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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Operational Test and Evaluation, Defense **Date:** February 2020

<b>Appropriation/Budget Activity</b> 0460: <i>Operational Test and Evaluation, Defense / BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605814OTE / <i>Operational Test Activities and Analyses</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	66.447	226.984	65.237	39.136	-	39.136	43.526	31.742	33.493	34.800	Continuing	Continuing
000920: <i>OTA&amp;A</i>	66.447	226.984	65.237	39.136	-	39.136	43.526	31.742	33.493	34.800	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Operational Test Activities and Analyses (OTA&A) programs are continuing efforts that provide management and oversight of test and evaluation functions and expertise to the Department of Defense (DoD). The OTA&A programs consist of three activities: Joint Test and Evaluation (JT&E); Threat Systems (TS); and Center for Countermeasures (CCM).

Joint Test and Evaluation projects are test and evaluation activities conducted in a joint military environment that develop process improvements. These multi-Service projects, chartered by the Office of the Secretary of Defense and coordinated with the Joint Staff, appropriate combatant commanders, and the Services, provide non-materiel solutions that improve: joint interoperability of Service systems, technical and operational concepts, joint operational issues, development and validation of joint test methodologies, and test data for validating models, simulations, and test beds. New projects are also encouraged to align their efforts to supporting the 2018 National Defense Strategy. The JT&E projects address relevant joint war fighting issues in a joint test and evaluation environment by developing and providing new tactics, techniques, and procedures to improve joint capabilities and methodologies.

Threat Systems, based on a memorandum of agreement between the Director, Operational Test and Evaluation (DOT&E) and the Defense Intelligence Agency, provides DOT&E support in the areas of threat resource analysis, intelligence support and threat systems investments. As DOT&E's agent, Threat Systems provides threat resource analyses on the availability, capabilities and limitations of threat representations (threat simulators, targets, models, U.S. surrogates, and foreign materiel) and analysis of test resources used for operational testing to support DOT&E's assessment of the adequacy of testing for those programs designated for oversight by DOT&E and the Office of the Under Secretary of Defense Acquisition and Sustainment (OUSD (A&S)). Threat Systems provides DOT&E action officers and other DOT&E activities with program specific threat intelligence support. Threat Systems also funds management, oversight, and the actual development of common-use threat specifications for threat simulators, threat representative targets, and digital threat models used for test and evaluation.

The Center, a Joint Service Countermeasure (CM) Test & Evaluation (T&E) Activity, directs, coordinates, supports, and conducts independent countermeasure/counter-countermeasure (CCM) T&E activities of U.S. and foreign weapon systems, subsystems, sensors, and related components. The Center accomplishes this work in support of DOT&E, Deputy Assistant Secretary of Defense (DASD) for Developmental Test and Evaluation (DT&E), weapon system developers, and the Services. The Center's testing and analyses directly supports operational effectiveness and suitability evaluations of CM/CCM systems, such as missile warning and aircraft survivability equipment (ASE), used on rotary-wing and fixed-wing aircraft. The Center develops unique CM/CCM test equipment to support testing in operationally realistic environments. The Center determines the effectiveness of precision-guided weapon (PGW) systems and subsystems when operating in an environment degraded by CMs. Analysis and recommendations on CM/CCM effectiveness are provided to Service Program Offices, DOT&E, DASD (DT&E), and the Services. The Center also supports Service member exercises, training, and pre-deployment activities with expertise on CM/CCM technology and capabilities.

This Program Element includes funds to obtain Federally Funded Research and Development support and travel funds.

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	66.984	58.737	57.896	-	57.896
Current President's Budget	226.984	65.237	39.136	-	39.136
Total Adjustments	160.000	6.500	-18.760	-	-18.760
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	160.000	6.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Due to the Defense-wide Review (DWR), the Joint Test and Evaluation Program (JT&E) was divested	-	-	-26.800	-	-26.800
• Additional Funding for Test and Evaluation for Directed Energy Weapons	-	-	8.040	-	8.040

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 000920: OTA&A

Congressional Add: *Program Increase for T&E Infrastructure*

Congressional Add: *Advanced Satellite Navigation Receiver*

Congressional Add: *Cyber talent recruitment initiative*

Congressional Add Subtotals for Project: 000920

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	150.000	-
	10.000	5.000
	-	1.500
Congressional Add Subtotals for Project: 000920	160.000	6.500
Congressional Add Totals for all Projects	160.000	6.500

