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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / <i>JNT Tactical Radio System - Maritime/Fixed Station</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	46.345	3.178	190.689	232.818	-	232.818	168.366	156.302	135.915	105.694	Continuing	Continuing
0725: <i>Communication Automation</i>	0.000	0.000	3.114	8.880	-	8.880	9.955	13.218	8.854	0.773	Continuing	Continuing
0742: <i>Sub Integrated Ant System</i>	0.000	0.000	18.925	13.749	-	13.749	13.698	11.888	12.010	12.252	Continuing	Continuing
0921: <i>NAVSTAR GPS Equipment</i>	0.000	0.000	59.977	51.750	-	51.750	30.321	11.524	8.372	7.061	Continuing	Continuing
1411: <i>Sub Tact Comm System</i>	0.000	0.000	14.175	14.329	-	14.329	14.182	14.814	15.080	15.383	Continuing	Continuing
2126: <i>ATDLS Integration</i>	0.000	0.000	18.201	21.203	-	21.203	21.254	22.665	23.127	23.590	Continuing	Continuing
3020: <i>MIDS/JTRS</i>	0.000	0.000	39.214	82.579	-	82.579	64.030	65.849	52.500	30.342	Continuing	Continuing
3078: <i>Digital Modular Radio</i>	46.345	3.178	3.262	2.770	-	2.770	3.162	6.521	6.555	6.686	Continuing	Continuing
3341: <i>Network Tactical Common Data Link</i>	0.000	0.000	30.776	34.520	-	34.520	8.887	6.889	6.424	6.554	Continuing	Continuing
4011: <i>Naval Coastal Warfare Surv and C4I Sys</i>	0.000	0.000	3.045	3.038	-	3.038	2.877	2.934	2.993	3.053	Continuing	Continuing

**Program MDAP/MAIS Code:**  
**Project MDAP/MAIS Code(s):** 554

**Note**  
 To ensure resources are aligned to enable rapid capability delivery, funding has been realigned into PE 0604280N from the following Program Elements/Projects as part of RD TEN PE Consolidation starting in FY20: PE 0204163N, Project 0725 (Communication Automation, Battle Force Tactical Network), PE 0604503N Project 0742 (Submarine Integrated Antenna system), PE 0604777N Project 0921 (NAVSTAR GPS Equipment), PE 0604503N Project 1411 (Submarine Tactical Communication System), PE 0205604N Project 2126 (ATDLS Integration), PE 0205604N Project 3020 (MIDS/JTRS), PE 0205604N Project 3341 (Network Tactical Common Data Link), PE 0604230N Project 4011 (Naval Coastal Warfare Surv and C4I Sys).  
 There are no New Starts associated with PE Consolidation.

**A. Mission Description and Budget Item Justification**  
 Programs will implement digital system-of-systems engineering by using tools such as Model Based System Engineering (MBSE) and Digital Twins to create adaptable digital models to optimize system engineering from design, development and testing to operations and sustainment. Programs will use Development, Security and

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<p>Operations (DevSecOps) processes for continuous development, integration, testing and deployment, along with common platform services such as Agile Core Services (ACS), for faster fielding of capability.</p> <p>(0725)The Communication Automation, Battle Force Tactical Network (BFTN) program, is a continuing program that provides for automation and communications upgrades for fleet tactical users. The Battle Force Tactical Network (BFTN) on each surface, subsurface, air, or fixed US Navy platform utilizes previously installed/ existing Line of Sight (LOS)/Extended Line of Sight (ELOS) radios to create a secure gateway that inter-connects all users into a common Radio Frequency (RF) Tactical Network. This network directly supports the Resilient Command and Control (RC2) posture of US-Only and North Atlantic Treaty Organization (NATO) Allied/ Coalition users' tactical data information exchanges on each platform between and/or across separately dispersed RF Networks even if Satellite Communications (SATCOM) channels to shore are lost. This system is formally specified by both Fleet Commanders as a threshold capability for global maritime command control and communications in a Distributed Maritime Environment to execute current warfighting plans.</p> <p>FY 2021 BFTN will focus on completing efforts necessary to obtain Full Rate Production (FRP) decision. BFTN will continue development of RC2 system enhancements that address Extended Line of Sight (ELOS) radio obsolescence issues and critical upgrades required to meet near-term communication threats.</p> <p>The HF Modernization study conducted in 2018 by DoN identified RC2 capability gaps needed to support the RC2 posture. BFTN RC2 System Enhancements (BRSE) will provide the RF network for an "always on / always connected" capability and for increased range and data rate capabilities through an agile RF data networking capability. BRSE will provide those improvements through the development of advanced HF waveforms with cognitive radios adjusting to spectrum interference, adaptive null steering, and Multiple Input Multiple Output (MIMO); the replacement of 2-channels current radios with modern radios and modems; and bringing increased performance in a contested and congested environment, including more robust links to/from shore with large gain directional shore sites instead of low gain omni-directional antennas. The BRSE system is formally specified by both Fleet Commanders as a threshold capability for global maritime command, control, and communications in a Distributed Maritime Environment to execute current warfighting plans.</p> <p>FY21 BRSE will develop the RC2 system enhancements that address the need of the RF network for an "always on / always connected" capability, and for increased range and data rate capabilities through an agile RF data networking capability, that are required to meet future communication threats.</p> <p>(0742)Submarine Integrated Antenna System: The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p> <p>(0921)Navigation Satellite Timing &amp; Ranging (NAVSTAR) Global Positioning System (GPS) project (0921) encompasses the Navy's efforts to pace the growing threat to GPS Navigation through the fielding of new GPS receivers, Anti-Jam (AJ) Antennas, and Assured-Positioning Navigation and Timing (A-PNT) technologies across all Navy platform types. NAVSTAR GPS is a group of A-PNT systems that provides authorized users with secure, worldwide, all weather, three dimensional position, velocity, and precise time data. NAVSTAR GPS provides A-PNT capability to Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) and combat systems in standalone and networked architectures throughout air and maritime domains. This project is comprised of four distinct efforts: Sea Navigation Warfare (NAVWAR), GPS-based Positioning, Navigation, and Timing (PNT) Service (GPNTS), Air Navigation Warfare (NAVWAR) and GPS Modernization. Sea NAVWAR provides AJ antennas and GPNTS provides GPS receivers and A-PNT technology to surface platforms, and Air NAVWAR provides AJ</p>		

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antennas and GPS Modernization provides GPS receivers to air platforms. Research, Development, Testing and Evaluation (RDT&E) funds are used to perform all the non-recurring GPS Surface Ship, Submarine and Aircraft Development, Integration, and Testing efforts in support of NAVSTAR GPS.

(1411)Submarine Tactical Communications System: The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

(2126) Tactical Data Link (TDL) systems includes the Advanced Tactical Data Link Systems (ATDLS) integration programs, specifically Link 16 Network, Command and Control Processor (C2P) and Link Monitoring and Management Tool (LMMT).

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under operational systems development because it encompasses engineering and manufacturing development for upgrade of existing operational systems.

Link 16 Network Program provides high power shipboard and shore integrated Link 16 capability through the fielding of Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ships (MOS) and MOS Modernization (MOS Mod) including transmit and receive antennas and High Power Amplifiers (HPA). JTIDS, MOS and MOS Mod utilizes the JTIDS, MIDS Low Volume Terminal (LVT), and MIDS Joint Tactical Radio System (JTRS) terminals respectively, integrates the HPA and interfaces to the shipboard antenna and Command and Control Processor (C2P). MIDS-LVT and MIDS JTRS terminals are developed by the MIDS Program Office. JTIDS terminal is no longer in production, but is undergoing product improvement to maintain interoperability and security with MIDS-LVT and MIDS JTRS. As part of the product improvement all shipboard Link 16 terminals are required to have dynamic network management (DNM), crypto modernization (CM) and frequency remapping (FR). MIDS Program Office is developing additional improvements to the MIDS-LVT and MIDS JTRS terminals. The MIDS-LVT will have Link 16 Enhanced Throughput (ET) and the MIDS JTRS will have the added capability of four net concurrent multi-netting (CMN) with current contention receive (CCR) and tactical targeting networking technology (TTNT).

(3020)The Multifunctional Information Distribution System (MIDS) program office is the Performing Activity for the Navy (Lead Service for Department of Defense (DoD)), Link 16 capability and consists of two (2) product lines, MIDS Low Volume Terminal (LVT) (legacy hardware defined radio) and MIDS Joint Tactical Radio System (JTRS) (software defined radio). MIDS-LVT effort is a cooperative development program between France, Germany, Italy, Spain, and the United States with United States joint service participation (Navy, Army, Air Force), and has provided over 11,000 terminals to 48 Nations providing interoperability with North Atlantic Treaty Organization (NATO) and coalition partners. The Department of Defense (DoD) established the program to design, develop, and deliver low volume, lightweight tactical information system terminals for U.S. and allied fighter aircraft, bombers, helicopters, ships, and ground sites. MIDS-LVT significantly increases force effectiveness and minimizes hostile actions and friend-on-friend engagements. MIDS-LVT Block Upgrade 2 was executed as an ECP and provides the critical upgrades to the MIDS-LVT Terminal to enable U.S., Coalition and International partners' ability to meet the National Security Agency (NSA) mandated timelines for Cryptographic Modernization (CM) and the National Telecommunications and Information Agency (NTIA) and Federal Aviation Agency (FAA) mandated timelines for Frequency Remapping (FR).

MIDS JTRS, designed as a Pre-Planned Product Improvement (P3I) and executed as an Engineering Change Proposal (ECP) to the production MIDS-LVT configuration, and is fully compatible with MIDS-LVT. The MIDS JTRS Core Terminal achieved Full Fielding & Production (FP&F) in March 2012. It facilitated

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<p>the JTRS incremental approach for fielding advanced JTRS transformational networking capability and transformed the MIDS-LVT into a 4-channel, Software Communications Architecture (SCA) compliant, Joint Tactical Radio. A form-fit-function replacement to MIDS-LVT, MIDS JTRS also adds three programmable 2 Megahertz (MHz) to 2 Gigahertz (GHz) channels capable of hosting the JTRS legacy and networking waveforms. In addition to Link 16, Tactical Air Navigation (TACAN), and voice functionality found in MIDS-LVT, MIDS JTRS has four channels and adds capabilities such as Link 16 Enhanced Throughput (ET), Link 16 FR, software programmability, CM, and Four Net Concurrent Multi-Netting with Concurrent Contention Receive (CMN-4).</p> <p>MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal providing an Internet Protocol-based networking capability on tactical aircraft. TTNT is a low latency, high throughput waveform that has the capability to support data exchange between fast-moving tactical aircraft, weapons, and unmanned aircraft, in addition to air, land, and sea-based command and control nodes, in a variety of air-to-air and air-to-ground missions including time sensitive targeting, air warfare, close air support, non-traditional ISR, and anti-surface warfare. TTNT and MIDS JTRS CMN-4 are critical Tactical Data Link capabilities and directly supports Naval Integrated Fire Control (NIFC) capability requirements. These capabilities provide Joint Airborne Network-Tactical Edge functionality to run advanced mission applications in a cross-platform/cross-domain tactical network enterprise.</p> <p>The FY 2021 Budget funds the MIDS Modernization Software and Firmware development and the Field Loadable capability development effort for the MIDS JTRS terminal. It also funds Special Test Equipment WIN10 upgrade and the test equipment and support for a new depot/lab. FY 2021 funds the NSA Information Assurance Security Requirements update for MIDS JTRS and TTNT specifications. FY 2021 completes the MIDS JTRS Link 16 transceiver hardware upgrade mitigating the effects of multipath. FY 2021 also completes the TTNT problem report fixes that come out of testing the TTNT terminal and completes the development of the TTNT Consolidated Automated Support System (CASS) Test Program Sets (TPS). The CASS TPS will enable I-level testing of the terminal in the field allowing field level replacement of SRUs instead of returning the entire terminal to the manufacturer.</p> <p>(3078)Digital Modular Radio (DMR) with Integrated Waveform (IW) and Mobile User Objective System (MUOS) capable hardware is the Navy's technical solution for the IW/MUOS requirement. The DMR AN/USC-61(C), is the first software defined radio to become a communications system standard for the U.S. Military. The compact, multi-channel DMR provides 3G, Wideband Code Division Multiple Access (WCDMA) technology, for high speed/capacity voice and data satellite communications. DMR radios currently operate aboard U.S. Navy surface and subsurface vessels, fixed-sites and other Department of Defense (DoD) communication platforms using frequencies ranging from 2 MHz to 2 GHz. Certified to pass secure voice and data at Multiple Independent Levels of Security (MILS) over High Frequency (HF), Very High Frequency (VHF), Ultra High Frequency (UHF), and Satellite Communications (SATCOM) channels, the DMR system was developed to the U.S. Navy's specifications and meets all the stringent environmental, Electromagnetic Interference (EMI) and performance requirements for use in the U.S. Fleet. This system is formally specified by both Fleet Commanders as a threshold capability, for global maritime command control and communications in a Distributed Maritime Environment, to execute current warfighting plans and is required for National Command and Control capability. This program is for continued development/integration of the IW and MUOS waveforms into the DMR in accordance with Military Standards 188-181,2,3. Additionally, the enhancements of High Frequency Distribution Amplifier Group (HFDAG) and HF Automated Link Establishment (ALE) will also be developed/integrated into the DMR. HFDAG is a follow-on HF solution to fulfill transmit and receive HF communication capability with various modes of operation, such as ALE, for Navy platforms. HFDAG will utilize the existing DMR as the exciter/receiver. Generation 3 (GEN 3) HF ALE/HF wideband provides Navy users with improved HF communications, increased transmission rates from radio to radio, and serves as a supplement to SATCOM when SATCOM networks are overloaded or unavailable. IW uses a Time Division Multiple Access (TDMA) communication system in an attempt to improve satellite bandwidth utilization over legacy SATCOM waveforms. This enables demand assigned services on UHF SATCOM networks to support new applications that</p>		

