

Statement of Requirement (SoR)

Reference Number	1000161611
Version Number	1.0 DSTL/DOC129755
Date	11/02/2021

1.	Requirement
1.1	Title
	Microelectronics [REDACTED – DEFENCE]
1.2	Summary
	<p>Dstl has a requirement to develop novel [REDACTED – DEFENCE] techniques for electronic systems using [REDACTED – DEFENCE]. Previous work has identified a number of potential [REDACTED – DEFENCE] that are applicable to certain microelectronic devices. Research has also been undertaken to understand the underlying physical mechanisms in each case, with a view to defining a preliminary specification for a [REDACTED – DEFENCE] capable of delivering them.</p> <p>This requirement aims to continue this work using a framework of defined research objects that reflect progress and insights made previously. Specialist knowledge of semiconductor design and fabrication techniques, coupled with a detailed understanding of the underlying physical processes applicable in each case, are considered key to successfully achieving these research objectives, and hence to delivering the [REDACTED – DEFENCE].</p>
1.3	Background

	<p>[1]. TTP plc. <i>EW&C CEME Task C3</i>. [REDACTED – DEFENCE]– <i>Final Report</i>. (F45307-002). April 2019. [REDACTED – Defence].</p> <p>[2]. TTP plc. <i>EW&C CEME-C3</i> [REDACTED – DEFENCE]. F45335-05_Rev1.1. July 2020. [REDACTED – Defence].</p> <p>[3]. [REDACTED – DEFENCE]</p> <p><u>Background</u></p> <p>Dstl has a requirement to develop novel [REDACTED – DEFENCE] techniques using [REDACTED – DEFENCE]. Known generally as '[REDACTED – DEFENCE]' these techniques will be intentionally designed to [REDACTED – DEFENCE].</p> <p>Previous work [1] looked at identifying [REDACTED – DEFENCE]. A total of five mechanisms were selected for further development. These were:</p> <p>[REDACTED – DEFENCE]</p> <p>A follow-on task was undertaken [2] to build on this work with a view to developing [REDACTED – DEFENCE], based on a full understanding of the underlying physical processes involved. In the longer term (and subject to contract), these deliberately designed [REDACTED – DEFENCE] will be used to inform the specification of novel [REDACTED – DEFENCE] capable of delivering them.</p> <p>[REDACTED – DEFENCE] If further exploitable failure mechanisms can be identified in line with the 'theory first' approach advocated by this project however, then Dstl would be very happy to hear of them also.</p>
1.4	Requirement

Task summary

Aim

The aim of this task is to specify a preliminary [REDACTED – DEFENCE] capable of delivering [REDACTED – DEFENCE]

Scope

[REDACTED – DEFENCE] relevant to this task have been shortlisted from those previously investigated at [2]. These are listed below together with a short description of the key Research Objectives (RO) that are expected to be achieved in each case. In cases where options apply, these should be viewed as lower priority 'secondary' objectives, and only attempted if this does not compromise research regarding the main, non-optional, mechanisms.

All [REDACTED – DEFENCE] shall be proven experimentally using the [REDACTED – DEFENCE] [1], [2]. Subject to availability, [REDACTED – DEFENCE] shall also be demonstrated against a broader target set supplied by Dstl. In all circumstances, minimum performance requirements will be against the two [REDACTED – DEFENCE] defined previously.

Whilst there is no restriction on the total number of [REDACTED – DEFENCE] required it is desirable for these to be minimised where, ideally, a single [REDACTED – DEFENCE] would be capable of delivering all [REDACTED – DEFENCE] techniques respectively.

Initial development can be by [REDACTED – DEFENCE] techniques. If the former case is adopted (to minimise uncontrolled variables for example), a clear view to [REDACTED – DEFENCE] techniques must be maintained from the outset; both from a radio frequency physics perspective and also in regards to eventual operational deployment.

Candidate [REDACTED – DEFENCE]

A list of candidate [REDACTED – DEFENCE] and their applicable key research objectives (RO) are provided below. Specialist knowledge of semiconductor design and fabrication techniques coupled with a detailed understanding of the underlying physical processes associated with each mechanism are considered key to successfully achieving these research objectives.

