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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2020 Office of the Secretary Of Defense **Date:** February 2019

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605502D8Z I <i>Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	97.227	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
502: <i>SBIR/STTR</i>	-	97.227	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

The goals of the Department of Defense (DoD) Office of the Secretary of Defense (OSD) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are to stimulate technological innovation, increase private sector commercialization of federal research and development (R&D), increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation. The SBIR and STTR programs are critical pathways for the Department to tap the innovation of America's small business community and research institutions to support development of cutting-edge technologies that will increase the readiness, modernization and lethality of the Joint Force.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	97.227	0.000	0.000	-	0.000
Total Adjustments	97.227	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	97.227	-			

**Change Summary Explanation**

Funds are allocated from other OSD programs and select Defense Agencies to support the SBIR and STTR programs as defined in 15 U.S.C. 638 (f) and (n).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Office of the Secretary Of Defense										<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 0400 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605502D8Z / <i>Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR)</i>					<b>Project (Number/Name)</b> 502 / <i>SBIR/STTR</i>		
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
502: <i>SBIR/STTR</i>	-	97.227	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The goals of the Office of the Secretary of Defense (OSD) Small Business Innovation Research (SBIR) program is to stimulate technological innovation, increase private sector commercialization of federal research and development (R&D), increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation. Leveraging the innovation of small business concerns is an important contributor to the development of the cutting-edge technologies that will generate decisive and sustained U.S. military advantages by increasing the readiness, modernization and lethality of the Joint Force. This program supports high priority projects within the DoD Components, their missions, and the Warfighter.

The goals of the OSD Small Business Technology Transfer (STTR) program is to stimulate a partnership of ideas between small business concerns (SBCs) and research institutions through DoD funded research or research and development (R/R&D). By providing awards to SBCs or cooperative R/R&D efforts with research institutions, DoD supports innovation and economic growth to generate decisive and sustained U.S. military advantages. This program supports high priority projects within the DoD Components, their missions, and the Warfighter.

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

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> SBIR	85.239	-	-
<b>Description:</b> The set-aside program for small business supports mission-oriented R&D with the goal of providing advanced capabilities to the Warfighter and commercializing those technologies, resulting in a vibrant small business innovation base supporting economic growth and technology innovation.			
The SBIR program contributed to the readiness and modernization of the Joint Force and improved operational capabilities through 164 innovative research projects in the following areas:			
<ul style="list-style-type: none"> <li>• Special Operations: Color Night Vision; Unmanned Aerial Vehicle Durability; Tactical Data Processing, Exploitation and Dissemination; Field Cooling and Storage for Blood and Pharmaceuticals; Standoff Chemical Detector;</li> <li>• Strategic Capabilities: Hypersonic Electro-Optical Seeker; High Acceleration and Hypervelocity Inertial Measurement Unit; High-Resolution/High-Sensitivity Video Seeker;</li> <li>• Logistics: Additive Manufacturing for Improved Survivability and Cost Reduction; Reverse Engineering for Alternative Sources of Supply; Nutrient-Dense Soldier Food Bar Ration; NanoSonic Seals for Supply Chain Management; Tamper Resistant/Anti-Counterfeit Package Labelling;</li> </ul>			