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<p>require better performance and higher channel throughput. The MUOS waveform will enable MUOS satellites to provide worldwide communication satellite coverage for DoD requirements. MUOS will provide functionality comparable to commercial mobile phone systems.</p> <p>FY 2021 DMR will complete AHF Functionality Development, conduct submarine EMCON testing, complete the MUOS Development and continue development of updated DMR Single Channel Ground and Airborne Radio System (SINCGARS) 3.1 Cryptographic Equipment Application (CEA) software to be compliant with the latest National Security Agency (NSA) cryptographic modernization specifications.</p> <p>(3341)Network Tactical Common Data Link (NTCDL) provides the ability to transmit/receive real-time intelligence, surveillance, and reconnaissance (ISR) data simultaneously from multiple sources (air, surface, sub-surface, and man-portable) and exchange command and control information (voice, data, imagery, and full-motion video) across dissimilar joint, service, coalition, and civil networks. NTCDL provides warfighters the capability to support multiple, simultaneous, networked operations with in-service Common Data Link (CDL) equipped aircraft (e.g., F/A-35, P-3, and MH- 60R) in addition to next-generation manned and unmanned platforms (e.g., P-8 Poseidon, Triton, MQ-25 (Stingray), small tactical unmanned aircraft systems (STUAS), and Fire Scout). NTCDL benefits the Fleet by providing a horizon extension for line-of-sight systems for use in time-critical strike missions.</p> <p>FY 2021 request is for NTCDL product development, to include delivery of two (2) NTCDL Engineering Development Models (EDMs) and associated software.</p> <p>(4011)The Navy Expeditionary C4I project supports the Navy Expeditionary Combat Command (NECC) mission to detect, deter or interdict potential threats to DoN assets using agile, modular and scalable technology. NECC units have a number of current and future Command, Control, Communications, Computers &amp; Intelligence (C4I) technological requirements for Tactical/Command Operations Center, tactical vehicles, combatant craft, and dismounted personnel. NECC operations require units to maintain effective command and control, develop and display a common tactical picture, and share intelligence and current operational information with higher headquarters, subordinate units, joint forces and coalition allies. Small, Medium, and Large Scale Communication Systems (LSCS) are the C4I hub for the NECC; Navy Enterprise Tactical Command and Control (NETC2) is the converged LSCS baseline. Future C4I research and development include enhanced information transport, network cyber security posture, assured communications in denied environments along with agility and mobility. Funding is required for testing and evaluation of cyber security issue associated with obsolescence of network items and if not addressed will impact the ability of the Program Office to maintain system accreditation under Risk Management Framework (RMF) revoking multiple LSCS assets authority to connectivity on the Department of Defense Information Network (DoDIN). Efforts are in alignment with NECC's strategic Expeditionary Warfare Improvement Program (EXWIP) Integrated Priority Capability List (IPCL) priorities and maintain alignment with greater DoD initiatives, such as Joint Information Environment (JIE), Mission Partner Environment (MPE) in order to maintain interoperability and drive down DoN enterprise costs.</p> <p>FY 2021 funding supports further investigation of cloud technologies and utilization of an application integration process for information warfare and rapid program insertion. Funding also supports evaluation of new technologies to enable rapid introduction of new products and technology to prevent obsolescence and end of support issues.</p>		

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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	3.272	192.345	183.047	-	183.047
Current President's Budget	3.178	190.689	232.818	-	232.818
Total Adjustments	-0.094	-1.656	49.771	-	49.771
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.656			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.094	0.000			
• Program Adjustments	0.000	0.000	48.769	-	48.769
• Rate/Misc Adjustments	0.000	0.000	1.002	-	1.002

**Change Summary Explanation**

The FY2021 funding request for PE 0604280N was increased by \$49.771 million, program adjustments are as follows:

- The FY2021 funding request was reduced by \$5.784 million to account for the availability of prior year execution balances.
- The FY2021 funding request was increased by \$0.843 million due to miscellaneous program and rate changes.
- The FY2021 funding request was increased by \$54.712 million due to MIDS Modernization and field download capability initiatives.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 0725 / Communication Automation			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
0725: Communication Automation	0.000	0.000	3.114	8.880	-	8.880	9.955	13.218	8.854	0.773	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0204163N Project 0725 as part of RDTEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

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

The BFTN program, is a continuing program that provides for automation and communications upgrades for fleet tactical users. BFTN on each surface, subsurface, air, or fixed US Navy platform utilizes previously installed/existing LOS/ELOS radios to create a secure gateway that inter-connects all users into a common RF tactical network. This network directly supports the RC2 posture of US-Only and NATO Allied/Coalition users' tactical data information exchanges on each platform between and/or across separately dispersed RF Networks even if SATCOM channels to shore are lost. This system is formally specified by both Fleet Commanders as a threshold capability for global maritime command control and communications in a Distributed Maritime Environment to execute current warfighting plans.

FY 2021 BFTN will focus on completing efforts necessary to complete FOT&E test report. BFTN will continue development of RC2 system enhancements that address ELOS radio obsolescence issues and critical upgrades required to meet near-term communication threats.

The HF Modernization study (conducted in 2018 by DoN identified RC2 capability gaps needed to support the RC2 posture. BFTN RC2 System Enhancements (BRSE) will provide the RF network for an "always on / always connected" capability and for increased range and data rate capabilities through an agile RF data networking capability. BRSE will provide those improvements through the development of advanced HF waveforms with cognitive radios adjusting to spectrum interference, adaptive null steering, and Multiple Input Multiple Output (MIMO); the replacement of 2-channels current radios with modern radios and modems; and bringing increased performance in a contested and congested environment, including more robust links to/from shore with large gain directional shore sites instead of low gain omni-directional antennas. The BRSE system is formally specified by both Fleet Commanders as a threshold capability for global maritime command, control, and communications in a Distributed Maritime Environment to execute current warfighting plans.

FY21 BRSE will develop the RC2 system enhancements that address the need of the RF network for an "always on / always connected" capability, and for increased range and data rate capabilities through an agile RF data networking capability, that are required to meet future communication threats.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Battle Force Tactical Network (BFTN)	0.000	3.114	8.880	0.000	8.880
<b>Articles:</b>	-	-	-	-	-

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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Description:</b> Overall program efforts include investigation of emerging technologies through study, development and associated testing for feasibility of program insertion. The BFTN is the Navy's program of record for high-frequency internet protocol (HFIP) and Ultra High Frequency (UHF) Line of Sight (LOS) subnet relay (SNR) communications. BFTN is the only Allied/Coalition option, providing command and control in a non-satellite communications (SATCOM) or near-term and future communication threats and serves as a primary backup for SIPRNET (Secret Internet Protocol Router Network) in the absence of SATCOM.</p> <p><b>FY 2020 Plans:</b> Develop strategies, tactical employment concepts, and system modifications to address capability gaps and deficiencies that are needed to enable Resilient Command and Control (RC2) communications. Identify and develop system modifications necessary to address near-term and future communications threats. Efforts are focused on systems that utilize High Frequency (HF) Military Standard Waveform (MSW) to boost legacy system performance. Initiate studies to analyze and assess current shipboard HF and Ultra High Frequency (UHF) Line of Sight (LOS) communications architecture, to include modifications needed for near-term threat environments, and enhancements needed for expected future threat environments. Initiate studies to assess the viability of using Battle Force Tactical Network (BFTN) chat capabilities in an organic shipboard-only environment (e.g., without shore reachback), along with the viability of using the High Frequency Global Communications System (HFGCS) and/or alternative shore systems to transmit and receive communications from legacy shipboard HF antenna systems. Obtain a Full Rate Production (FRP) decision.</p> <p><b>FY 2021 Base Plans:</b> Continue developing and testing strategies, tactical employment concepts, and system modifications to address capability gaps and deficiencies that are needed to enable Resilient Command and Control (RC2) communications. Continue developing the system modifications previously identified to address near-term and future communications threats. Efforts are focused on completing design and testing of a more robust MIL-STD-110C/D based High Frequency (HF) waveform. Develop strategies to modify and enhance existing shipboard HF and Ultra High Frequency (UHF) Line of Sight (LOS) communications architecture to meet near-term threat and future threat environments. Begin developing and testing capabilities designed to enable BFTN's message and chat capabilities in an organic shipboard-only environment (e.g., without requiring shore reachback).</p> <p><b>FY 2021 OCO Plans:</b></p>					

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
N/A					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The \$5.8 million increase from FY 2020 to FY 2021 is for BFTN RC2 System Enhancements (BRSE) to commence design, development and testing of RC2 enhancements. These enhancements include development of advanced HF waveforms with cognitive radios adjusting to spectrum interference, adaptive null steering, and MIMO; the replacement of current 2-channel radios with modern radios and modems; and bringing increased performance in a contested and congested environment, including more robust links to/from shore with large gain directional shore site antennas instead of low gain omni-directional antennas.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	3.114	8.880	0.000	8.880

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/3057: Battle Force Tactical Network (BFTN)	9.723	12.196	25.267	-	25.267	40.459	35.574	27.243	19.142	Continuing	Continuing
• RDTEN/0204163N/0725: Battle Force Tactical Network (BFTN)	0.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	248.488

**Remarks**

**D. Acquisition Strategy**  
Battle Force Tactical Network (BFTN) - Develop and test Resilient Command and Control (RC2) Extended Line of Sight (ELOS) waveform capability development.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0725 / Communication Automation
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<b>Product Development (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development - BFTN	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.395	Oct 2019	2.201	Dec 2020	-		2.201	Continuing	Continuing	Continuing
Product Development - BFTN	WR	NIWC LANT : Charleston, SC	0.000	0.000		0.773	Oct 2019	3.640	Dec 2020	-		3.640	Continuing	Continuing	Continuing
Product Development - BFTN	TBD	TBD : TBD	0.000	0.000		1.546	Mar 2020	3.039	Dec 2020	-		3.039	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		2.714		8.880		-		8.880	Continuing	Continuing	N/A

<b>Support (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
HF Strategy Study - BFTN	C/FFP	MIT/Lincoln Lab : Lexington, MA	0.000	0.000		0.400	Dec 2019	0.000		-		0.000	0.000	0.400	-
<b>Subtotal</b>			0.000	0.000		0.400		0.000		-		0.000	0.000	0.400	N/A

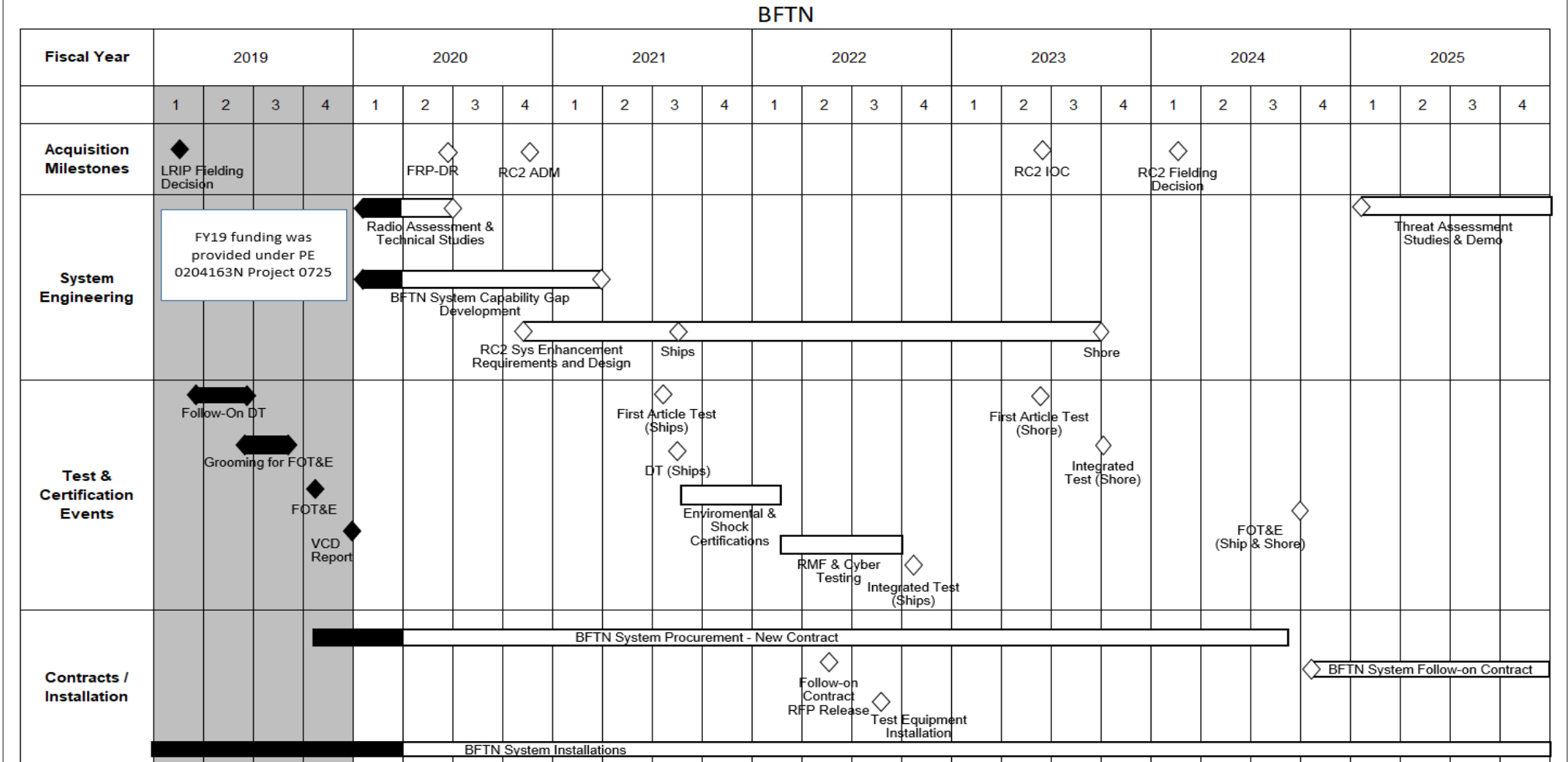
<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	0.000	0.000	3.114	8.880	-	8.880	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data for BFTN is provided under PE 0204163N, Project 0725.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0725 / Communication Automation
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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Navy</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0725 / Communication Automation

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 0725</b>				
Radio Assessment & Technical Studies	1	2020	2	2020
BFTN System Capability Gap Development	1	2020	1	2021
BFTN System Procurement - New Contract	1	2020	3	2024
BFTN System Installations	1	2020	4	2025
Resilient Command and Control (RC2) Sys Enhancement Requirements and Design	4	2020	3	2023
RC2 Acquisition Decision Milestone (ADM)	4	2020	4	2020
First Article Test (Ships)	3	2021	3	2021
Ship Design	3	2021	3	2021
Development Testing (DT) (Ships)	3	2021	3	2021
Enviromental & Shock Certifications	3	2021	1	2022
Risk Management Framework (RMF) & Cyber Testing	1	2022	3	2022
Follow-On Contract Request for Proposal (RFP) Release	2	2022	2	2022
Test Equipment Installation	3	2022	3	2022
Integrated Test (Ships)	4	2022	4	2022
RC2 Initial Operational Capability (IOC)	2	2023	2	2023
First Article Test (Shore)	2	2023	2	2023
Shore Design	4	2023	4	2023
Integrated Test (Shore)	4	2023	4	2023
RC2 Fielding Decision	1	2024	1	2024
Follow-On Test and &Evaluation (FOT&E) (Ship & Shore)	4	2024	4	2024
BFTN System Procurement Follow-On Contract	4	2024	4	2025

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0725 / Communication Automation

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Threat Assessment Studies & Demo	1	2025	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
0742: Sub Integrated Ant System	0.000	0.000	18.925	13.749	-	13.749	13.698	11.888	12.010	12.252	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0604503N Project 0742 as part of RDTEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

The FY2021 funding request was reduced by \$0.300 million to account for the availability of prior year execution balances.