An evidence based approach is therefore advocated, with full use of the available literature made where applicable. Experimental testing shall demonstrate that performance is as expected. The use of 'functional testing' methods to produce effects without reference to an underlying process or mechanism are discouraged and should be avoided.

[REDACTED – DEFENCE]

Confidence¹

As in the case of previous work [2], confidence shall be considered in terms of the specific [REDACTED – DEFENCE] and techniques defined here. A view to the longer term should be maintained however, where subject to contract; provision of confidence with a view to quantifying performance at a system level for example, will be addressed by future research phases.

Assumptions and Limitations

¹ For the purposes of this task, confidence is defined as [REDACTED – DEFENCE]containing uncontrolled variables; typically by use of statistical techniques.

[REDACTED – DEFENCE]Any computational models developed as a result of this study shall be compatible with Dstl's pulsed RF Statistical Performance Model (SPM). This is in the process of being upgraded and is not currently available for release. To ensure compatibility, it is therefore requested that any proposed modelling activity is notified to Dstl at the earliest opportunity.

Government Furnished Information (GFI)

Reports detailing previous work will be made available at contract award, as will details of the [REDACTED – DEFENCE]used previously [1], [2].

Further to these [REDACTED – DEFENCE] may also be supplied by Dstl. Depending on their availability, use of these [REDACTED – DEFENCE] will be agreed with all stakeholders at the appropriate time. In all circumstances, minimum performance requirements will be against the two reference targets defined previously.

Dstl may be able to provide visual verification of selected [REDACTED – DEFENCE].

Government Furnished Equipment (GFE)

To aid with the development of waveforms, Dstl may be in a position to lend items of test equipment such as arbitrary waveform generators, high voltage pulsers, and RF amplifiers for example, should these be required/desired. The need for such equipment shall be agreed initially at contract placement and remain open to review for the task duration.

Definitions

A series of guideline definitions have been produced to help bound the project and remain open to change/modification subject to agreement of all relevant stakeholders. These are provided at Appendix A below.

Appendix A – Definitions

[REDACTED – DEFENCE]

Radio Frequency

For the purposes of this study the term Radio Frequency (RF) shall include the electromagnetic spectrum from 20 kHz to 300 GHz. Note that there is no consistent definition for the term radio frequency. This range approximately corresponds to the upper limit of audio frequencies to the lower limit of infrared.

Pulsed RF

For the purposes of this study the term pulsed RF shall be defined as any radio frequency signal gated in respect to time. Pulses may include modulation for example, and may be generated individually (i.e. single shot) or repeatedly at a defined Pulse Repetition Frequency (PRF).

[REDACTED – DEFENCE]

Waveform

For the purposes of this study the term waveform [REDACTED – DEFENCE]

[REDACTED – DEFENCE]

Confidence

[REDACTED – DEFENCE].

1.5 Options or follow on work

	Development of technique up to TRL 4
--	--------------------------------------

1.6	Deliverables & Intellectual Property Rights (IPR)						
Ref.	Title	Due by	Format	TRL*	Expected classification (subject to change)	What information is required in the deliverable	IPR DEFCON/ Condition
D1	Kick-off Meeting	T0	Teleconference with supporting slide pack	n/a	[REDACTED – Defence]	Introduction and discussion of proposed approach with any initial issues or questions raised.	705 Full rights
D2	Informal Progress Meetings (Min. 2 off)	Minimum 2 off; 1 either side of D3. Otherwise as required.	Teleconference with supporting slide packs as required	n/a	[REDACTED – Defence]	Flexible format to discuss progress and matters arising.	705 Full rights
D3	Interim Report	Halfway point or thereafter	Softcopy. Adobe PDF.	2	[REDACTED – Defence]	Draft technical report describing progress to date. To be delivered a minimum of 5 working days before interim progress review at D4 to enable sufficient time for Dstl review.	705 Full rights
D4	Interim Progress Review	D3 + 5 days	Teleconference with supporting slide pack	n/a	[REDACTED – Defence]	Meeting to discuss interim report feedback and agree an appropriate way forward.	705 Full rights
D5	Draft Final Report	D7 – 5 days	Softcopy. Adobe PDF.	2	[REDACTED – Defence]	Draft technical report fully describing all work undertaken, including a full list of references. To include a preliminary waveform specification as per SoR. To include model user guide if applicable.	705 Full rights

