT programme can be shaped. The identified behaviours and features will need to address the AI&RA across the full communications stack to enable performance and resilience trade-offs to be made. A corresponding set of management-control behaviours and features will also need to be developed and ultimately implemented to ensure that operational agility can be achieved.

In order to step ahead and stay ahead of potential threat evolutions, the focus of this work is the incorporation of **in-bearer deception and gaming** into GAN agile and intelligent communications system. This novel research theme will build on Commercial-Off-the-Shelf (COTS) and Military-Off-the-Shelf (MOTS) systems, which generally do not provide built-in deception or gaming behaviours, and explore mechanisms to allow their integration.

In addition to using **information on the EME derived from sensing**, this new approach will incorporate the use of other **operational contextual information** with the goal of establishing and maintaining 'predictable' information services across UK, Allied and Partner Forces. 'Predictable' in this context refers to the minimisation of variations in the Quality of Service (QoS) delivered to the end users, since wide oscillations

in QoS can generate uncertainty. A commander could potentially accept a reduction in the performance of the communications system (e.g. a reduced bandwidth) if this offers a more consistent and predictable QoS, thereby avoiding system instability and undesirable user response behaviours.

Whilst the generic challenge within each operational domain (Land, Maritime and Air) is similar, the detailed challenges and GAN communications solution spaces will have key differences and these need to be considered. However, it is assumed that having more information about an interferer and the operational context will allow more effective and resilient GAN communications response behaviours, regardless of the operational domain.

Requirement

This is a CV call to create the Subject Matter Expert Task force that will be help define the research needed. Being a member of the task force does not preclude you from contributing to the research. The research activities that the task force will be asked to conduct are outlined below and the CV must demonstrate appropriate capabilities and expertise in some or all of the domains outlined

The requirement for this Strategic Review funded DCEAT work is **to create a team to conduct and drive the (low TRL 2-4) research** and develop UK capability through demonstrations, prototyping and simulations, to advance and mature the technologies and techniques needed by GAN radio communications systems to **implement gaming approaches**, based on **spectrum sensing** and **other contextual information**, to achieve **predicable resilient communications systems**.

The following are possible activities that could be undertaken over the coming years to meet this requirement. An emphasis is to be placed on building on previous work, such as academic and commercial cognitive/intelligent radios, the papers generated within the Resilient Deployed Communications (RDC) Work Packages 2 & 5, and the work of the Intelligent Bearers Systems Engineering Team (IBSET- Serapis task AII27):

Year 1 (to end of March 2023)

Establish a core Subject Matter Expert Task Force (SMETF), with a nominated Chair to coordinate and drive its activities, to provide strategic direction, conduct research work and develop and address (either using resources within the task force itself or by drawing on additional expertise outside the task force via SoRs) an action log of activities.

The SMETF should comprise a range of expertise in the application and development of agile radios, coupled with expertise in the use of gaming approaches to increase resilience. It is anticipated that, as the task progresses and develops, the make-up of the SMETF may be modified to meet the emerging research requirements including tying in with DCEAT WP4 activities on Programmable Network Infrastructures.

Within the first 2 months the SMETF should develop an initial action-plan of activities to be conducted. This plan could include aspects such as the:

- implications of the UK's Investigatory Powers Act 2016 (IPA16) (or other in country legislation) for training and operations, and suggest modifications required to support future spectrum sensing requirements,

- exploitability and benefits of different spectrum sensing approaches, the technical viability and the related sensing technologies needed within a communications system (cost, size, etc),

- levels of accuracy/fidelity/timing of data required to feed in-bearer gaming strategies,

- exploitation of data and the artificial intelligence (AI) techniques needed,

- impact and implications of different interferer types (e.g. intentional, accidental, noise, spoofing),

- usage of additional contextual information, including third party supplied and self-collected to enable gaming,

- communications management needed and how it will be realised through a Programmable Network Infrastructure (PNI) as well as the wider exploitation of the in-bearer spectrum sensing information (e.g. to coordinate changes in network routing),

- development of Dynamic Spectrum Exploitation (DSpX) management techniques and how they could be undertaken effectively and efficiently within a PNI,

- demonstration, prototyping and simulation activities that should be undertaken,

- international activities that should be supported (conferences, experiments, meetings), and

- the development of a costed research plan/outline roadmap for Year 2 with the expectation of technology demonstrations in Year 4.