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

The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Transition Engineering	0.000	5.151	1.966	0.000	1.966
<b>Articles:</b>	-	-	-	-	-
<b>FY 2020 Plans:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books					
<b>Title:</b> Submarine High Data Rate (SubHDR) Pre-Planned Product Improvement (P3I)	0.000	3.480	3.164	0.000	3.164
<b>Articles:</b>	-	-	-	-	-



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p> <p><b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p>					
<p><b>Title:</b> Antenna Improvements</p> <p align="right"><b>Articles:</b></p>	0.000	1.577	1.455	0.000	1.455
<p><b>FY 2020 Plans:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p> <p><b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.</p>	-	-	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	18.925	13.749	0.000	13.749

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0604503N/0742: <i>Submarine Integrated Antenna System</i>	15.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	341.084
• OPN/3130: <i>Submarine Communication Equipment</i>	71.190	60.794	62.214	-	62.214	73.899	73.227	74.121	75.594	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Classified	TBD	Not Specified : Not Specified	0.000	0.000		15.117	Nov 2019	10.523	Nov 2020	-		10.523	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		15.117		10.523		-		10.523	Continuing	Continuing	N/A

**Remarks**  
 - FY19 cost data is provided under PE 0604503N, Project 0742  
 - The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.716	Feb 2020	0.690	Feb 2021	-		0.690	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.716		0.690		-		0.690	Continuing	Continuing	N/A

**Remarks**  
 - FY19 cost data is provided under PE 0604503N, Project 0742  
 - The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Classified	TBD	Not Specified : Not Specified	0.000	0.000		2.196	Oct 2019	1.741	Oct 2020	-		1.741	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		2.196		1.741		-		1.741	Continuing	Continuing	N/A

**Remarks**  
 - FY19 cost data is provided under PE 0604503N, Project 0742  
 - The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.896	Feb 2020	0.795	Feb 2021	-		0.795	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.896		0.795		-		0.795	Continuing	Continuing	N/A

**Remarks**  
 - FY19 cost data is provided under PE 0604503N, Project 0742  
 - The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	0.000	18.925	13.749	-	13.749	Continuing	Continuing	N/A

**Remarks**  
 - FY19 cost data is provided under PE 0604503N, Project 0742  
 - The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System
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<b>Proj 0742</b>	<b>FY 2019</b>				<b>FY 2020</b>				<b>FY 2021</b>				<b>FY 2022</b>				<b>FY 2023</b>				<b>FY 2024</b>				<b>FY 2025</b>			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
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2021DON - 0604280N - 0742

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0742 / Sub Integrated Ant System

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 0742</b>				
Classified (Place Holder)	1	2020	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
0921: NAVSTAR GPS Equipment	0.000	0.000	59.977	51.750	-	51.750	30.321	11.524	8.372	7.061	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0604777N Project 0921 (NAVSTAR GPS Equipment) as part of RDTEN PE Consolidation starting in FY 2020. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

The FY2021 funding request was reduced by \$0.404 million to account for the availability of prior year execution balances.

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

The FY 2021 funding request was reduced by \$5.765 million due to MGUE development delays impacting EGI-M GPS Receivers.

Navigation Satellite Timing & Ranging (NAVSTAR) Global Positioning System (GPS) project (0921) encompasses the Navy's efforts to pace the growing threat to GPS Navigation through the fielding of new GPS receivers, Anti-Jam (AJ) Antennas, and Assured-Positioning Navigation and Timing (A-PNT) technologies across all Navy platform types. NAVSTAR GPS is a group of A-PNT systems that provides authorized users with secure, worldwide, all weather, three dimensional position, velocity, and precise time data. NAVSTAR GPS provides A-PNT capability to Command, Control, Communications, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) and combat systems in standalone and networked architectures throughout air and maritime domains. This project is comprised of four distinct efforts: Sea Navigation Warfare (NAVWAR), GPS-based PNT Service (GPNTS), Air NAVWAR and GPS Modernization. Sea NAVWAR provides AJ antennas and GPNTS provides GPS Receivers and A-PNT technology to surface platforms, and Air NAVWAR provides AJ antennas and GPS Modernization provides GPS receivers to air platforms. Research, Development, Testing and Evaluation (RDT&E) funds are used to perform all the non-recurring GPS Surface Ship, Submarine and Aircraft Development, Integration, and Testing efforts in support of NAVSTAR GPS.

The Air and Sea NAVWAR programs provide continued access to GPS information in a denied or impeded electronic environment. Development efforts for both programs provide improvements to various platform type antennas and ensure compatibility with the new Military Code (M-Code) signal. The Air NAVWAR program continues integration efforts using GPS Antenna System (GAS-1), Advanced Digital Antenna Production (ADAP), and other AJ antennas on air platforms while investigating smaller AJ antennas for space constrained platforms and aircraft with unique requirements. The Sea NAVWAR program integrates AJ antennas onto surface and subsurface platforms. The Sea NAVWAR program will continue to research the viability and development of smaller AJ antennas for space-constrained platforms. The program continues to support the Submarine Anti-Jam GPS Enhancement (SAGE) antenna development which integrates AJ capability into the submarine Multi-Function Mast (OE-538B) antenna system.

The GPNTS system is being developed to serve as the primary A-PNT system for the surface Navy to ensure reliable PNT capability and interoperability insertion into GPS receivers and associated C4ISR and Combat Systems in a denied environment. GPNTS pairs with AJ antennas and provides precise A-PNT data required for

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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combat, weapons, command, control, communications, navigation, and other systems, as well as providing the time synchronization critical for network environments. GPNTS will back fit current PNT/GPS systems as well as serve as a forward fit for new platforms. GPNTS is an Open Architecture (OA) development, enabling rapid software and hardware based capability improvements to be inserted without a requirement for single-source contracting. GPNTS will host the Air Force GPS Directorate-developed Military GPS User Equipment (MGUE) card, allowing access to the new GPS M-Code signal. GPNTS will provide more robust and secure GPS/PNT capabilities than is currently in the Fleet. The system will provide the capability to migrate non-real time GPS data toward a Common Computing Environment (CCE) and provide a path for the integration of advanced navigation systems and sensors. GPNTS provides A-PNT capability to C4ISR and Combat Systems in standalone and networked architectures throughout maritime domains.

