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| Item Description | Work Package for Optoelectronic Module Model Development, Testing and Documentation |
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### Scope of Work

#### 1. Technical Specifications:

D-FCR of LRDE has taken up various new development activities in Optoelectronics domain with respect to various Radar applications. Mainly, three activities related to the development of various photonic modules and towards benchmarking are included in the proposed scope of the work package, namely activities related to simulation and modeling, software and firmware development and testing. These include testing at module and sub-module level and the integration to various radar systems.

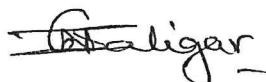
#### 2. Module Model Development, Testing and Documentation

Once the demonstration of Photonic Radar is completed, lot of activities have to be carried towards the benchmarking of this radar with conventional radar system. In addition, the subsystems can be re-explored to make use of the full potential of Photonics technologies. Moreover, the division has also taken up various new development activities in photonics domain with respect to various radar applications

The photonic module testing of will be done along with unit testing, integration testing, as per validation requirements, along with generation of required test reports.

The overall estimated time for testing and documentation is around 18 Months from PO. The complete development cycle may consume efforts of maximum of 144 man months in integration, porting and testing along with documentation.

| Sl. No.  | Description of Requirements   | Effort Estimation in Man-Months |
|----------|---|---------------------------------|
| <b>1</b> | <b>Simulation and Modeling</b>  |                                 |
| 1.1      | Simulation and Modeling of various photonic modules which involves: <ul style="list-style-type: none"> <li>i. Modeling of sub-modules in respective simulation environments</li> <li>ii. Testing of the simulation models to various test conditions</li> <li>iii. Subsystem level modeling</li> <li>iv. Optimization of modules, if necessary</li> <li>v. Testing of sub modules in subsystem level models</li> <li>vi. Optimization in sub system level, if necessary</li> <li>vii. Generation of all test reports</li> </ul> | 36 Man-Months                   |
| <b>2</b> | <b>Software development for Test vector generation and testing</b>  |                                 |
| 2.1      | Software testing of subsystem which involves <ul style="list-style-type: none"> <li>i. Test vector generation</li> </ul>  |                                 |



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|       | ii. Integration testing with photonic module and generation of test reports<br>iii. Generation of software documents as per DSSD guidelines   | 36 Man-Months  |
| 3     | <b>Test jig Firmware development and testing</b>  |                |
| 3.1   | Firmware development of test jigs required for testing of Photonic submodules, which involves<br>I. Identification of firmware modules<br>II. Development of firmware code as per guidelines and standards<br>III. Firmware module testing<br>IV. Firmware Integration and testing<br>V. Generation of firmware test reports as per DSSD guidelines | 36 man-months  |
| 4     | <b>Integration and Testing, Generation of reports and documentation</b>   |                |
| 4.1   | <b>Software modules for test jigs</b>   |                |
| 4.1.1 | Integration and testing of all software CSCIs, which involves<br>a) Software/Hardware Test Report in the integrated mode  | 18 Man-months  |
| 4.2   | <b>Firmware Modules for test jigs</b>   |                |
| 4.2.1 | Integration and testing of all Firmware modules, which involves<br>a) Firmware ware/Hardware Test Report in the integrated mode   | 18 Man-months  |
| 4.2.2 | Firmware documentation during integration and testing as per LRDE F/W Development standard using standard tools.  |                |
|       | Total Man-Months  | 144 Man-Months |

### 3. Other conditions

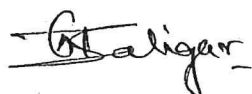
1. Vendor should submit compliance matrix for all the above specifications in the quotation.
2. The activities needs to be completed in a time bound manner and the progress of the same will be monitored by the LRDE periodically.
3. Vendor Selection Criteria and Responsibilities :
  - a. Vendor should have prior experience (more than 5 years) in real time systems or software development using C/C++, RTL level development in VHDL. Domain knowledge of radar system, documentation V&V, modeling and simulation experience, linux, MATLAB, and Firmware development (Xilinx /Altera platforms)



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Open GL /Open CV, experience pertaining to Radar systems & similar projects as per standards.

- b. The firm should have experience in radar signal and data processor system application development (both software and firmware). The firm should have Experience in DO 178B/DO 254 processes and technical software documentation proof of supply order to be submitted.
4. The activities needs to be completed in a time bound manner and the progress of the same will be monitored by the LRDE periodically
5. Warranty: Warranty applicable is 04 months effective from the date of receipt, inspection, and acceptance at LRDE. Warranty on software and firmware development include:
  - a. Software/firmware Bug fixing, found during integration, testing or evaluation.
  - b. Onsite service when required.
  - c. Updating software documents as and when there is bug fixing carried out in software.
6. Acceptance Criteria: Delivered reports and Analysis details will be reviewed by Project Team or a committee approved by Division. The vendor is required to close the review points, if any before the final acceptance by LRDE.
7. Payment Terms:
  - a. 30% of the payment shall be released after delivering each of the items listed as sl. no. 1, (Milestone1) and sl. no. 2 (Milestone 2))as per list of deliverables (LoD) and against satisfactory acceptance by the user
  - b. Balance payment shall be released after delivering the item sl. no. 3 as per list of deliverables (LoD) and against satisfactory acceptance by the user.
8. The development work should be carried out by the firm in LRDE and the firm shall work during normal working hours and working days.
9. The firm is required to sign Non-Disclosure Agreement (NDA) with LRDE.
10. The rights of Intellectual Property (IPR), developed under the work package, shall be the property of LRDE.
11. Delivery Schedule: The firm has to develop and deliver the complete scope of work within eighteen months from the date of placement of Supply Order. This time period includes the inspection and acceptance by LRDE.




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### Special Terms and Conditions

#### Vendor Selection Criteria and Responsibilities

The firm has to prove the technical capability if required by the Technical Evaluation Committee at the time of TCEC. TCEC decision will be final and binding.

  
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**4. List of Deliverables and Milestone based Delivery Schedule :**

| SI No | Timeline (months)  | Output (Deliverables)   | Qty  | Milestone   | Payment Terms  |
|-------|--|---|--|-------------|--|
| 1     | T0+6<br>(including inspection and acceptance time of 10 days)  | Requirement Specification, Test plan and Architectural design documents for various optoelectronic modules as specified by D-FCR,LRDE | 1 CD (soft copy) consists of listed deliverables | Milestone 1 | 30% of total payment (inclusive of applicable Taxes) |
| 2     | T0+12<br>(including inspection and acceptance time of 10 days) | Detailed Design Documents and Unit Test Plan for various optoelectronic modules as specified by D-FCR,LRDE                            | 1 CD (soft copy) consists of listed deliverables | Milestone 2 | 30% of total payment (inclusive of applicable Taxes) |
| 3     | T0+18<br>(including inspection and acceptance time of 10 days) | Software and Firmware Unit and Integration Test Reports , Acceptance Test Reports, Complete Source code, models and Documents         | 1 CD (soft copy) listed deliverables             | Milestone 3 | 40% of total payment (inclusive of applicable Taxes) |

  
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