**Change Summary Explanation**

FY 2019 Congressional add for Test and Evaluation Infrastructure +150M

FY 2019 Congressional add for Advanced Satellite Navigation Receiver +\$10M

FY 2020 Congressional add for Advanced Satellite Navigation Receiver +\$5M

FY 2020 Congressional add for Cyber Talent Recruitment Initiative +\$1.5M

FY 2021 Due to the Defense-wide Review (DWR), the Joint Test and Evaluation Program (JT&E) was divested

FY 2021 Additional Funding for Test and Evaluation for Directed Energy Weapons

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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
000920: <i>OTA&amp;A</i>	66.447	226.984	65.237	39.136	-	39.136	43.526	31.742	33.493	34.800	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Operational Test Activities and Analyses (OTA&A) programs are continuing efforts that provide management and oversight of test and evaluation functions and expertise to the Department of Defense (DoD). The OTA&A programs consist of three activities: Joint Test and Evaluation (JT&E); Threat Systems (TS); and, the Center for Countermeasures (CCM).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Operational Test Activities and Analyses	66.984	58.737	39.136
<p><b>FY 2020 Plans:</b>                      Joint Test and Evaluation (JT&amp;E)                      As a result of the Defense-Wide Review (DWR), the JT&amp;E Program will be divested by the end of FY 2020. JT&amp;E plans to complete test projects scheduled for completion in FY 2020 and conduct early close-down of remaining projects providing interim products to the warfighting customer. JT&amp;E will completely shut down the program by closing facilities, terminating contracts, transitioning government personnel to new jobs in the DoD, and terminating all service Memorandums of Agreement (MOAs)/ Memorandums of Understanding (MOUs), and all support contracts.</p> <p>JT&amp;E will complete or close down four Joint Test, seven Quick Reaction Tests, and one Special Project. The four Joint Tests are: Joint Laser Systems Effectiveness, Multi-Domain Unified Situational Awareness, Joint – Hypersonic Strike Planning, Execution, Command and Control, and Joint Interoperability through Data Centricity.</p> <p>The seven Quick Reaction Tests are: Joint Chemical Biological Radiological Nuclear (CBRN) Tactical Information Management, Joint Enterprise Data Interoperability, Joint Aviation Multi-Ship Integrated Air Defense System (IADS) Survivability Validation, Situational Positioning of LD2 Intelligence, Surveillance and Reconnaissance (ISR) - CONOPS Evolution, Joint Military Application of the Space Environment, Integration of small Unmanned Aircraft Systems into Joint Airspace, and Joint/Interagency - Ground Air Transponder Operational Risk Reduction.</p> <p>The Special Project is Joint Alerting for Survivability and Endurability.</p> <p>Threat Systems</p>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>In FY 2020, Threat Systems will continue test planning working group participation and perform technical analyses to identify threat shortfalls; aligns with the National Defense Strategy (NDS) requirements; conduct special studies and provide current intelligence support tailored to specific U.S. weapon systems acquisitions based on the availability of funding. Threat Systems will:</p> <ul style="list-style-type: none"> <li>- Continue to support the reduction in acquisition and test timelines while increasing test capabilities against near-peer threats.</li> <li>- Increase understanding of near-peer threats (to include cyber) via testing with artificial intelligence (AI), machine learning (ML), and neural networks.</li> <li>- Continue development of an Advanced Satellite Navigation Receiver (ASNR) for an open service Global Positioning System / Inertial Measurement Unit (GPS/IMU) coupled high-fidelity, high dynamic next generation Time Space Position Information (TSPI) system to support future missile tests and Joint Standard Instrumentation Suite (JSIS) flight testing.</li> <li>- Continue to support the US warfighter by providing threat intelligence relevant to emerging threats such as artificial intelligence autonomy, robotics, directed energy, hypersonic and biotechnology to ensure operational and developmental testing occurs against realistic threat representations, including (but not limited to) threats from both revisionist powers such as China and Russia, threats from rogue regimes such as North Korea and Iran, and threats from non-state actors.</li> <li>- Continue to support initiatives for the development of near-peer threat representative jammers, for use in terrain constricted tests as a directional active electronically steered array jammer that will limit Federal Aviation Administration and other common jammer restrictions.</li> <li>- Continue initiatives to improve satellite and space threat representations.</li> <li>- Continue to sustain and manage threat modelling and simulation (M&amp;S) to support test and evaluation by overseeing and coordinating intelligence community developed threat models, performing threat model anomaly resolution resolving differences from live fire testing, integrating threat models into T&amp;E facilities and distributing performance and signature models to T&amp;E users.</li> <li>- Continue to represent DOT&amp;E at foreign material exchanges, inter-agency coordinating groups, and non-proliferation groups to raise awareness of T&amp;E needs for foreign materiel, coordinate service requirements, and de-conflict and prioritize foreign materiel requirements for T&amp;E.</li> <li>- Continue to provide intelligence support to DOT&amp;E staff to address specific questions on threat systems affecting programs on the OSD T&amp;E Oversight list and provide briefings and special intelligence reports when necessary.</li> <li>- Continue to conduct threat intelligence investigations that support use of innovative technologies in the areas of artificial intelligence (AI), autonomy, robotics, machine learning (ML), quantum computing, lasers, nanotechnology, chemical and biological, directed energy, hypersonic and biotechnology being developed by nation states to improve threat representation in the contested domain of air, land, sea, space and cyberspace.</li> <li>- Continue identifying initiatives to improve cyberspace threat representation and prediction, cyber-economic threats to DoD systems, and scalable cyberspace threat test environments that can interface with cyber test networks.</li> <li>- Continue identifying initiatives to conduct offensive cyber operations (OCO) and defensive cyber operations (DCO) without significantly impacting critical operational capabilities.</li> </ul>			