GPS Modernization executes the Navy's integration of MGUE being developed by the Air Force GPS Directorate on Navy air platforms. This effort provides Navy platforms improved access to GPS signals in challenged and jammed environments. Because of the number and diversity of all of the Navy's air and weapons platforms, this project will consist of multiple parallel efforts that integrate different M-code GPS receivers into different type model series aircraft across many program offices with central coordination and management of funding and priorities by GPS Modernization. Each platform will require unique prime vendor integration and testing that includes software updates to avionics and mission computers as well as modifications to the airframe based on Size, Weight and Power and Cost (SWaP-C) requirements. Modernized Global Positioning System (GPS) receivers will utilize the new M-Code GPS Signal in Space, incorporate enhanced cryptology, deliver greater position and time accuracy, and provide improved protection against signal spoofing as compared to legacy receivers. Additionally, GPS Modernization delivers increased GPS Anti-Jam (AJ) protection and enables blue force GPS electronic attack. This effort supports Navy compliance with Public Law 111-383 which prohibits spending funds on non-Military Code (M-Code) GPS user equipment after FY 2017.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> Sea Navigation Warfare (NAVWAR)	0.000	2.622	2.617	0.000	2.617
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> Sea NAVWAR provides the Warfighter continued access to GPS through the use of AJ Antenna Systems designed to counter GPS Electronic Warfare threats due to intentional and unintentional interference on surface and subsurface platforms through the continued development of AJ antennas. Program currently supports two (2) efforts: Increment 2 Advanced Digital Antenna Production (ADAP) antenna for surface platforms, and the Submarine Anti-Jam GPS Enhancement (SAGE) antenna for subsurface platforms. Increment 2 ADAP continues to research the viability and development of smaller AJ antennas for surface platforms with Size, Weight and Power and Cost (SWaP-C) restrictions and will ensure compatibility with the Military Code (M-Code) signal. Increment 2 ADAP received acquisition authority (November 2018) to add a small antenna variant to the program baseline. Program is continuing the SAGE antenna development, which integrates AJ capability into the submarine Multi-Function Mast (OE-538B).					
<b>FY 2020 Plans:</b> Submarine Anti-Jam GPS Enhancement (SAGE) antenna:					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Continue government oversight, system engineering, logistics, contracts, and programmatic management efforts for the Submarine Anti-Jam Global Positioning System (GPS) Enhancement (SAGE), and integration into the submarine Multi-Function Mast (OE-538B) antenna system development.					
Conduct OE-538B Developmental Testing/Operational Testing (DT/OT) on operational submarine classes.					
Increment 2 Advanced Digital Antenna Production (ADAP) antenna: Continue development efforts for Increment 2 ADAP to include smaller AJ antenna variants for surface platforms with Size, Weight and Power and Cost (SWaP-C) restrictions.					
Complete requirements analysis and Environmental Qualification Testing (EQT) of the smaller Military Code (M-code) capable Anti-Jam (AJ) antenna, MAGNA, for Patrol Coastal small host platform.					
Complete integration testing and DT/OT preparation for the MAGNA smaller M-code capable AJ antenna					
Complete required documentation in support of ADAP small variant, MAGNA, Fielding Decision Review.					
Complete Patrol Coastal (PC) topside study and mounting pedestal designs to support MAGNA PC integration.					
<b>FY 2021 Base Plans:</b> Submarine Anti-Jam GPS Enhancement (SAGE) antenna: Complete government oversight, system engineering, logistics, contracts, and programmatic management efforts for the Submarine Anti-Jam Global Positioning System (GPS) Enhancement (SAGE), and integration into the submarine Multi-Function Mast (OE-538B) antenna system development.					
Complete OE-538B Developmental Testing/Operational Testing on operational submarine classes.					
Increment 2 Advanced Digital Antenna Production (ADAP) antenna: Continue government oversight, system engineering, logistics, contracts, and programmatic management efforts for Increment 2 ADAP to include smaller AJ antenna variants for surface platforms with Size, Weight and Power and Cost (SWaP-C) restrictions.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment			
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>					
	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Begin investigating enhanced anti-jam (AJ) capabilities for integration into existing Sea NAVWAR antenna systems.					
Begin conducting Technology Developmental efforts with industry to mature technical base for a next-generation anti-jam (AJ) antenna.					
Commence SWaP-C antenna integration efforts for the development of GPNTS SWaP-C receiver solution to ensure compatibility.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY 2020 to FY 2021 funding request does not change.					
<b>Title:</b> Global Positioning System (GPS) - Based Positioning, Navigation and Timing (PNT) Service (GPNTS)	0.000	15.792	8.906	0.000	8.906
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> GPNTS is the Navy's next generation Assured Position Navigation and Timing (A-PNT) system. GPNTS will provide more robust and secure GPS/PNT capabilities than is currently in the Fleet. GPNTS will replace Navigation Sensor System Interface (NAVSSI) and WRN-6 systems on surface ships. GPNTS will back fit current PNT/GPS systems as well as serve as a forward fit for new platforms. The system contains Selective Availability Anti-spoofing Security Module (SAASM) GPS security architecture with a planned migration to GPS M-Code.					
<b>FY 2020 Plans:</b> Continue the implementation of GPNTS Pre-planned Product Improvement (P3I) technology software enhancements for Assured Position Navigation and Timing (A-PNT) sensor suite integration to include: All Source Position Navigation (ASPN) algorithm, Celestial Navigation, Two Way Satellite Time Transfer (TWSTT), Public/Private Key Infrastructure (PKI), and Host-Based Security System (HBSS). Implementation requires complex software modifications and significant engineering updates. ASPN algorithm, Celestial Navigation and TWSTT address emerging threats to the GPS signal in a GPS-denied environment.					
Continue GPNTS hardware and software enhancements associated with the Non-GPS Aided Positioning, Navigation and Timing for Surface Ships (NoGAPSS) Future Navy Capability (FNC) which will be part of					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>the Early Operational Capability (EOC). Other NoGAPSS efforts include prepare for demonstration of the NoGAPSS FNC including coordination of available platforms, installation of the NoGAPSS modifications, and operating the NoGAPSS capability in a relevant environment. Prepare of Aegis Integration Event (AIE) and conduct test demonstration of the NoGAPSS FNC including coordination of available platforms, installation of the NoGAPSS modification, and operating the NoGAPSS capability in a relevant environment. Begin platform coordination activities to prepare for the required Follow-on Operational Test and Evaluation (FOT&amp;E) required to inform a fielding decision for the NoGAPSS capability.</p> <p>Complete GPNTS Technical Evaluation prior to Initial Operational Test and Evaluation (IOT&amp;E), and complete GPNTS IOT&amp;E for two rack solution. Complete updates to all Regulatory and Statutory Acquisition documents in support of Global Positioning System (GPS) - Based Positioning, Navigation and Timing (PNT) Service (GPNTS) Full Rate Production (FRP) Decision as a result of successful Initial Operational Test and Evaluation (IOT&amp;E).</p> <p>Commence designing a Global Positioning System (GPS) - Based Positioning, Navigation and Timing (PNT) Service (GPNTS) small Size, Weight and Power and Cost (SWaP-C) solution for smaller surface combatant platforms to include Dock Landing Ship, patrol crafts, Unmanned Surface Vessel (USV) and Military Sealift Command platforms.</p> <p>Continue hardware and software development in a Small Form Factor of GPNTS.</p> <p>Participate in annual GPS testing event, NAVFEST, at 746th Test Squadron Holloman Air Force Base, New Mexico.</p> <p>Continue Model Based Systems Engineering (MBSE) implementation into GPNTS systems engineering documents.</p> <p>Support GPS Injection Testing event.</p> <p><b>FY 2021 Base Plans:</b> Continue the implementation of GPNTS Pre-planned Product Improvement (P3I) technology software enhancements for Assured Position Navigation and Timing (A-PNT) sensor suite integration to include: All Source Position Navigation (ASPN) algorithm, Celestial Navigation, Two Way Satellite Time Transfer (TWSTT),</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy				<b>Date:</b> February 2020	
<b>Appropriation/Budget Activity</b> 1319 / 5		<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station		<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment	
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>					
Public/Private Key Infrastructure (PKI), and Host-Based Security System (HBSS). Implementation requires complex software modifications and significant engineering updates. ASPN algorithm, Celestial Navigation and TWSTT address emerging threats to the GPS signal in a GPS-denied environment.					
Complete GPNTS hardware and software enhancements associated with the Non-GPS Aided Positioning, Navigation and Timing for Surface Ships (NoGAPSS) Future Navy Capability (FNC) which will be part of the Early Operational Capability (EOC). Other NoGAPPSS efforts include to conduct Aegis Integration Event (AIE) and conduct test demonstration of the NoGAPSS FNC including coordination of available platforms, installation of the NoGAPSS modifications, and operating the NoGAPSS capability in a relevant environment. Continue coordination activities to prepare for and conduct the required Follow-on Operational Test and Evaluation (FOT&E) in support of a fielding decision for the NoGAPSS capability. Initiate preparations to forward-fit and back-fit NoGAPSS capability on legacy receiver and GPNTS fielded platforms respectively.					
Continue hardware and software development in a Small Form Factor of GPNTS.					
Participate in annual GPS testing event, NAVFEST, at 746th Test Squadron Holloman Air Force Base, New Mexico.					
Complete Model Based Systems Engineering (MBSE) implementation into GPNTS systems engineering documents.					
Continue software defect resolution with software vendor in support of Full Operational Capability and Full Rate Production.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreases by \$6.886 million to \$8.906 million due to the completion of the GPNTS IOT&E and documentation required to support a Full Rate Production (FRP) Decision.					
<b>Title:</b> Air Navigation Warfare (NAVWAR)					
<b>Articles:</b>					
	0.000	6.667	9.363	0.000	9.363
	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Description:</b> Air NAVWAR provides the Warfighter continued access to GPS through the use of Anti-Jam (AJ) Antenna Systems designed to counter GPS Electronic Warfare threats due to intentional and unintentional interference. Air NAVWAR efforts include investigation and testing of emerging technologies to improve AJ capability and technologies such as development of miniaturized very small antenna systems to allow for the capability on small variant aircraft. Efforts will also include development to ensure antennas can accept the new Military Code (M-Code) signal.</p> <p><b>FY 2020 Plans:</b> Continue to support Aviation Assured-Position, Navigation and Timing (A-PNT) efforts by working with Navy Air platforms on navigation requirements and coordinating with surface Navy platforms to leverage synergies. Complete initial market research to identify potential solutions to fill identified capability gaps in aviation mission requirements.</p> <p>Complete development of HI-GAINS antenna system, focusing on the integrated system: integrating the antenna and antenna electronics into one unit. Upon completion of development, two production representative assets will be delivered to the government.</p> <p>Continue GPS Demonstrations and laboratory testing of GPS receivers with associated antennas at Facilities for Antenna and Radar Cross Section (RCS) Measurements (FARM), to include lab testing/antenna demonstrations of Global Positioning System (GPS) antennas, specifically MAGNA-I for MQ-8C and High-Integrity GPS (Global Positioning System) Aided Inertial Navigation System (HI-GAINS) for Unmanned Aerial Systems (UAS). Additional testing comparing performance between traditional nulling systems and new beam-steering antenna electronics will be conducted. The data collected will be used by platforms as they consider future antenna system updates.</p> <p>Conduct initial ground testing of HI-GAINS Integrated antenna to include thermal and environmental testing.</p> <p>Complete study to define specific aviation capability requirements in terms of position and time, showing the current (SAASM and M-Code) PNT system performance over time compared to the required performance to complete the mission. The mission capability requirements of focus were Integrated Fires (current and planned EA-18G, F/A-18E/F, E-2D), ISR (MQ-4).</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Continue to provide subject matter expertise to various platforms (including MQ-4C, MQ-25, RQ-21) as they consider various anti-jam solutions.					
Continue developmental effort for AJ capability on MQ-8C to include hardware and software integration of Multi-Platform Anti-jam GPS Navigation Antenna Integrated (MAGNA-I) and commence preparations for testing.					
Commence integration efforts for Multi-Platform Anti-jam GPS Navigation Antenna Integrated (MAGNA-I) on AH-1Z, UH-1Y helicopters to include heat sink and environmental testing, Non-Recurring Engineering (NRE) for platform interface modifications; software development, integration testing, and hardware integration.					
<b><i>FY 2021 Base Plans:</i></b>					
Continue to support Aviation Assured-Position, Navigation and Timing (A-PNT) efforts by working with Navy Air platforms on navigation requirements and coordinating with surface Navy platforms to leverage synergies.					
Continue GPS Demonstrations and laboratory testing of GPS receivers with associated antennas at Facilities for Antenna and Radar Cross Section (RCS) Measurements (FARM), to include completing the lab testing/ antenna demonstrations of MAGNA-I and High-Integrity GPS (Global Positioning System) Aided Inertial Navigation System (HI-GAINS). Additionally, complete the laboratory testing comparing performance between traditional nulling systems, beam-steering antenna electronics, and direction finding antennas to inform platforms as they determine solutions for modernizing current fleet of anti-jam antennas.					
Upon completion of FARM lab testing and demonstrations of HI-GAINS, conduct flight testing HI-GAINS on an Unmanned Aerial System (UAS) at White Sands Missile Range (WSMR).					
Complete lab testing/antenna demonstrations of MAGNA-I for MQ-8C and High-Integrity GPS (Global Positioning System) Aided Inertial Navigation System (HI-GAINS) for Unmanned Aerial Systems (UAS) at Facilities for Antenna and Radar Cross Section (RCS) Measurements (FARM).					
Continue to provide subject matter expertise to various platforms (including MQ-4C, MQ-25, RQ-21) as they consider various anti-jam solutions.					
Complete the developmental effort for the integration of Multi-Platform Anti-jam GPS Navigation Antenna Integrated (MAGNA-I) on MQ-8C to include Non-Recurring Engineering (NRE) for platform interface					

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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>modifications; software development, integration testing, and hardware integration. Complete ground testing of MAGNA-I antenna on MQ-8C to include thermal and environmental testing and commence MAGNA-I on MQ-8C flight testing.</p> <p>Continue integration efforts for Multi-Platform Anti-jam GPS Navigation Antenna Integrated (MAGNA-I) on AH-1Z, UH-1Y helicopters to include Non-Recurring Engineering (NRE) for platform interface modifications; software development, integration testing, and hardware integration. Commence ground testing for UH-1Y/AH-1Z and begin development of test plans for FY22 flight testing.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increases by \$2.696 million to \$9.363 million in FY 2021 to support flight testing for UH-1Y/AH-1Z, MQ-8B/C, and HI-GAINS.</p>					
<p><b>Title:</b> Global Positioning System (GPS) Modernization</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> GPS Modernization delivers increased GPS Anti-Jam (AJ) protection through modernized GPS receivers that will utilize the new Military Code (M-Code) GPS Signal in Space, incorporate enhanced cryptology, enable blue force GPS electronic attack, deliver greater position and time accuracy, and provide improved protection against signal spoofing as compared to legacy receivers. This project funds the Navy's integration of M-Code capable GPS receivers being developed by the United States Air Force (USAF) GPS Directorate into various receivers on Navy air platforms. This effort supports Navy's compliance with Public Law 111-383, which requires that all GPS user equipment be capable of receiving the new GPS M-Code signal after FY 2017.</p> <p>To meet the Navy's mandate, system engineering and requirement development efforts must begin before actual delivery of Military GPS User Equipment (MGUE). The integration timeline of modernized GPS receivers is 5+ years from planning to test and is dependent on platform type. Each platform uses a unique GPS receiver, and has a unique GPS system configuration, which requires separate parallel efforts to include software updates to avionics and mission computers as well as modifications to the airframe based on Size, Weight and Power and Cost (SWaP-C) requirements; coordination with each Program Management Air (PMA) organization; management, oversight and support of the effort; and contracting and working with the identified Prime Vendor</p>	0.000 -	34.896 24	30.864 -	0.000 -	30.864 -

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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>Integrator for the platform. Project currently consists of five (5) parallel efforts that integrate two (2) different M-Code GPS receivers into five (5) different type model series aircraft.</p> <p><b>FY 2020 Plans:</b>  FY 2020 funding continues to support Prime Vendor Integration (PVI) and begin testing of Miniaturized Airborne GPS receiver 2000-Modernization (MAGR2K-M) GPS Receivers on two (2) air platforms; MV-22B, and CMV-22B. MAGR2K-M GPS Receivers required minimal enhanced functionality and kept the same aviation form factor as the legacy MAGR2K-S receivers. Due to the developmental complexity of Embedded GPS Inertial-M-Code (EGI-M) GPS Receivers, PVI, and testing of EGI-M GPS Receivers will be delayed in order to incorporate enhanced capabilities as required by the EGI-M System Requirements Document (SRD). FY 2020 will support critical integration efforts of EGI-M GPS Receivers for two (2) air platforms: E-2D and CH-53K. Begin studies to incorporate improvements into GPS receivers, specifically teaming with the US Air Force to explore the feasibility of using a Software Defined Radio (SDR) as a GPS Receiver Card.</p> <p>Continue GPS Modernization efforts on the following two (2) air platforms, MV-22B and CMV-22B, which require MAGR2K-M receivers:</p> <ul style="list-style-type: none"> <li>- Support United States Air Force (USAF) box level M-Code GPS receiver performance and certification testing.</li> <li>- Begin development of aircraft software modifications required for integrating Military Code (M-Code) Global Positioning System (GPS) receivers into aircraft.</li> <li>- Begin laboratory testing of M-Code receivers in government and vendor aircraft systems integration labs.</li> <li>- Provide overarching management, central coordination, government oversight and guidance, shared expertise, and engineering support to ensure aircraft performance and integration requirements are supported during M-Code receiver platform integration.</li> </ul> <p>Continue GPS Modernization efforts on the following two (2) air platforms, E-2D and CH-53K, which require Embedded GPS/Inertial Navigation System (INS) (EGI) type of GPS receivers (LN-351):</p> <ul style="list-style-type: none"> <li>- Continue Systems Engineering and Technical Reviews (SETR) to include Pre-Engineering &amp; Manufacturing Development Review and Technology Readiness Assessment for aircraft software development efforts for all air platforms.</li> <li>- Begin hardware and software M-Code integration efforts to include Systems Requirement Review (SRR), structural analysis, electrical power load analysis, human engineering, product support analysis, and product support review of Engineering &amp; Manufacturing Development (EMD) Contract Data Requirements List (CDRL) deliverables.</li> </ul>					

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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<ul style="list-style-type: none"> <li>- Begin laboratory testing of M-Code receivers in E-2D aircraft systems integration labs.</li> <li>- Procure test article receivers to provide production representative M-Code receivers for laboratory testing for all platforms.</li> <li>- Begin E-2D integration efforts to include: review of requirements and design documentation, risk management, systems engineering integration, and system integration laboratory (SIL) standup.</li> <li>- Begin CH-53K missionization that will leverage PNT PO contracts to develop missionize CH-53K specific requirements for EGI-M integration.</li> <li>- Provide overarching management, central coordination, government oversight and guidance, shared expertise, and engineering support to ensure aircraft performance and integration requirements are supported during M-Code receiver development.</li> </ul> <p>OCO: N/A.</p> <p><b>FY 2021 Base Plans:</b> FY 2021 funding continues to support Prime Vendor Integration (PVI) and testing of Miniaturized Airborne GPS receiver 2000 - Modernization (MAGR2K-M) GPS Receivers on two (2) air platforms; MV-22B, and CMV-22B. MAGR2K-M GPS Receivers required minimal enhanced functionality and kept the same aviation form factor as the legacy MAGR2K-S receivers. Due to the developmental complexity of Embedded GPS Inertial-M-Code (EGI-M) GPS Receivers, PVI and testing of EGI-M GPS Receivers will be delayed in order to incorporate enhanced capabilities as required by the EGI-M System Requirements Document (SRD). FY 2021 will continue integration efforts of EGI-M GPS Receivers for two (2) air platforms: E-2D and CH-53K. Continue teaming with the US Air Force to determine the feasibility of using a Software Defined Radio (SDR) as a GPS Receiver Card, and continue to study opportunities to incorporate improvements into GPS receivers.</p> <p>Continue GPS Modernization efforts on the following two (2) air platforms, MV-22B and CMV-22B, which require MAGR2K-M receivers:</p> <ul style="list-style-type: none"> <li>- Support United States Air Force (USAF) box level M-Code GPS receiver performance and certification testing</li> <li>- Continue development of aircraft software modifications required for integrating Military Code (M-Code) Global Positioning System (GPS) receivers into aircraft.</li> <li>- Continue laboratory testing of M-Code receivers in government and vendor aircraft systems integration labs.</li> <li>- Begin developmental flight testing of MAGR2K-M GPS receivers for MV-22B, and CMV-22B.</li> </ul>					