Year 2 (to end of March 2024)

Maintain, review and, if appropriate, modify the technical team composition to provide strategic direction and develop and address the evolving action list and roadmap from Year 1. Year 2 actions could include:

- development via initial experimentation/simulation of key components,
- identifying barriers to developing and exploiting the technologies needed,
- attending exploitation and knowledge gathering events such as conferences and workshops,
- holding a planning meeting to discuss and plan for the coherent demonstration of the research being conducted, and
- developing a costed research plan/outline roadmap for Year 3 with the expectation of technology demonstrations in Year 4.

Year 3 (to end of March 2025)

Maintain, review and, if appropriate, modify the technical team composition to provide strategic direction and develop and address the evolving action list and roadmap from Year 2. Year 3 actions could include:

- demonstrate the TRL 4 technologies that have been developed,
- highlight the benefits and threats of the technologies to platform development,
- develop an integration/exploitation roadmap,
- input work into international standards or guidance notes, and
- develop a costed research plan/outline roadmap for potential Year 4 activities.

Innovation Benefits and Exploitation Plan (IBEP)

By conducting the work outlined in this SoR, the following are anticipated.

1. Innovation – (i.e. what are we building on?)
   a. academic and other lower TRL research
   b. applications know-how in a military/civil domain
   c. previous academic collaborations

2. Benefits (i.e. what will the contracted stakeholders get from this?)
   a. increased defence know-how
   b. access to industrial defence sector expertise
   c. new cross-domain collaborations
   d. development of new capabilities
   e. closer defence-sector / academic collaboration

3. Exploitation (what are the artefacts that Dstl will get that can be more widely exploited)
   a. know-how in the defence industrial base (conference, papers, reports, presentations)
   b. know-how in the academic supply base

        c.   potential new physical facilities to be used for experimentation for defence research
        d.   potential simulation capabilities that could be re-used for defence
        e.   new data and simulation results

4. Plan (what's the plan for exploitation)
    a. evidence to shape UK MOD requirements and investment
    b. know-how into the industrial base
    c. enhanced UK reputation in defence S&T
    d. exploitation internationally e.g. USA DoD research themes
    e. international influence through ideas and generation of best practice/standards

Wider economic and societal benefits of the work

The wider societal benefits of the work include:
- advancing discovery and know-how in the field of resilient communications
- maintaining and developing UK expertise.
- increasing technology in the defence and security sector
- creation of new networks
- enhanced international profile
- engagement in communications standards forums (e.g. 6G, ETSI, ITU, 3GPP)

Outputs.

Outputs (or artefacts) of the project activities that may be exploited more widely include:
- demonstrations / prototypes of hardware based technologies
- demonstrations / prototypes of software or algorithms
- demonstrations of results
- conference papers/presentations
- interface description documents
- experimentation plans
- system design architectural plans

Deliverables.

The formal deliverables (progress reports and presentations) of the project are highlighted in the Deliverables section, which may be enhanced during the proposal stage.

An end of FY 23 consolidated report will be required in February/March 2023 highlighting:
- Aims
- Technical Progress
- Achievements
- Exploitable outputs
- Recommendations

Procurement Strategy

☒ Lot Lead to recommend   ☐ Single Source / Direct Award

Pricing:

☐ Firm Pricing   ☐ Ascertained Costs*   ☐ Other*

Firm Pricing shall be in accordance with DEFCON 127 and DEFCON 643

Ascertained Costs shall be in accordance with DEFCON 653 or DEFCON 802.