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

	FY 2018	FY 2019	FY 2020
<ul style="list-style-type: none"> <li>• Missile Defense: Ballistic Missile Defense System-Level Simulation Optimization; Distributed Real-Time Information Assurance Management Technologies; Divert and Attitude Control Systems; Debris Modelling;</li> <li>• Defense Advanced Research Projects: Hybrid Off-Road Motorcycle; Tools for Understanding Human Social Systems; Gun-Launched Integrated Guidance, Navigation and Control System; Load Bearing Thermal Protection Structure for Hypersonic Flight;</li> <li>• Advanced Small Arms Ammunition: Techniques for Caseless Ammunition; Active Noise Control for Small Arms Ammunition; Conductive Propellant Additives for Electrical Ignition; Small Arms Neural-Network Automatic Target Classification System;</li> <li>• Cybersecurity: Cyber Deception for Network Defense; Cyber Defense Ranking and Prioritization of Attack-related Events; Cyber Physical Security for Tactical Systems; Network Isolation of Industrial Control Systems; and</li> <li>• Geospatial Intelligence: Machine Learning to Suppress False Alarms in Automated Target Recognizers; Automated Assessment of Urban Environment Degradation for Disaster Relief and Reconstruction.</li> </ul> <p>Emerging Results from SBIR Investments in FY 2018:</p> <ul style="list-style-type: none"> <li>• The SilentHawk all-wheel drive hybrid-electric military motorcycle prototype enables troops to rapidly and quietly move through rugged terrain with up to 170 miles of range and two hours of quiet mode.</li> <li>• An extended range synthetic aperture radar system that tracks people and vehicles in all weather, day or night, using a ground moving target indicator is now moving into a DoD Program of Record.</li> <li>• An additive manufacturing project to make seamless fuel bladders for helicopters is reinventing a manufacturing process unchanged since World War II, showing promising improvements that will extend service life by 50%, reduce weight by 20%, and reduce total cost of ownership by 40%.</li> <li>• Government testers evaluated small arms stabilization systems with very favorable results that are pending future investment decisions.</li> <li>• A subsurface diver tracking and communications system showed very positive results and is pending review and transition into a program of record.</li> <li>• A mechanism to enable divers to lock-in and lock-out of a submersible transport system demonstrated attributes desired by managers of a program of record.</li> </ul> <p>The Congressionally directed reorganization of the Office of the Secretary of Defense and the subsequent reprioritization of DoD research will result in the following areas receiving the bulk of future resource commitments:</p> <ul style="list-style-type: none"> <li>• Artificial Intelligence: Improve algorithms, address data quality, optimize human-machine coordination and disrupt adversaries' efforts;</li> <li>• Autonomy: Address teaming of autonomous systems; machine perception, reasoning and intelligence; human and autonomy systems trust and interaction;</li> </ul>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>• Communications: Addressing high-performance, low power embedded processing and developing algorithms for self-configuring, self-healing and resource allocation;</li> <li>• Cyber: Address behavioral issues, develop self-securing networks and develop methodologies to assess cyber effects and consequences;</li> <li>• Directed Energy: Address power scaling, jitter reduction, laser size and weight, adaptive optics, beam propagation and target tracking;</li> <li>• Hypersonics: Address high temperature materials, hypersonic vehicle manufacturing, air breathing propulsion and hypersonic guidance and control systems;</li> <li>• Microelectronics: Develop domestic capabilities through small business investments;</li> <li>• Quantum Sciences: Address quantum clocks and sensors, quantum communications technologies and develop enabling technologies for quantum computing in the areas of cryogenics and photon detection; and</li> <li>• Space: Developing Low Earth Orbit nano-satellites for missile warning, intelligence, surveillance, reconnaissance, navigation and communications.</li> </ul>			
<p><b>Title:</b> STTR</p> <p><b>Description:</b> The set-aside program that funds cooperative R/R&amp;D projects for small businesses in partnership with research institutions.</p> <p>The STTR program contributed to the readiness and modernization of the Joint Force and improved operational capabilities through nine innovative research projects in the following areas:</p> <ul style="list-style-type: none"> <li>• Special Operations: Situational Awareness;</li> <li>• Chemical/Biological Defense: Mitigation of Radiation Effects; Electromagnetic Pulse and High Power Microwave Protection Systems;</li> <li>• Defense Advanced Research Projects: Radio Frequency Emitter-Localization for Complex Environments; Portable Lasers; Visual Recognition System;</li> <li>• Additive Manufacturing: Low Cost Phased Array Manufactured by 3D Printing; and</li> <li>• Geospatial Intelligence: Algorithms for Look-down Infrared Target Exploitation.</li> </ul> <p>Emerging results from the nine STTR projects are unavailable due to project immaturity.</p> <p>The Congressionally directed reorganization of the Office of the Secretary of Defense and the subsequent reprioritization of DoD research will result in the following areas receiving the bulk of future resource commitments:</p>	11.988	-	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2018	FY 2019	FY 2020
<ul style="list-style-type: none"> <li>• Artificial Intelligence: Improve algorithms, address data quality, optimize human-machine coordination and disrupt adversaries' efforts;</li> <li>• Autonomy: Address teaming of autonomous systems; machine perception, reasoning and intelligence; human and autonomy systems trust and interaction;</li> <li>• Communications: Addressing high-performance, low power embedded processing and developing algorithms for self-configuring, self-healing and resource allocation;</li> <li>• Cyber: Address behavioral issues, develop self-securing networks and develop methodologies to assess cyber effects and consequences;</li> <li>• Directed Energy: Address power scaling, jitter reduction, laser size and weight, adaptive optics, beam propagation and target tracking;</li> <li>• Hypersonics: Address high temperature materials, hypersonic vehicle manufacturing, air breathing propulsion and hypersonic guidance and control systems;</li> <li>• Microelectronics: Develop domestic capabilities through small business investments;</li> <li>• Quantum Sciences: Address quantum clocks and sensors, quantum communications technologies and develop enabling technologies for quantum computing in the areas of cryogenics and photon detection; and</li> <li>• Space: Developing Low Earth Orbit nano-satellites for missile warning, intelligence, surveillance, reconnaissance, navigation and communications.</li> </ul>			
<b>Accomplishments/Planned Programs Subtotals</b>	97.227	-	-

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

**Remarks**

**D. Acquisition Strategy**  
N/A

**E. Performance Metrics**  
N/A