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>- Provide overarching management, central coordination, government oversight and guidance, shared expertise, and engineering support to ensure aircraft performance and integration requirements are supported during M-Code receiver development.</p> <p>Continue GPS Modernization efforts on the following two (2) air platforms, E-2D and CH-53K, which require Embedded GPS/Inertial Navigation System (INS) (EGI) type of GPS receivers (LN-351):</p> <ul style="list-style-type: none"> <li>- Support United States Air Force (USAF) box level M-Code GPS receiver performance and certification testing</li> <li>- Continue supporting Systems Engineering and Technical Reviews (SETR) to include Integrated Baseline Review and Critical Design Review (CDR) for aircraft software development efforts for all air platforms</li> <li>- Continue hardware and software M-Code integration efforts to include Systems Requirement Review (SRR), structural analysis, electrical power load analysis, human engineering, product support analysis, and product support review of Engineering &amp; Manufacturing Development (EMD) Contract Data Requirements List (CDRL) deliverables</li> <li>- Continue laboratory testing of M-Code receivers in E-2D aircraft systems integration labs.</li> <li>- Continue E-2D integration efforts to include: electromagnetic interference (EMI) impact testing, integrated master schedule (IMS) planning, and technical information meetings (TIM).</li> <li>- Begin CH-53K integration efforts to include: review of requirements and design documentation, risk management, systems engineering integration, and system integration laboratory (SIL) standup.</li> <li>- Continue CH-53K missionization that will leverage PNT PO contracts to develop missionize CH-53K specific requirements for EGI-M integration.</li> <li>- Provide overarching management, central coordination, government oversight and guidance, shared expertise, and engineering support to ensure aircraft performance and integration requirements are supported during M-Code receiver development.</li> </ul> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreases by \$4.032 million to \$30.864 million in FY 2021. Funding decreases due to delayed integration efforts of Embedded Global Position System (GPS) Inertial-M-Code (EGI-M) GPS Receivers for two (2) air platform: EA-18G, and KC-130J. FY2021 funding will support PVI and testing of MAGR2K-M GPS</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Receivers on two (2) air platforms: MV-22B and CMB-22B; and critical integration efforts of EGI-M GPS for two (2) air platforms: E-2D and CH-53K.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	59.977	51.750	0.000	51.750

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

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• OPN/2657: NAVSTAR GPS Receivers (Space)	10.703	23.294	38.043	-	38.043	34.052	30.331	36.702	41.964	Continuing	Continuing
• APN/0577: Common Avionics Changes	10.064	8.118	19.235	-	19.235	24.615	34.443	37.233	55.169	111.951	703.787

**Remarks**

**D. Acquisition Strategy**

Both the Navigation Warfare (NAVWAR) Air and Sea programs will continue to integrate improved anti-jam (AJ) capability onto air and sea platforms and ensure compatibility with new Military Code (M-Code) signal.

Global Positioning System (GPS)-based Positioning, Navigation, and Timing (PNT) Service (GPNTS) program will develop, acquire, and field GPNTS, a scalable Selective Availability/Anti-Spoofing Module (SAASM) GPS-based service-oriented architecture PNT system that will provide an open, extensible, modernized replacement for the current fleet PNT systems. GPNTS will also integrate Military GPS User Equipment (MGUE) and the Office of Naval Research (ONR) developed Non-GPS Aided Positioning for Surface Ships (NoGAPSS) capabilities. A firm fixed price contract was awarded March 2018 to procure Low Rate Initial Production (LRIP) and Full Rate Production (FRP) systems.

GPS Modernization will manage the non-recurring engineering required to conduct systems engineering, integration and test of modernized GPS receivers and utilize United States Air Force (USAF) hardware contracts, and Navy air platform integration contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity 1319 / 5				R-1 Program Element (Number/Name) PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				Project (Number/Name) 0921 / NAVSTAR GPS Equipment							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Air NAVWAR Development	MIPR	Mayflower : Fort Eustis, VA	0.000	0.000		0.600	Feb 2020	0.600	Feb 2021	-		0.600	0.000	1.200	-
Air NAVWAR Development Support	WR	NAWC : Pax River, MD	0.000	0.000		1.600	Nov 2019	2.100	Nov 2020	-		2.100	Continuing	Continuing	Continuing
Air NAVWAR Govt Eng Support	WR	NAWC : Pax River, MD	0.000	0.000		1.500	Dec 2019	2.292	Dec 2020	-		2.292	Continuing	Continuing	Continuing
Sea NAVWAR Development Support	WR	SSC PAC, NUWC : San Diego, Newport	0.000	0.000		0.362	Dec 2019	0.420	Dec 2020	-		0.420	Continuing	Continuing	Continuing
GPNTS SW / NoGAPSS Development	C/CPFF	TBD : TBD	0.000	0.000		6.900	Jan 2020	3.600	Jan 2021	-		3.600	Continuing	Continuing	Continuing
GPNTS Development Support	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.365	Dec 2019	1.065	Dec 2020	-		1.065	Continuing	Continuing	Continuing
GPNTS Govt Eng Support	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.800	Dec 2019	1.414	Dec 2020	-		1.414	Continuing	Continuing	Continuing
GPS Mod Development F/ A-18E/F MAGR2K-M	C/CPIF	Boeing : St Louis, MO	0.000	0.000		6.950	Dec 2019	8.733	Dec 2020	-		8.733	Continuing	Continuing	Continuing
GPS Mod Development E-2D	C/CPIF	Northrup Gruman : Pax River, MD	0.000	0.000		0.850	Nov 2019	0.850	Nov 2020	-		0.850	Continuing	Continuing	Continuing
GPS Mod Development MV-22B,CMV-22B	C/CPIF	Bell Boeing : Amarillo, TX	0.000	0.000		4.800	Feb 2020	4.187	Feb 2021	-		4.187	Continuing	Continuing	Continuing
GPS Mod Development CH-53K	C/CPIF	Sikorsky : Stratford, CT	0.000	0.000		0.850	Nov 2019	0.850	Nov 2020	-		0.850	Continuing	Continuing	Continuing
GPS Mod Hardware E-2D	C/FFP	TBD : TBD	0.000	0.000		2.786	Apr 2020	0.000		-		0.000	0.000	2.786	-
GPS Mod Hardware CH-53K	C/FFP	TBD : TBD	0.000	0.000		2.786	Apr 2020	0.000		-		0.000	0.000	2.786	-
GPS Mod Development Support	WR	NIWC PAC, NAWC : San Diego, Pax River	0.000	0.000		2.250	Nov 2019	2.250	Nov 2020	-		2.250	Continuing	Continuing	Continuing
GPS Mod Govt Eng Support	WR	NIWC PAC, NAWC : San Diego, Pax River	0.000	0.000		3.178	Nov 2019	3.198	Nov 2020	-		3.198	Continuing	Continuing	Continuing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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<b>Product Development (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Product Development	WR	GPS Directorate : Los Angeles, CA	0.000	0.000		0.950	Dec 2019	0.950	Dec 2020	-		0.950	Continuing	Continuing	Continuing
Systems Engineering	WR	Govt, Contractor : San Diego, Newport	0.000	0.000		0.250	Nov 2019	0.250	Nov 2020	-		0.250	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		39.777		32.759		-		32.759	Continuing	Continuing	N/A

**Remarks**  
 FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment). FY 2021 decrease in funding requirements is for the reduction in integration efforts for three (3) EGI-M GPS Receivers: F/A-18E/F, EA-18G, and KC-130J. FY 2021 funding will continue to support the development, test planning and integration of MAGR2K-M GPS Receivers on 2 (3) air platforms; MV-22B, and CMV-22B; and critical integration efforts of EGI-M GPS Receivers for two (2) air platforms: E-2D and CH-53K.

<b>Support (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Contract Engineering Services	WR	BAH : San Diego, Pax River, China Lake	0.000	0.000		1.350	Nov 2019	1.350	Nov 2020	-		1.350	Continuing	Continuing	Continuing
Engineering Services	WR	NIWC PAC, NAWC : San Diego, Pax River	0.000	0.000		1.642	Nov 2019	1.839	Nov 2020	-		1.839	Continuing	Continuing	Continuing
Integrated Logistics Support	WR	NIWC PAC, NAWC : San Diego, Pax River	0.000	0.000		1.500	Dec 2019	1.500	Dec 2020	-		1.500	Continuing	Continuing	Continuing
Software Contract Support	C/CPFF	Raytheon : San Diego	0.000	0.000		2.553	Nov 2019	0.000		-		0.000	0.000	2.553	-
<b>Subtotal</b>			0.000	0.000		7.045		4.689		-		4.689	Continuing	Continuing	N/A

**Remarks**  
 FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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<b>Test and Evaluation (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Air NAVWAR Test & Evaluation	WR	NAWC : Pax River	0.000	0.000		1.343	Nov 2019	2.704	Nov 2020	-		2.704	Continuing	Continuing	Continuing
Sea NAVWAR Test & Evaluation	WR	NIWC PAC, NUWC : San Diego, Newport	0.000	0.000		2.000	Nov 2019	1.943	Nov 2020	-		1.943	Continuing	Continuing	Continuing
GPNTS Test & Evaluation	WR	NIWC PAC : San Diego	0.000	0.000		1.100	Nov 2019	1.100	Nov 2020	-		1.100	Continuing	Continuing	Continuing
GPS Mod Test & Evaluation	WR	NIWC PAC, NAWC : San Diego, Pax River	0.000	0.000		4.400	Nov 2019	4.400	Dec 2020	-		4.400	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		8.843		10.147		-		10.147	Continuing	Continuing	N/A

**Remarks**  
FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

<b>Management Services (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Program Management Support	C/CPAF	BAH : San Diego, Pax River, China Lake	0.000	0.000		4.312	Nov 2019	4.155	Nov 2020	-		4.155	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		4.312		4.155		-		4.155	Continuing	Continuing	N/A

**Remarks**  
FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	0.000	0.000	59.977	51.750	-	51.750	Continuing	Continuing	N/A

**Remarks**  
FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

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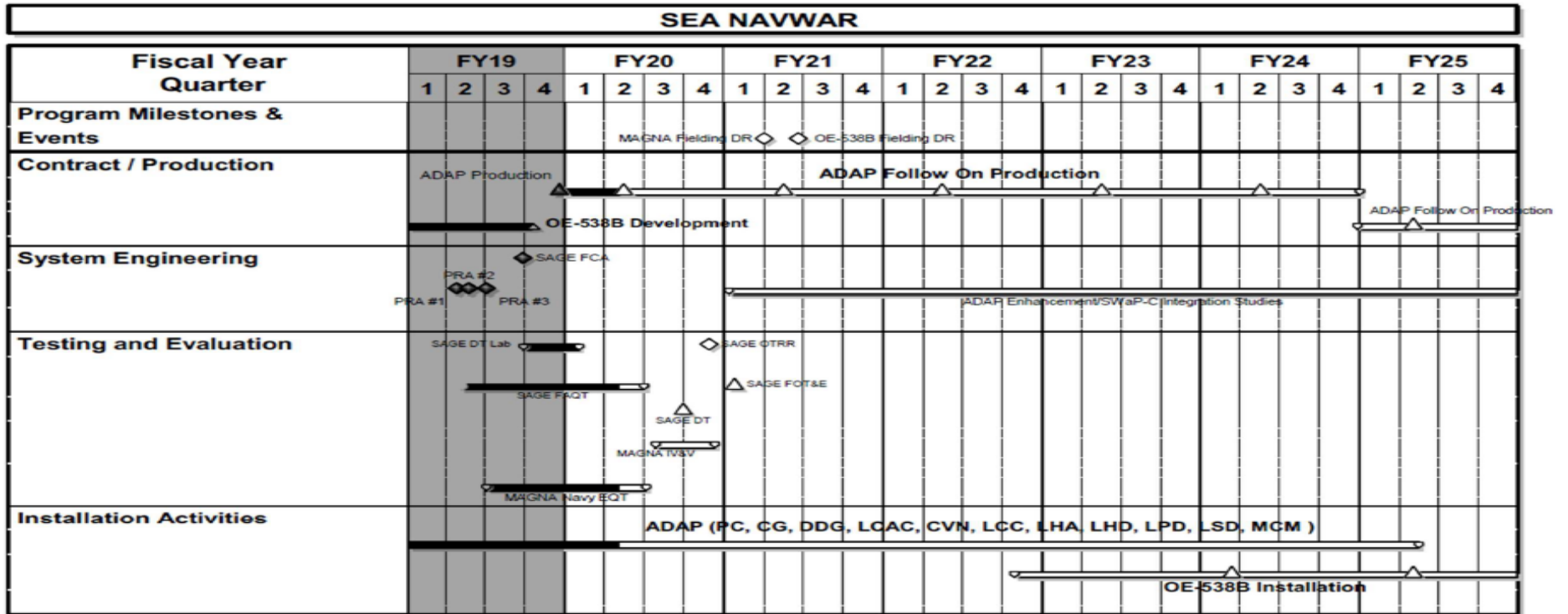
Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

Date: February 2020

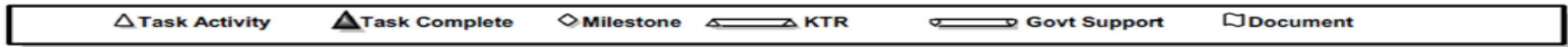
Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604280N / JNT Tactical Radio System -  
Maritime/Fixed Station

Project (Number/Name)  
0921 / NAVSTAR GPS Equipment



FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment)