*only at Authority's discretion

Task IP Conditions

Task IP Conditions (Follow the NIPPY guide to identify your information and IP requirements for each deliverable)	Summary of the Authority's rights in foreground IP (IP generated by the supplier in performance of the contract)
DEFCON 703 ☐	Vests ownership with the Authority
DEFCON 705 Full Rights ☒	Enables MOD to share in confidence as GFI or IRC under certain types of agreements. Can be shared in confidence within UK Government.
OTHER IP DEFCONS: 14* ☐, 15* ☐, 16* ☐, 90* ☐, 91* ☐, 126* ☐	Generally only suitable for deliverables at TRL 6 and above.
BESPOKE IP Clause ☐ *	Details to be added and agreed by IP Group

* Do not use without IPG advice and approval

Please state in this text box if MOD or the customer has a requirement a) that one or more Other Government Departments is able to share confidentially with their own suppliers, b) to publish but you do not think there is a requirement to own or control the deliverable, or c) to share under a procurement* Memorandum of Understanding (MOU).

If any of these three issues applies, please contact IPG for advice before completing this form.
*Listing research MOUs is not required, but can be a helpful courtesy to the supplier.

DELIVERABLES

Ref	Title	Due by	Format	TRL	Expected classification (subject to change)	Information required in deliverable	IPR DEFCON
D-1	*Quarterly Progress reports (QPTR)*	*T0+3 Months*	*Report and Presentation (.pptx)*		[REDACTED]	Report and Presentation pack to include but not limited to: • Update on technical progress • Progress report against project schedule. • Review of risk management plan. • Commercial aspects. • Review of deliverables. • Risks/issues. • GFA and supplier performance	*705*
D-2	Annual progress report (APR)	T0-12	Report		[REDACTED]	Report to include: • Aims • Technical Progress • Achievements • Exploitable outputs	

						• Recommendations	
D3							
D4							

DELIVERABLE: ACCEPTANCE / REJECTION CRITERIA

Unless otherwise stated below, Standard Deliverable Acceptance / Rejection applies. This is 30 business days, in accordance with DEFCON 524 Rejection, and DEFCON 525 Acceptance.

Standard Deliverable Acceptance / Rejection:-

Yes ☒ (DEFCON 524 Rejection, and DEFCON 525 Acceptance)

No ☐ (if no, please state details of applicable criteria below)

Deliverable Acceptance / Rejection Criteria:-

If there are any other specific acceptance/rejection criteria you would like to apply to any of the deliverables, please state them here.

Government Furnished Assets (GFA)

ISSUE OF EQUIPMENT/RESOURCES/INFORMATION/FACILITIES (*if not applicable, delete table and insert "None" in this text box*)

Unique Identifier/ Serial No	Description	Classification	Type	Available Date	Issued by	Return or Disposal Date	Any restrictions?
Serial no	*Description*	*Official-Sensitive*	*Equipment*	*00/00/0000*	*Issuer*	*00/00/0000*	*Include details here*
N/A	N/A						

QUALITY STANDARDS

☐ **ISO9001**   (Quality Management Systems)

☐ **ISO14001**   (Environment Management Systems)

☐ **ISO12207**   (Systems and software engineering — software life cycle)

☐ **TickITPlus**   (Integrated approach to software and IT development)

☐ **Other:**   (Please specify in free text below)

SECURITY CLASSIFICATION OF THE WORK

The highest classification of this SOR

OFFICIAL ☐   OFFICIAL-SENSITIVE ☐   SECRET ☐   TOP SECRET ☐   STRAP ☐   SAP ☐

The highest expected classification of the work carried out by the contractor

OFFICIAL ☐   OFFICIAL-SENSITIVE ☐   SECRET ☐   TOP SECRET ☐   STRAP ☐   SAP ☐

The highest expected classification of Deliverables/Output

OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

Is a Security Aspects Letter (SAL) required? *(A Security Aspects Letter (SAL) will be required for each Task above Official-Sensitive and above)*

Yes ☐   No ☐

TASK CYBER RISK ASSESSMENT. *(In accordance with DEF STAN 05-138 and the* Risk Assessment Workflow)

Cyber Risk Level	[REDACTED]
Risk Assessment Reference	[REDACTED]

ADDITIONAL TERMS AND CONDITIONS APPLICABLE TO THIS CONTRACT

Please ensure all completed forms are copied to DSTLSERAPIS@dstl.gov.uk when sending to the Lot Lead.