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**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Continue providing DOT&amp;E representative support at the Threat Steering Group (TSG) in the transitioning of the System Threat Assessment Reports (STARS) to the new Validated Online Lifecycle Threat (VOLT) Report process.</li> <li>- Continue to represent DOT&amp;E interests on Intelligence Acquisition Agility Working Group (IAAWG) and Executive Steering Group (ESG) and provide access to the Intelligence Mission Data Management Analysis &amp; Reporting System (IMARS).</li> <li>- Manage Integrated Technical Evaluation and Analysis of Multiple Sources (ITEAMS) efforts supporting programs on the OSD Oversight T&amp;E List by conducting intelligence “deep dives” to produce intelligence in sufficient detail to develop new threat test assets.</li> <li>- Review validation reports to independently ensure the correct threat data and critical parameters are presented in the report to assess the threat representations’ capabilities to replicate a real world threat system.</li> <li>- Represent DOT&amp;E at the Intelligence Mission Data Oversight Board responsible for development, production and sharing issues affecting the intelligence data supporting weapons systems acquisition.</li> <li>- Oversee legacy DOT&amp;E investments and continue management and oversight of legacy and new Test Resource Management Center-funded threat system investments.</li> <li>- Continue ITEAMS efforts leading to the development of new threat systems for T&amp;E.</li> <li>- Continue reviewing Services’ Threat Systems investments to prevent any duplication of effort and encourage cost savings by the sharing or multi-service use of newly developed threat representations to T&amp;E.</li> <li>- Continue to foster rapid technological advancements in the areas of threat representation for T&amp;E and threat test resources by incorporating innovative technologies from the intelligence community into threat test assets to provide improved test fidelity and performance at lower cost.</li> </ul> <p>Threat Systems will continue its efforts to continually improve the standards set of threat performance models as the global threat environment evolves. With adequate funding, these activities help DOT&amp;E carry out its Title 10 responsibilities to assess test adequacy and determine whether testing is realistic and suitable, promotes common solutions to Service threat representation needs and ultimately supports the warfighter.</p> <p>The Center The Center will test, analyze, and report on more than 30 systems/platforms. Testing will focus on directed energy weapon systems, counter-unmanned aerial systems (CUAS), aircraft survivability equipment (with a focus on Joint Urgent Operational Need (JUON) and Urgent Universal Need Statement (UUNS) programs), and pre-deployment warfighter training exercises. High priority programs will receive an independent assessment of our data/findings for CM/CCM evaluations. Our support will be distributed across all the Services, as well as intelligence agencies and research and development activities. These activities will help to enhance and support the survivability of equipment, aircraft and personnel.</p>			

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**B. Accomplishments/Planned Programs (\$ in Millions)**

The Center will build upon improvement and modernization efforts from FY 2019 to improve T&E capabilities. Specifically, the missile plume simulator smart emitter upgrades are expected to be completed by the end of FY 2020. The implementation of JSIS Full Operational Capability (FOC) will add signature instrumentation focused on emerging programs, additional instrumentation to support data collection for multiple, concurrent events, instrumentation to support static live fire events, and full trajectory coverage for missile attitude related data collection. The Center will continue its involvement in the Directed Energy (DE) community as an active participant in the DE Instrumentation Initiative review panel. The Center will also lead the development of the High Energy Laser Remote Target Scoring (HRTS) project and partner with other T&E investment programs. The Center will continue to support international T&E collaborative efforts. In addition, the Center will continue support of domestic panels, committees and working groups.