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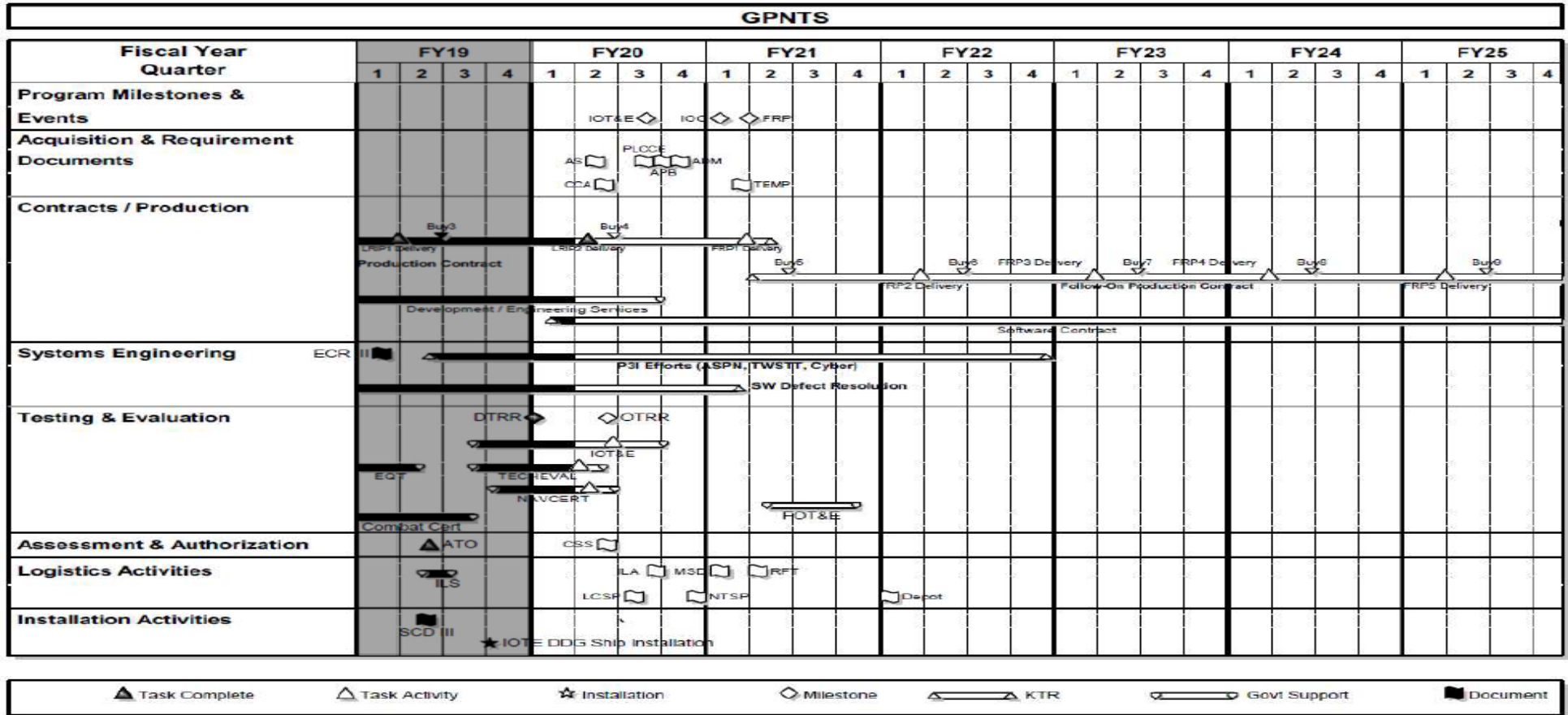
Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

Date: February 2020

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station

Project (Number/Name)  
0921 / NAVSTAR GPS Equipment



FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

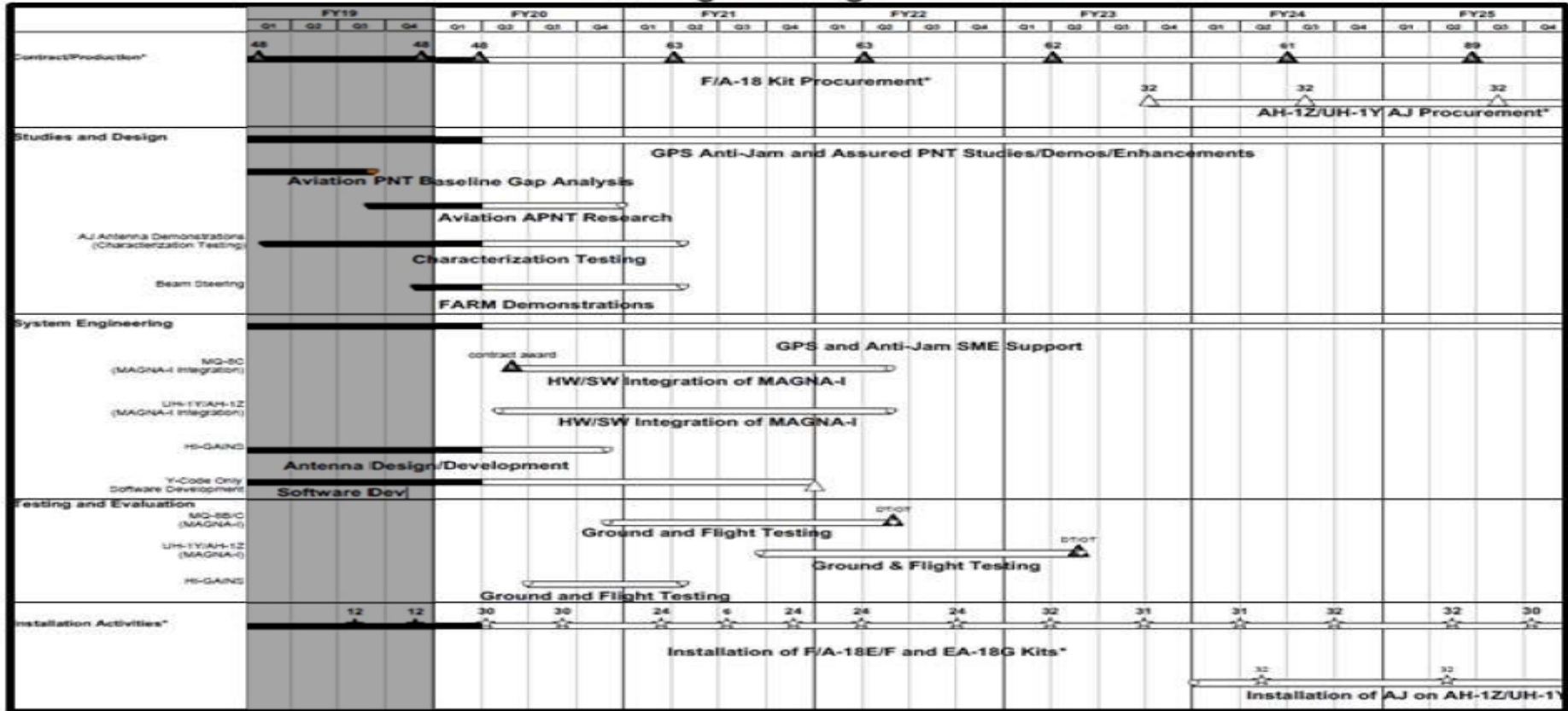
Date: February 2020

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604280N / JNT Tactical Radio System -  
Maritime/Fixed Station

Project (Number/Name)  
0921 / NAVSTAR GPS Equipment

Air Navigation Program Schedule



\* These Schedule activities are funded with APN

FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

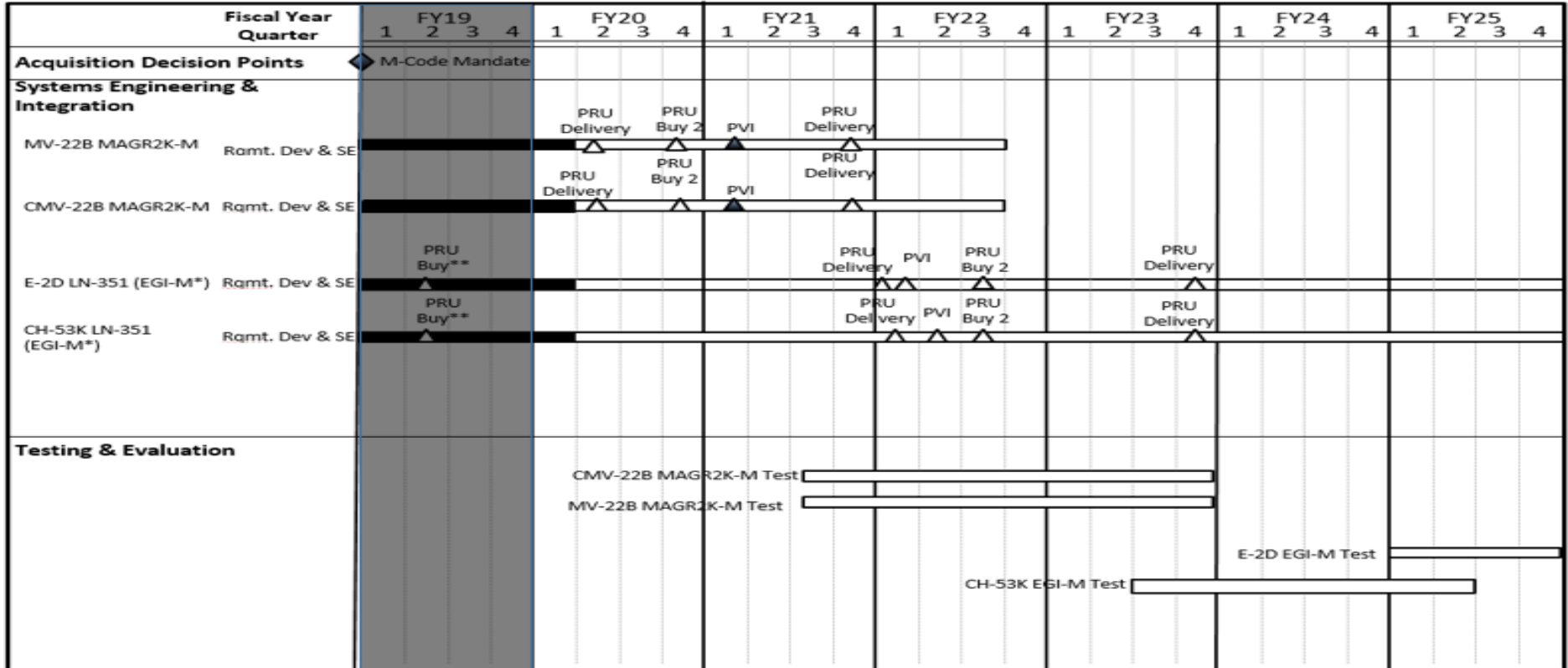
Date: February 2020

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station

Project (Number/Name)  
0921 / NAVSTAR GPS Equipment

**GPS Modernization**



- \* EGI-M Platforms will conduct critical Early Integration Efforts in FY19 and FY20
- \*\* EGI-M PRU Procurements in FY19 are for Lab and government early integration efforts. Other EGI-M PRU buys shown are notional and based on current vendor projections.

FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Navy</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b>Proj 0921</b>				
Sea NAVWAR: Sea Navigation MAGNA Fielding Decision	2	2021	2	2021
Sea NAVWAR: Sea Navigation OE-538B Fielding Decision	2	2021	2	2021
Sea NAVWAR: Sea Navigation ADAP Production	1	2020	4	2024
Sea NAVWAR: Sea Navigation ADAP Follow On Production	1	2025	4	2025
Sea NAVWAR: Sea Navigation ADAP Enhancement/SWaP-C Integration Studies	1	2021	4	2025
Sea NAVWAR: Sea Navigation SAGE Development Test Lab (DT)	1	2020	1	2020
Sea NAVWAR: Sea Navigation SAGE Operational Test Readiness Review (OTRR)	4	2020	4	2020
Sea NAVWAR: Sea Navigation SAGE First Article Qualification Testing (FAQT)	1	2020	2	2020
Sea NAVWAR: Sea Navigation SAGE Full Operational Test & Evaluation (FOT&E)	1	2021	1	2021
Sea NAVWAR: Sea Navigation SAGE Development Test (DT)	4	2020	4	2020
Sea NAVWAR: Sea Navigation MAGNA IV&V	3	2020	4	2020
Sea NAVWAR: Sea Navigation MAGNA Navy EQT	1	2020	2	2020
Sea NAVWAR: Sea Navigation ADAP Installations	1	2020	2	2025
Sea NAVWAR: Sea Navigation OE-538B Installations	4	2022	4	2025
GPS-based PNT Service (GPNTS): GPNTS IOT&E	3	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS Initial Operational Capability (IOC)	1	2021	1	2021
GPS-based PNT Service (GPNTS): GPNTS Full Rate Production (FRP)	2	2021	2	2021
GPS-based PNT Service (GPNTS): GPNTS AS	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS PLCCE	3	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS APB	3	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS ADM	4	2020	4	2020

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GPS-based PNT Service (GPNTS): GPNTS CCA	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS TEMP	1	2021	1	2021
GPS-based PNT Service (GPNTS): GPNTS Production Contract	1	2020	2	2021
GPS-based PNT Service (GPNTS): GPNTS Follow On Production Contract	2	2021	4	2025
GPS-based PNT Service (GPNTS): GPNTS Buy 4	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS Buy 5	2	2021	2	2021
GPS-based PNT Service (GPNTS): GPNTS Buy 6	2	2022	2	2022
GPS-based PNT Service (GPNTS): GPNTS Buy 7	2	2023	2	2023
GPS-based PNT Service (GPNTS): GPNTS Buy 8	2	2024	2	2024
GPS-based PNT Service (GPNTS): GPNTS Buy 9	2	2025	2	2025
GPS-based PNT Service (GPNTS): GPNTS Development / Engineering Services	1	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS Software Contract	1	2020	4	2025
GPS-based PNT Service (GPNTS): GPNTS P3I Efforts	1	2020	4	2022
GPS-based PNT Service (GPNTS): GPNTS SW Defect Resolution	1	2020	1	2021
GPS-based PNT Service (GPNTS): GPNTS DTRR	1	2020	1	2020
GPS-based PNT Service (GPNTS): GPNTS OTRR	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS Initial Operational Test and Evaluation (IOT&E)	1	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS TECH EVAL	1	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS NAVCERT	1	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS Follow-on Operational Test and Evaluation (FOT&E)	2	2021	4	2021
GPS-based PNT Service (GPNTS): GPNTS CSS	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS ILA	3	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS MSD	1	2021	1	2021
GPS-based PNT Service (GPNTS): GPNTS RFT	2	2021	2	2021