Tasking Form Part 2: *(To be completed by the Lot Lead)*

To:	The Authority		From:	The Lot Lead	
Proposal Reference	SERAPIS Task AII117: DCEAT WP4.6 Operational Agility - Generation After Next (GAN) Intelligent Spectrum Sensing and Gaming, QINETIQ/EMEA/CIT/PRO2201613, V1.0				**(attached)**

Delivery of the requirement:

The proposal shall include, but not be limited to:

- A full technical proposal that meets the individual activities that are detailed in Statement of Requirements (Part 1 to Tasking Form).
- Breakdown of individual Deliverables, with corresponding Intellectual Property rights applied.
- Breakdown of Interim Milestone Payments, with corresponding due dates.
- A work breakdown structure/project plan with key dates and deliverables identified.
- A list of required Government Furnished Assets from the Authority, including required delivery dates.
- A clear identification of Dependencies, Assumptions, Risks and Exclusions which underpin your Technical Proposal.
- Sub-Contractors Personnel Particulars Research Worker Form and security clearances (if applicable)

COMMERCIAL

[REDACTED]

The Ascertained Cost provision / Limit of Liability for WP2/3 is the remaining balance of the Authority's budget; the scope of work and deliverables will need to be mutually agreed before QinetiQ can provide the customer with a firm price proposal.

PRICE BREAKDOWN

You are to use the costs detailed in Item 2 Table I in the Schedule of Requirement and at Annex E Table 2 of the Serapis Framework Agreement. Please also provide a price breakdown which should include, but is not limited to: Lot Lead Rates, Sub-contractors costs and rates, travel and subsistence. In support of your Proposal you are requested to provide clear details of all Dependencies, Assumptions, Risks and Exclusions that underpin your price.

Offer of Contract: *(to be completed and signed by the Contractor's Commercial or Contract Manager)*

Total Proposal Price in £	£229,957.25 Firm Price for WP1 only	
	£70,042.75 Ascertained Costs WP2/3	(ex VAT)

Start Date:		13/10/22	**End Date:**	31/03/23
Lot Leads Representative	Name	[REDACTED]		
	Tel	[REDACTED]		
	Email	[REDACTED]		
	Date	29th September 2022		
Position in Company	Commercial Manager			
Signature	[REDACTED]			

Core Work – Breakdown

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Core Work – Milestone breakdown costs

Proposed Milestones Payments

Your TMS bid costs shall be included in milestone 1.

The final Milestone must reflect the actual cost of the deliverable, and be greater than 20% of the Task value, unless otherwise agreed with your Commercial POC

Please duplicate the template per milestone table format below as necessary, and rename milestone number accordingly.

[REDACTED]
[REDACTED]

Options – Summary
[REDACTED]

Tasking Form Part 3:

To be completed by the Authority's Commercial Officer and copied to the Authority's Project Manager.

1. Acceptance of Contract:		
Authority's Commercial Officer	Name	[REDACTED]
	Tel	[REDACTED]
	Email	[REDACTED]
	Date	11/10/2022
Requisition Number		RQ0000008952
Contractor's Proposal Number		QINETIQ/EMEA/CIT/PRO2201613
Purchase Order Number		DSTL0000008658
Signature		[REDACTED]
Please Note: Task authorisation to be issued by the Authority's Commercial Officer or Contract Manager. Any work carried out prior to authorisation is at the Contractor's own risk.		