**FY 2021 Plans:**

Threat Systems

In FY 2021, Threat Systems will continue test planning working group participation and perform technical analyses to identify threat shortfalls; aligns with the National Defense Strategy (NDS) requirements; conduct special studies and provide current intelligence support tailored to specific U.S. weapon systems acquisitions based on the availability of funding. Threat Systems will:

- Continue to support the reduction in acquisition and test timelines while increasing test capabilities against near-peer threats.
- Continue to understand and address near-peer threats (to include cyber) via testing with artificial intelligence (AI), machine learning (ML), and neural networks.
- Complete development of an Advanced Satellite Navigation Receiver (ASNR) for an open service Global Positioning System / Inertial Measurement Unit (GPS/IMU) coupled high-fidelity, high dynamic next generation Time Space Position Information (TSPI) system to support future missile tests and Joint Standard Instrumentation Suite (JSIS) flight testing.
- Continue to support the US warfighter by providing threat intelligence relevant to emerging threats such as artificial intelligence, autonomy, robotics, directed energy, hypersonic and biotechnology to ensure operational and developmental testing occurs against realistic threat representations, including (but not limited to) threats from both revisionist powers such as China and Russia, threats from rogue regimes such as North Korea and Iran, and threats from non-state actors.
- Continue to support initiatives for the development of near-peer threat representative jammers, for use in terrain constricted tests as a directional active electronically steered array jammer that will limit Federal Aviation Administration and other common jammer restrictions.
- Continue initiatives to improve satellite and space threat representations.
- Continue to sustain and manage threat M&S to support test and evaluation by overseeing and coordinating intelligence community developed threat models, performing threat model anomaly resolution resolving differences from live fire testing, integrating threat models into T&E facilities and distributing performance and signature models to T&E users.