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**Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GPS-based PNT Service (GPNTS): GPNTS LCSP	3	2020	3	2020
GPS-based PNT Service (GPNTS): GPNTS NTSP	4	2020	4	2020
GPS-based PNT Service (GPNTS): GPNTS Depot	1	2022	1	2022
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2020	2	2020	2	2020
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2021	2	2021	2	2021
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2022	2	2022	2	2022
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2023	2	2023	2	2023
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2024	3	2024	3	2024
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2025	3	2025	3	2025
Air NAVWAR: Air Navigation AH-1Z/UH-Y AJ Procurement 2023	4	2023	4	2023
Air NAVWAR: Air Navigation AH-1Z/UH-Y AJ Procurement 2024	3	2024	3	2024
Air NAVWAR: Air Navigation AH-1Z/UH-Y AJ Procurement 2025	3	2025	3	2025
Air NAVWAR: Air Navigation GPS Anti-Jam and Assured PNT Studies/Demos/ Enhancements	1	2020	4	2025
Air NAVWAR: Air Navigation Aviation APNT Market Research	1	2020	4	2020
Air NAVWAR: Air Navigation Characterization Testing	1	2020	2	2021
Air NAVWAR: Air Navigation FARM Demonstrations	1	2020	2	2021
Air NAVWAR: Air Navigation GPS and Anti-Jam SME Support	1	2020	4	2025
Air NAVWAR: Air Navigation HW/SW Integration of MAGNA-I on MQ-8B/8C	2	2020	2	2022
Air NAVWAR: Air Navigation HW/SW Integration of MAGNA-I on UH-1Y/AH-1Z	2	2020	2	2022
Air NAVWAR: Air Navigation HI-GAINS Antenna Design/Development	1	2020	4	2020
Air NAVWAR: Air Navigation Software Development	1	2020	4	2021
Air NAVWAR: Air Navigation MQ-8B/8C MAGNA-I Ground and Flight Testing	4	2020	2	2022
Air NAVWAR: Air Navigation MQ-8B/8C MAGNA-I DT/OT	2	2022	2	2022
Air NAVWAR: Air Navigation UH-1Y/AH-1Z MAGNA-I Ground and Flight Testing	3	2021	2	2023
Air NAVWAR: Air Navigation UH-1Y/AH-1Z MAGNA-I DT/OT	2	2023	2	2023

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**Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Air NAVWAR: Air Navigation HI-GAINS Ground and Flight Testing	3	2020	2	2021
Air NAVWAR: Air Navigation Installation of F/A-18E/F & EA-18G Kits	1	2020	4	2025
Air NAVWAR: Air Navigation Installation of AJ on AH-1Z/UH-1Y	1	2024	4	2025
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M Rqmt. Dev & SE	1	2020	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M PRU Delivery 1	2	2020	2	2020
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M PRU Buy 2	4	2020	4	2020
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M Prime Vendor Integration	1	2021	1	2021
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M PRU Delivery 2	4	2021	4	2021
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M Rqmt. Dev & SE	1	2020	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M PRU Delivery 1	2	2020	2	2020
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M PRU Buy 2	4	2020	4	2020
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M Prime Vendor Integration	1	2021	1	2021
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M PRU Delivery 2	4	2021	4	2021
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 Rqmt. Dev & SE	1	2020	4	2025
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Delivery 1	1	2022	1	2022
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 Prime Vendor Integration	1	2022	1	2022
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Buy 2	3	2022	3	2022

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**Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 0921 / NAVSTAR GPS Equipment
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Delivery 2	4	2023	4	2023
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 Rqmt. Dev & SE	1	2020	4	2025
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Delivery 1	1	2022	1	2022
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 Prime Vendor Integration	2	2022	2	2022
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Buy 2	3	2022	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Delivery 2	4	2023	4	2023
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M Test	3	2021	4	2023
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M Test	3	2021	4	2023
Air NAVWAR: GPS Modernization: GPS Modernization E-2D EGI-M Test	1	2025	4	2025
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K EGI-M Test	3	2023	2	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System
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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
1411: <i>Sub Tact Comm System</i>	0.000	0.000	14.175	14.329	-	14.329	14.182	14.814	15.080	15.383	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0604503N Project 1411 as part of RDTEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

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

The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. The details of S3S within project 1411 are classified.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> Common Submarine Radio Room (CSRR)  <b>Articles:</b>  <b>FY 2020 Plans:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.  <b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.	0.000	10.126	10.478	0.000	10.478
<b>Articles:</b>	-	-	-	-	-
<b>Title:</b> Undersea Assured Command & Control (UAC2)  <b>Articles:</b>  <b>FY 2020 Plans:</b>	0.000	0.352	0.000	0.000	0.000
<b>Articles:</b>	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System			
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>					
The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 Base Plans:</b> N/A					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books					
<b>Title:</b> Link 16					
<b>Articles:</b>					
	0.000	3.397	2.438	0.000	2.438
	-	-	-	-	-
<b>FY 2020 Plans:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>Title:</b> S3S					
<b>Articles:</b>					
	0.000	0.300	1.413	0.000	1.413
	-	-	-	-	-
<b>Description:</b> Detailed information available at a higher classification.					
<b>FY 2020 Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 Base Plans:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	14.175	14.329	0.000	14.329

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• 0604503N/1411: Submarine Tactical Communication System	15.711	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	258.491
• OPN/3130: Submarine Communication Equipment	71.190	60.794	62.214	-	62.214	73.899	73.227	74.121	75.594	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System
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<b>Product Development (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Classified	TBD	Not Specified : Not Specified	0.000	0.000		10.817	Dec 2019	9.928	Dec 2020	-		9.928	Continuing	Continuing	Continuing
S3S Platform Integration	MIPR	Army/TSMO : Redstone Arsenal, AL	0.000	0.000		0.300	Sep 2020	1.413	Sep 2021	-		1.413	0.000	1.713	-
<b>Subtotal</b>			0.000	0.000		11.117		11.341		-		11.341	Continuing	Continuing	N/A

**Remarks**  
 - FY18 and FY19 cost data is provided under PE 0604503N Project 1411  
 - The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

<b>Support (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Classified	TBD	Not Specified : Not Specified	0.000	0.000		1.955	Nov 2019	1.913	Nov 2020	-		1.913	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		1.955		1.913		-		1.913	Continuing	Continuing	N/A

**Remarks**  
 - FY18 and FY19 cost data is provided under PE 0604503N Project 1411  
 - The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

<b>Test and Evaluation (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.120	Nov 2019	0.199	Nov 2020	-		0.199	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.120		0.199		-		0.199	Continuing	Continuing	N/A

**Remarks**  
 - FY18 and FY19 cost data is provided under PE 0604503N Project 1411

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

- The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.983	Nov 2019	0.876	Nov 2020	-		0.876	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.983		0.876		-		0.876	Continuing	Continuing	N/A

**Remarks**  
 - FY18 and FY19 cost data is provided under PE 0604503N Project 1411  
 - The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	0.000	14.175	14.329	-	14.329	Continuing	Continuing	N/A

**Remarks**  
 - FY18 and FY19 cost data is provided under PE 0604503N Project 1411  
 - The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System
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Proj 1411.L39	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
<div style="border: 1px solid black; width: 100%; height: 100%;"></div>																												

2021DON - 0604280N - 1411.L39

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 1411 / Sub Tact Comm System

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 1411.L39</b>				
Classified (Place Holder)	1	2020	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 2126 / ATDLS Integration			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
2126: ATDLS Integration	0.000	0.000	18.201	21.203	-	21.203	21.254	22.665	23.127	23.590	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0205604N Project 2126 as part of the RD TEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

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

This project develops and improves the Navy's Tactical Data Link (TDL) systems. It includes the Advanced Tactical Data Link Systems (ATDLS) Integration Programs, specifically Link 16 Network, Command and Control Processor (C2P) and Link Monitoring and Management Tool (LMMT).

ATDLS Integration Program develops new and improved capabilities for Navy TDL users. The ATDLS Integration Programs perform technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues. The programs insert new technology enhancements via incremental software & hardware upgrades and deliver as annual build release. The Navy Link 16 Network Increment II consists of Dynamic Network Management (DNM), Cryptographic Modernization (CM) and Frequency Remapping (FR). C2P is a critical component of the shipboard combat system enabling tactical data link integration with the combat systems. C2P is a critical component of the Aegis Ballistic Missile Defense (BMD) architecture. C2P Technology Refresh (TR) will modernize obsolete C2P system hardware components and improve C2P system cyber security posture. C2P Modernization (MOD) is a service life extension effort required to sustain C2P system viability and significantly improve its cyber resiliency. C2P MOD modernizes the legacy C2P system software to enable improved cyber resiliency, improved system operational availability and the ability to run in multiple hardware environments. Link 22 development and integration into the C2P allows for improved maritime tactical data link operations with coalition forces. LMMT will upgrade commercial off-the-shelf hardware and modernize software operating systems. LMMT will perform monitoring and management of all TDL and provide information in support of the Integrated Air & Missile Defense (IAMD) and Ballistic Missile Defense (BMD) missions.

Link 16 Network Increment II: (1) Develop and implement CM and FR mandates as a product improvement into existing legacy JTIDS and MOS terminals and integration into Link 16 terminals and integration into shore sites, ship (NGC2P, Next Generation Command and Control Processor), and current Navy Joint Tactical Information Distribution System (JTIDS) airborne platforms; (2) Developmental Testing (DT) / Operational Testing (OT) of Navy platform CM/FR modifications; (3) provide product improvement for continued production capability Multifunctional Information Distribution System (MIDS) on Ship (MOS) Modernization (MOS Mod) and extensibility to new Tactical Data Link capabilities of shipboard Link 16 terminals, (4) qualification of replacement shipboard Link 16 antenna to replace end of life existing antenna. JTIDS, MOS CM/FR, and MOS Mod efforts are in support of NSA and Joint Chiefs of Staff mandates for the modernization of the cryptographic algorithm used in Link 16 terminals and the Department of Defense and the Department of Transportation Memorandum of Agreement for the implementation of a capability to remap any 14 of the existing 51 frequencies in order to remain operable within the United States and its possessions. All Link 16 terminals are required to have this capability to support Link 16 Interoperability.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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FY2021 Justification (Link 16): Conduct MOS Mod Fielding Decision Review (FDR). Investigate MOS Mod and MIDS JTRS deficiencies identified during testing. Continue integrated testing of C2P and MOS Mod with CMN capability.

Command and Control Processor (C2P): Command and Control Processor (C2P): The two RDT&E initiatives are 1) C2P Technology Refresh (TR) cyber security update and 2) C2P Modernization which now includes Link 22 integration. C2P TR cyber security update is a new initiative driven by recently discovered cyber security risk to the C2P system in support of the BMD mission. The C2P TR Cyber security update is planned to support acceleration on all AEGIS BMD ships. C2P Modernization funds the transition of the C2Ps legacy CMS-2Y software code (old Navy unique computer programming language from the 1980s) to a modern software language. Transition to a modern software language is required to sustain the system software and to more adequately address growing cybersecurity and Ao challenges and to enable more affordable transition to new hardware processing components as a result of commercial of the shelf processor obsolescence. Link 22 which was previously planned for fielding in the C2P TR architecture has been delayed until the fielding of C2P Modernization. This was based on prioritizing existing resources to address the emergent cyber security risk that has resulted in the C2P TR cybersecurity update plan. Link 22 is a modernized replacement for Link 11, providing beyond line of site (BLOS) tactical data communications using HF radios.

FY2021 Justification (C2P): Complete C2P TR cybersecurity update development and conduct combat system integration testing. Continue C2P Modernization development and complete initial spiral software releases A and B.

Link Monitoring and Management Tool (LMMT) is a system delivered on commercial off-the-shelf hardware providing gateway functions for multiple Tactical Data Link (TDL) interface, routing and display of TDL data to include Link 16 and Joint Range Extension (JRE). LMMT is also capable of performing TDL network monitoring and management, data forwarding between the TDLs and providing tactical data to the IAMD, BMD network, and Global Command and Control System (GCCS) for establishing the common operational picture. LMMT requirements will be incrementally developed and delivered in capability drops via the Joint Capabilities Integration Development System (JCIDS) IT Box approach.

FY 2021 Justification (LMMT): Conduct Capability Drop (CD) 3 .

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> Link 16 Network Increment II - Cryptographic Modernization (CM) / Frequency Remapping (FR)	0.000	3.384	0.598	0.000	0.598
<b>Articles:</b>	-	1	-	-	-
<b>FY 2020 Plans:</b>					
Complete JTIDS CM/FR shipboard integrated testing and data reduction including for operational test.					
Continue preparations and conduct JTIDS CM/FR Fielding Decision Review (FDR).					
Complete MOS CM/FR integrated testing and data reduction including for operational test.					
Continue preparations and conduct MOS CM/FR Fielding Decision Review (FDR).					
Continue government testing and data reduction including for operational testing of MOS Mod.					
Continue preparations for MOS Mod FDR fielding decision review.					
Complete integration and test MIDS JTRS CMN terminal into MOS Modernization terminal.					
Develop C2P software update to implement CMN capability.					
Initiate government integration and testing of CMN capability with MOS Mod and C2P					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy			<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration				
<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>						
		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Continue Link 16 Network integration logistics support. <b>FY 2021 Base Plans:</b> Complete government testing and data reduction including for operational testing of MOS MOD. Conduct MOS Mod FDR Investigate MOS Mod and MIDS J deficiencies Continue government integration and testing of CMN capability with MOS Mod and C2P. <b>FY 2021 OCO Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY 2020 to FY 2021 decrease of \$2.786 million is due to a transition from development to production for JTIDS CM/FR, MOS CM/FR and MOS Mod after OT for each system to be completed in FY20. The remaining planned effort is limited to integration and testing of CMN capability with MOS Mod and C2P.						
<b>Title:</b> Command and Control Processor (C2P)		0.000	12.591	18.408	0.000	18.408
		<b>Articles:</b>	-	-	-	-
<b>FY 2020 Plans:</b> Complete C2P TR cyber security baseline development. Commence C2P TR cyber security baseline IV&V testing. Continue C2P Modernization development. <b>FY 2021 Base Plans:</b> Complete C2P TR cyber security IV&V testing Conduct C2P TR Cybersecurity Combat System Integration testing Commence fielding of C2P TR Cyber security baseline Continue C2P Modernization development and deliver Releases A and B <b>FY 2021 OCO Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>						

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 to FY2021 funding request increase of \$5.832 million is the result of pivoting staffing resources to support full C2P Modernization development efforts in order to maintain the current schedule for Software Releases A and B.					
<b>Title:</b> Link Monitoring and Management Tool (LMMT)	0.000	2.226	2.197	0.000	2.197
<b>Articles:</b>	-	-	-	-	-
<b>FY 2020 Plans:</b> Conduct Capability Drop (CD 3) Build Decision and commence CD 3 development. Conduct Build Technical Review (BTR) for CD 3.					
<b>FY 2021 Base Plans:</b> Continue CD 3 development Conduct Independent Verification and Validation (IVV)					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> There is no change for the funding request from FY 2020 to FY2021.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	18.201	21.203	0.000	21.203

