STATEMENT OF WORK
DISTRIBUTED EWM&S

SCOPE

The Code 5770 of the Tactical Electronic Warfare Division (TEWD) is seeking contractor assistance in a variety of disciplines related to Electronic Warfare (EW) and computer modeling and simulation (M&S) applications. Code 5770 areas of interest include systems engineering, combat systems analysis, EW tactics development and computer simulation and modeling.

The contractor shall provide research and development, EW analysis, systems engineering services and computer programming services in support of two basic task areas:

- Task I - Distributed Simulation Technologies
- Task II - Systems Engineering and Modeling and Simulation

Distributed simulation - networking multiple, separate simulation components together - has become a key technology in maximizing the advantages of computer simulations, making possible the interface and interaction of a wide range of simulation components. Standardized protocols, such as Distributed Interactive Simulation (DIS), and technical advances, such as High Level Architecture (HLA), Run-Time Infrastructure (RTI) are the keys to the application of distributed simulations. Contractor support sought in this statement of work will concentrate on theoretical research, system research and development (R&D), modeling and simulation, and test and evaluation (T&E) relating to the interactions of various US Navy (USN) platforms, weapons, sensors, and electronic warfare systems. Additionally, environmental effects including atmospheric conditions and sea and land clutter, on radar and communications signals will be studied. The selected contractor shall also develop and support HLA, DIS technologies in support of USN combat system analysis through the federation of multiple complex and high fidelity models, simulators, and tactical hardware and software. This work will include the development of computer source code and complex algorithms which shall remain the property of the Government. The unique nature of this research requires access to NRL hardware and classified computing resources and databases dictating that a major portion of the labor tasks be performed on-site at the Naval Research Laboratory (NRL). The Contractor shall be required to support unclassified and classified tasks up to and including Top Secret. The Contractor shall provide, on a level-of-effort basis, the man-hours of analysis, R&D, scientific, technical, engineering, and software development support stated in the personnel qualification.

1.0 TASK DESCRIPTIONS

1.1 TASK 1 – DISTRIBUTED SIMULATION TECHNOLOGIES

The Contractor shall support the goal of federated computer EW simulation objectives through the development of methods for synchronization and coordination of initializing federated simulations across both a local area network (LAN) and a wide area network (WAN). The Contractor shall monitor the interaction of federated programs to ensure the coordinated functionality and quality of computer simulations and shall develop automated systematic methods and mechanisms for start and initialization of computer simulations for performing batch processes of distributed EW simulations across a WAN in order to run multiple iterations of scenarios. Using a rigorous systems engineering approach, the Contractor shall support the development of efforts to formulate a comprehensive means to facilitate federation setup and initialization and thereby reduce the amount of time required to perform individual scenarios. Further, the Contractor shall support research into the handling and compartmentalizing of secure or proprietary data for
a multi-level security infrastructure to allow for greater interoperability. The Contractor shall conduct
research in interoperability improvements such as automated distributed simulation coordination and
synchronization across multiple sites to increase the number of simulation runs in a given period, thereby
increasing productivity.

Technical Requirements

The Contractor shall;

1. Develop HLA requirements and standards for the Run-Time Infrastructure for running
   scenarios interactively across a WAN.
2. Establish documentation requirements and ensure documentation adheres to the
   requirements.
3. Execute simulations.
4. Analyze HLA simulation inputs and outputs to determine the pertinence and validity of
data such as RADAR, atmospheric measurements, missile fly-out data, EW measures and
countermeasures.
5. Perform corrective action or coordinate corrective action among other
   federation participants as required. Simulation outputs will include missile, radar,
atmospheric, EW and communications data.
6. Analyze simulations of NRL electronic warfare models to determine if the EW tactic
   injected into the simulation performed as expected and recommend corrections as
   necessary.
8. Draft HLA simulation requirements and provide data for testing.
9. Develop a plan to log on, access, and run classified software from a remote site on a
   classified network.
10. Establish Methodologies for consistent and repeatable random number generation across
    multiple simulations on a distributed network to support statistical analyses.
11. Research the handling and compartmentalization of secure data using the HLA Run-Time
    Infrastructure (RTI).
12. Provide prototype software tools as needed.
13. Define the basis for the exchange of data and events between simulations using HLA/RTI
    while maintaining simulation interoperability and portability across computing platforms,
    operating systems and communications systems.

The following is a breakdown of the labor categories and estimated labor hours that will be necessary to
complete Task I broken down by contract years:

<table>
<thead>
<tr>
<th>TASK I</th>
<th>ESTIMATED LABOR HOURS</th>
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<tbody>
<tr>
<td>Labor Category</td>
<td>Year 1 (base)</td>
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<tr>
<td>Sr. Engineer/Analyst</td>
<td>1550</td>
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<tr>
<td>Sr. Systems Engineer</td>
<td>1020</td>
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</tbody>
</table>
1.2 TASK II – SYSTEMS ENGINEERING AND MODELING AND SIMULATION

The Contractor shall develop high fidelity HLA simulations that accurately represent the performance of EW systems in a complex electromagnetic environment in tandem with Government employees. Data on these topics may be classified at the SCI level requiring contractor personnel to possess SCI access. All SCI work will be performed at the Naval Research Laboratory and not the contractor’s facilities. The simulations will be implemented using advanced object oriented programming techniques and capable of interoperable operation using distributed processing capabilities on state-of-the-art computer hardware. The simulations will interface with key intelligence databases that support EW parameters used in the dynamic environments. The Contractor shall support verification and validation efforts for the simulations.

Technical Requirements

The Contractor shall;

1. Develop interface enhancements for EW simulations.
2. Develop graphical user interfaces and cross-platform software for SIMDIS and Builder, interface and test all new software.
3. Build models that adhere to current development architecture that represent US and foreign platforms, weapons, electronic warfare systems, and sensors.
4. Draft verification, validation and accreditation plans of hardware and EW models and simulations to ensure they are credible and accurate.
5. Develop HLA simulation interface software.
6. Design and program computer software and scripts to make systems more efficient.
7. Analyze programs and scripts to sort, analyze, parse, and report data.
8. Trouble shoot and developing HLA simulation software.
9. Develop HLA RTI testing software.

The following is a breakdown of the labor categories and estimated labor hours that will be necessary to complete Task II broken down by contract years:

<table>
<thead>
<tr>
<th>Labor Category</th>
<th>Year 1 (base)</th>
<th>Year 2 (option 1)</th>
<th>Year 3 (option 2)</th>
<th>Year 4 (Option 3)</th>
<th>Year 5 (Option 5)</th>
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<tr>
<td>Sr. Engineer/Analyst</td>
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