FY 2019	FY 2020	FY 2021

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**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Continue to represent DOT&amp;E at foreign material exchanges, inter-agency coordinating groups, and non-proliferation groups to raise awareness of T&amp;E needs for foreign materiel, coordinate service requirements, and de-conflict and prioritize foreign materiel requirements for T&amp;E.</li> <li>- Continue to provide intelligence support to DOT&amp;E staff to address specific questions on threat systems affecting programs on the OSD T&amp;E Oversight list and provide briefings and special intelligence reports when necessary.</li> <li>- Continue to conduct threat intelligence investigations that support use of innovative technologies in the areas of artificial intelligence (AI), autonomy, robotics, machine learning (ML), quantum computing, lasers, nanotechnology, chemical and biological, directed energy, hypersonic and biotechnology being developed by nation states to improve threat representation in the contested domain of air, land, sea, space and cyberspace.</li> <li>- Continue identifying initiatives to improve cyberspace threat representation and prediction, cyber-economic threats to DoD systems, and scalable cyberspace threat test environments that can interface with cyber test networks.</li> <li>- Continue identifying initiatives to conduct offensive cyber operations (OCO) and defensive cyber operations (DCO) without significantly impacting critical operational capabilities.</li> <li>- Continue providing DOT&amp;E representative support at the Threat Steering Group (TSG) in the transitioning of the System Threat Assessment Reports (STARS) to the new Validated Online Lifecycle Threat (VOLT) Report process.</li> <li>- Continue to represent DOT&amp;E interests on the Intelligence Acquisition Agility Working Group (IAAWG) and Executive Steering Group (ESG) and provide access to the Intelligence Mission Data Management Analysis &amp; Reporting System (IMARS).</li> <li>- Continue to manage Integrated Technical Evaluation and Analysis of Multiple Sources (ITEAMS) efforts supporting programs on the OSD Oversight T&amp;E List by conducting intelligence “deep dives” to produce intelligence in sufficient detail to develop new threat test assets.</li> <li>- Continue to review validation reports to independently ensure the correct threat data and critical parameters are presented in the report to assess the threat representations’ capabilities to replicate a real world threat system.</li> <li>- Continue to represent DOT&amp;E at the Intelligence Mission Data Oversight Board responsible for development, production and sharing issues affecting the intelligence data supporting weapons systems acquisition.</li> <li>- Oversee legacy DOT&amp;E investments and continue management and oversight of legacy and new Test Resource Management Center-funded threat system investments.</li> <li>- Continue ITEAMS efforts leading to the development of new threat systems for T&amp;E.</li> <li>- Continue reviewing Services’ Threat Systems investments to prevent any duplication of effort and encourage cost savings by the sharing or multi-service use of newly developed threat representations to T&amp;E.</li> <li>- Continue to foster rapid technological advancements in the areas of threat representation for T&amp;E and threat test resources by incorporating innovative technologies from the intelligence community into threat test assets to provide improved test fidelity and performance at lower cost</li> </ul> <p>Threat Systems will continue its efforts to continually improve the standards set of threat performance models as the global threat environment evolves. With adequate funding, these activities help DOT&amp;E carry out its Title 10 responsibilities to assess test</p>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
adequacy and determine whether testing is realistic and suitable, promotes common solutions to Service threat representation needs and ultimately supports the warfighter.			
<p>The Center</p> <p>The Center will continue to emphasize support of the DOT&amp;E enterprise, with a clear focus on Title 10 oversight programs, DE, CUAS, aircraft survivability, and warfighter training events. The Center expects to increase focus on Directed Energy Weapons and other critical technology areas, which will contribute to the testing of future weapons and the understanding of emerging threats. The Center's ability to provide unique test equipment and expertise will remain a benefit to all Services, and the ongoing Improvement and Modernization plans will ensure test capabilities are provided at a cost savings across the DoD. Additional instrumentation, personnel, and training will be key to ensuring our ongoing test support continues to add significance in emerging technology areas.</p> <p>In FY 2021 The Center will build critical test and evaluation capabilities and the workforce necessary to evaluate emerging Directed Energy Weapon (DEW) war fighting technologies. This includes mobile, open-air DEW data collection and analysis capabilities that will support the test &amp; evaluation (T&amp;E) of the rapid prototyping and fielding needs of these systems. The mobile test capability will allow T&amp;E of operational representative test scenarios in an open air environment to support the accelerated development and fielding of DEW within the DoD.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The decrease from FY 2020 to FY 2021 of -\$19.601 Million is consistent with the divestment of the JT&amp;E program due to the Defense-Wide review (DWR) and the addition of funds for Test and Evaluation of Directed Energy Weapons</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	66.984	58.737	39.136

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Program Increase for T&E Infrastructure	150.000	-
<b>FY 2019 Accomplishments:</b> DOT&E is developing critical test capabilities needed to test hypersonics, directed energy, advanced computing/big data analytics, artificial intelligence/machine learning, and autonomy/robotics.		
<b>Congressional Add:</b> Advanced Satellite Navigation Receiver	10.000	5.000
<b>FY 2019 Accomplishments:</b> DOT&E is developing the preliminary design of 6 Degrees of Freedom Time Space Position Information (TSPI) Advanced Satellite Navigation Receiver (ASNR) for dynamic TSPI collection by DOT&E labs, facilities, ranges, and partners including "Five Eyes" (FVEY) and North American Treaty Organization (NATO) partners. In FY 2019, the team initiated development of the advanced Global Navigation Satellite System (GNSS) receiver, developed solver, validation, and estimation models, issued requests for		

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	FY 2019	FY 2020
acquisition of multi-axis rate table and GNSS Global Positioning System (GPS) Simulator, issued the tech package to antenna manufacturer, and presented the project to NATO for partner input.  <b>FY 2020 Plans:</b> In FY 2020 DOT&E is developing the Advanced Satellite Navigation Receiver System-level Telemetry Kit with development and prototyping of GNSS/GPS sensor and Inertial Measurement Unit (IMU) sensor. DOT&E will also design and develop the Ground Control System to include post-processing hardware and software development of post-processing applications and refinement and integration of models. Finally, DOT&E will resolve issues with encryption requirements (desired for NSA implementation on US and NATO ranges).		
<b>Congressional Add:</b> Cyber talent recruitment initiative  <b>FY 2020 Plans:</b> In FY 2020, DOT&E will implement a pilot program to provide scholarships through qualified institutions of higher education, including community colleges, to students who are enrolled in programs that lead to degrees or specialized program certifications in the cybersecurity field that support Department of Defense requirements.	-	1.500
<b>Congressional Adds Subtotals</b>	160.000	6.500

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A