						To be delivered a minimum of 5 working days before final presentation meeting at D7 to enable sufficient time for Dstl review.	
D6	Associated Models	D5	Model source code	n/a	[REDACTED – Defence]	All models to be delivered together with draft final report and must be compatible with Dstl's existing statistical performance model.	705 Full rights
D7	Final Presentation	TBA	Teleconference or face to face meeting with supporting slide pack.	2	[REDACTED – Defence]	Meeting to discuss conclusions and recommendations reported at D5, plus any additional Dstl feedback.	705 Full rights
D8	Practical Demonstration	TBA	Face to face meeting at contractors premises	2	[REDACTED – Defence]	[REDACTED – DEFENCE]	705 Full rights
D9	Final Report	D7 + 10 days	Softcopy. Adobe PDF.	2	[REDACTED – Defence]	Up-issued final report incorporating any changes notified at the final presentation meeting D7.	705 Full rights

***Technology Readiness Level required**

Notes- IPR should be inserted / checked by commercial staff before sharing with the supplier(s) to ensure accuracy.

1.7	Standard Deliverable Acceptance Criteria
1.8	Specific Deliverable Acceptance Criteria
	n/a

2.	Quality Control and Assurance
2.1	Quality Control and Quality Assurance processes and standards that must be met by the contractor
	<input type="checkbox"/> ISO9001 (Quality Management Systems) <input type="checkbox"/> ISO14001 (Environment Management Systems) <input type="checkbox"/> ISO12207 (Systems and software engineering — software life cycle) <input type="checkbox"/> TickITPlus (Integrated approach to software and IT development) <input checked="" type="checkbox"/> Other: (Please specify below) Proposal should include how quality will be assured
2.2	Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement
	No significant aspects

3.	Security	
3.1	Highest security classification	
	Of the work	[REDACTED – DEFENCE]
	Of the Deliverables/ Output	[REDACTED – DEFENCE]
3.2	Security Aspects Letter (SAL)	
	<p>Choose an item.</p> <p>If yes, please see SAL reference- 1000161611</p>	
3.3	Cyber Risk Level	
	Low	
3.4	Cyber Risk Assessment (RA) Reference	
	<p>[REDACTED – Defence]</p> <p>If stated, this must be completed by the contractor before a contract can be awarded. In accordance with the Supplier Cyber Protection Risk Assessment (RA) Workflow please complete the Cyber Risk Assessment available at https://suppliercyberprotection.service.xgov.uk/</p>	

4.	Government Furnished Assets (GFA)				
<p>GFA to be Issued - Choose an item.</p> <p><i>If 'yes' – add details below. If 'supplier to specify' or 'no,' delete all cells below.</i></p>					
GFA No.	Unique Identifier/ Serial No	Description: <i>Classification, type of GFA (GFE for equipment for example), previous MOD Contracts and link to deliverables</i>	Available Date	Issued by	Return Date or Disposal Date (T0+) <i>Please specify which</i>

GFA-1	F45307-002	TTP plc. <i>EW&C CEME Task C3</i> . [REDACTED – DEFENCE]– <i>Final Report</i> . (F45307-002). March 2019. [REDACTED – Defence].	Project start	Dstl	Dispose end of contract
GFA-2	F45335-05	TTP plc. <i>EW&C CEME-C3</i> [REDACTED – DEFENCE]. F45335-05_Rev1.1. July 2020. [REDACTED – Defence]	Project start	Dstl	Dispose end of contract

5. Proposal Evaluation criteria	
5.1	Technical Evaluation Criteria
	<p>The best technical proposal which is affordable and can be delivered within the timings noted in the SoR will be selected:</p> <ul style="list-style-type: none"> • 50% Understanding of the requirement and technical plan to deliver • 30% Experience in <ul style="list-style-type: none"> • [REDACTED – DEFENCE]. • Specialist knowledge of semiconductor design and fabrication techniques (may be sub-contracted if required). • Modelling complex electronic systems. • Relevant experimentation (with access to facilities). • Pulsed RF systems. • 20% Delivery and project management plan
5.2	Commercial Evaluation Criteria
	<ul style="list-style-type: none"> • No limiting IP issues • Total cost below £150k • Complies with EW&C T&Cs