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/2614: Adv Tact Data Link Sys (ATDLS)	29.822	52.753	103.835	-	103.835	86.367	60.020	62.574	62.991	Continuing	Continuing
• RDTEN/0205604N/2126: ATDLS Integration	24.398	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	840.376

**Remarks**

**D. Acquisition Strategy**  
The JTIDS Crypto Modernization (CM)/Frequency Remapping (FR) development and low rate initial production (LRIP) contract was awarded to Data Link Solutions (DLS). A sole source determination was approved for the production and integration of JPI hardware. DLS will produce and integrate JPI hardware and software into existing JTIDS terminals. Multifunctional Information Distribution System (MIDS) on Ship (MOS) CM/FR will be accomplished through integration of the MIDS LVT

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / <i>JNT Tactical Radio System - Maritime/Fixed Station</i>	<b>Project (Number/Name)</b> 2126 / <i>ATDLS Integration</i>
<p>Block Upgrade 2 (BU) into the existing MOS cabinet. MOS CM/FR required development and integration of a High-Power Amplifier (HPA) bypass switch. HPA bypass switch development was conducted by NIWC Pacific. Production of HPA Switch will be performed by NIWC PAC for existing MOS systems. To address the WIN 10 implementation for the MOS system, a new MOS Terminal Controller hardware and software has been developed and is being produced on the MOS Lot 4 contract. MOS MOD contract will provide three engineering manufacturing development (EMD) units for developmental and operational testing. The MOS MOD contract will also provide full rate production units. A second MOS Mod contract for production will be competitively awarded to extend the production period and increase capacity.</p> <p>The C2P Technology Refresh (TR) and Link 22 development contract was awarded to Northrop Grumman. The Data Terminal Set (DTS) contract to support the Link 11/ Link 22 functions of the C2P system was awarded in August 2016. An existing Indefinite Delivery Indefinite Quantity Multiple Award Contract (IDIQ MAC) contract will be used to procure initial TR units with a new ATDLS production contract planned for future procurements in FY 19 and beyond.</p> <p>The Link Monitoring and Management Tool (LMMT) capability will replace previously-fielded Air Defense Systems Integrator (ADSI) systems. LMMT will leverage existing government-off-the-shelf (GOTS) software and commercial-off-the-shelf (COTS) hardware. LMMT capabilities are implemented primarily in software and will be developed in capability drops (CDs). Existing GOTS software will be updated to incorporate network performance monitoring and management capabilities by Naval Information Warfare Center(NIWC).</p>		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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<b>Product Development (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Link 16 Network Technical Design Agents	C/CPFF	SeaPort- Various : San Diego, CA	0.000	0.000		0.832	Oct 2019	0.000		-		0.000	0.000	0.832	-
Link 16 Network Systems Engineering	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.103	Oct 2019	0.000		-		0.000	0.000	1.103	-
C2P Systems Engineering	WR	NIWC PAC : San Diego, CA	0.000	0.000		5.397	Oct 2019	2.004	Oct 2020	-		2.004	Continuing	Continuing	Continuing
C2P IV&V	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.506	Oct 2019	0.000		-		0.000	Continuing	Continuing	Continuing
C2P Development & Integration	WR	NIWC PAC : San Diego, CA	0.000	0.000		3.288	Oct 2019	13.630	Oct 2020	-		13.630	Continuing	Continuing	Continuing
LMMT Development	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.955	Oct 2019	1.010	Oct 2020	-		1.010	Continuing	Continuing	Continuing
LMMT Systems Engineering	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.594	Oct 2019	0.377	Oct 2020	-		0.377	Continuing	Continuing	Continuing
LMMT IV&V	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.197	Oct 2019	0.252	Oct 2020	-		0.252	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		12.872		17.273		-		17.273	Continuing	Continuing	N/A

**Remarks**  
 FY19 cost data is provided under PE 0205604N Project 2126  
 C2P IV&V has no cost in FY21 due to the completion of v3.11 baseline in FY20. IV&V will continue though as the next IV&V cycle will be C2P MOD in FY22.

<b>Test and Evaluation (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Link 16 Network T&E	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.310	Oct 2019	0.488	Oct 2020	-		0.488	Continuing	Continuing	Continuing
C2P T&E	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.800	Oct 2019	1.505	Oct 2020	-		1.505	Continuing	Continuing	Continuing
LMMT T&E	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.000		0.272	Oct 2020	-		0.272	0.000	0.272	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			0.000	0.000		3.110		2.265		-		2.265	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0205604N Project 2126

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Link 16 Network Program Management Support	C/CPFF	SeaPort- Various : San Diego, CA	0.000	0.000		0.139	Oct 2019	0.110	Oct 2020	-		0.110	Continuing	Continuing	Continuing
C2P Program Management Support	C/CPFF	SeaPort- Various : San Diego, CA	0.000	0.000		0.800	Oct 2019	0.591	Oct 2020	-		0.591	Continuing	Continuing	Continuing
C2P Systems Engineering Support	C/CPFF	SeaPort- Various : San Diego, CA	0.000	0.000		0.800	Oct 2019	0.678	Oct 2020	-		0.678	Continuing	Continuing	Continuing
LMMT Program Management	C/CPFF	SeaPort- Various : San Diego, CA	0.000	0.000		0.480	Oct 2019	0.286	Oct 2020	-		0.286	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		2.219		1.665		-		1.665	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0205604N Project 2126

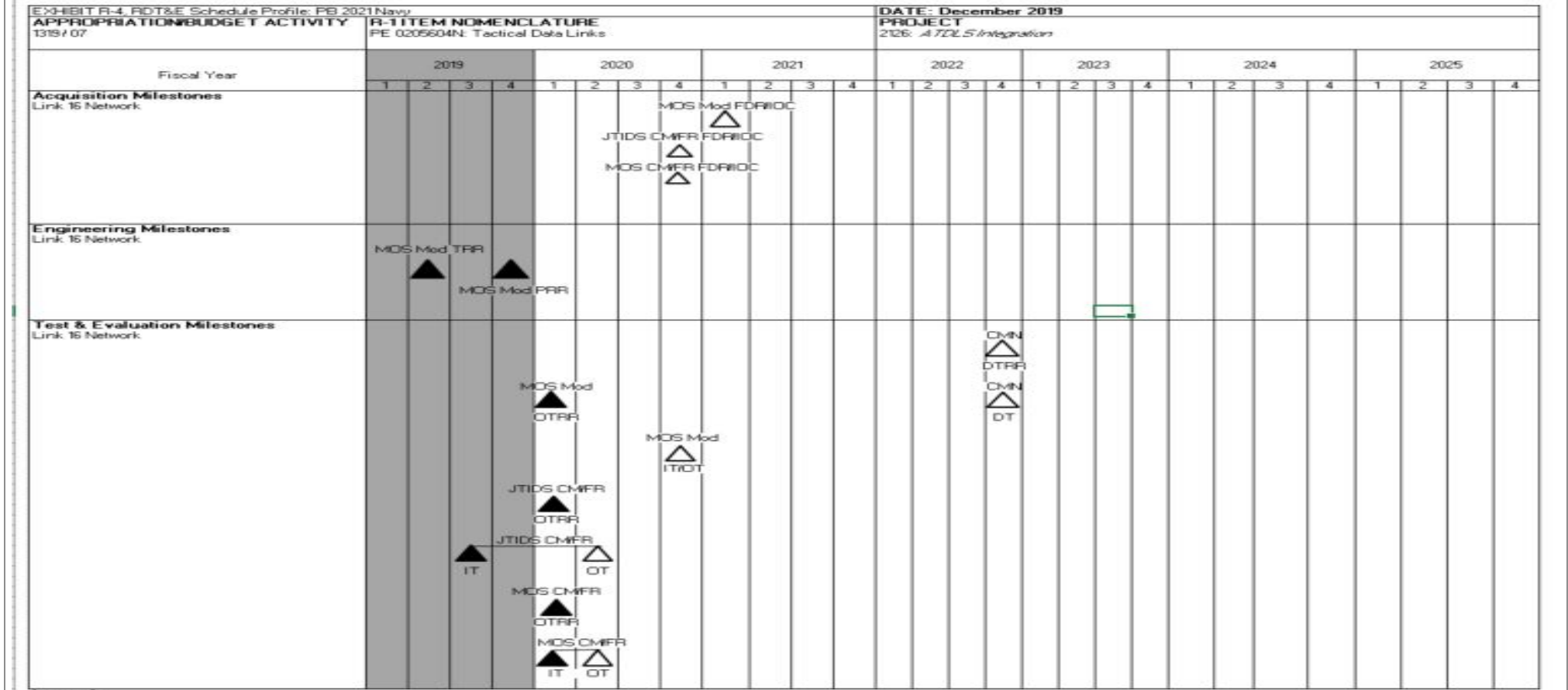
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	0.000	18.201	21.203	-	21.203	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0205604N Project 2126

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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**Legend:**  
 CM - Cryptographic Modernization  
 DNMT - Dynamic Network Management  
 OT - Developmental Test  
 DTRR - Developmental Test Readiness Review  
 FDR - Fielding Decision Review  
 FOC - Full Operating Capability  
 FDT&E - Follow-on Operational Test & Evaluation  
 FR - Frequency Reshaping  
 IOC - Initial Operating Capability  
 IT - Integrated Test  
 ITRR - Integrated Test Readiness Review  
 IV&V - Independent Verification and Validation  
 JTIDS - Joint Tactical Information Distribution System  
 MOS - MDS On Ship  
 MOS MOD - MDS Modernization  
 OT - Operational Test  
 OTRR - Operational Test Readiness Review  
 PRR - Production Readiness Review  
 TRR - Test Readiness Review

Efforts in FY20 and out are funded under PE 0604280N Proj 2126



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Navy</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration

Fiscal Year	2019																2020				2021				2022				2023				2024				2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
	<b>Acquisition Milestones</b> LMMT																																							
<b>Engineering Milestones</b> LMMT																																								
<b>Test &amp; Evaluation Milestones</b> LMMT																																								

**Legend:**  
 BD - Build Decision      CD - Capability Drop      FDR - Fielding Decision Review      FTR - Fielding Technical Review      OT - Operational Test  
 BTR - Build Technical Review      DT - Developmental Test      FOC - Full Operational Capability      IOC - Initial Operating Capability      OTRR - Operational Test Readiness Review  
 IVV - Independent Verification and Validation

FY19 funding was provided under PE 0205604N Project 2126

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 2126</b>				
Link 16 MOS Mod Integrated Test	4	2020	4	2020
Link 16 MOS CM/FR Integrated Test	1	2020	1	2020
Link 16 JTIDS CM/FR Operational Test Readiness Review	1	2020	1	2020
Link 16 JTIDS CM/FR Operational Test	2	2020	2	2020
Link 16 MOS CM/FR Operational Test Readiness Review	1	2020	1	2020
Link 16 MOS CM/FR Operational Test	2	2020	2	2020
LMMT CD 3 Build Decision	1	2020	1	2020
LMMT CD 3 Build Technical Review	1	2020	1	2020
Link 16 MOS Mod Operational Test Readiness Review	1	2020	1	2020
Link 16 MOS Mod Operational Test	4	2020	4	2020
Link 16 JTIDS CM/FR Fielding Decision Review / Initial Operating Capability	4	2020	4	2020
Link 16 MOS CM/FR Fielding Decision Review / Initial Operating Capability	4	2020	4	2020
LMMT IVV	3	2021	3	2021
Link 16 MOS Mod Fielding Decision Review / Initial Operating Capability	1	2021	1	2021
C2P Technology Refresh Cybersecurity/Combat System Integration	1	2021	4	2021
C2P Mod Software release A	2	2021	2	2021
C2P Mod Software release B	4	2021	4	2021
C2P Mod Software release C	2	2022	2	2022
Link 16 CMN Development Test Readiness Review	4	2022	4	2022
Link 16 CMN Development Test	4	2022	4	2022
LMMT CD 3 Operational Test Readiness Review	3	2022	3	2022

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**Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 2126 / ATDLS Integration
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C2P Modernization Combat Systems integration/Link 22 certification	4	2022	4	2023
C2P Modernization Software release D	1	2023	1	2023
LMMT CD 3 Fielding Technical Review	1	2023	1	2023
LMMT CD 3 Fielding Decision Review	1	2023	1	2023
C2P Modernization release E	1	2024	1	2024
C2P Modernization DT	2	2024	2	2024
C2P Modernization OT	4	2024	4	2024
C2P Link 22 Fielding Decicsion Review/ Initial Operating Capability	3	2025	3	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 3020 / MIDS/JTRS			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
3020: MIDS/JTRS	0.000	0.000	39.214	82.579	-	82.579	64.030	65.849	52.500	30.342	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
<b>Project MDAP/MAIS Code:</b> 554												

**Note**

Funding has been realigned into PE 0604280N from PE 0205604N Project 3020 as part of RD TEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

The FY2021 funding request was reduced by \$3.342 million to account for the availability of prior year execution balances.

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

The Multifunctional Information Distribution System (MIDS) program office is the Performing Activity in the Navy (Lead Service for Department of Defense (DOD)) Link 16 capability and consists of two (2) product lines, MIDS Low Volume Terminal (LVT) (legacy hardware defined radio) and MIDS Joint Tactical Radio System (JTRS) (software (SW) defined radio). MIDS-LVT effort is a cooperative development program between France, Germany, Italy, Spain, and the United States with United States joint service participation (Navy, Army, Air Force), and has provided over 11,000 terminals to 48 Nations providing interoperability with North Atlantic Treaty Organization (NATO) and coalition partners. The Department of Defense (DoD) established the program to design, develop, and deliver low volume, lightweight tactical information system terminals for U.S. and allied fighter aircraft, bombers, helicopters, ships, and ground sites. MIDS-LVT significantly increases force effectiveness and minimizes hostile actions and friend-on-friend engagements. MIDS-LVT Block Upgrade 2 was executed as an ECP and provides the critical upgrades to the MIDS-LVT Terminal to enable U.S., Coalition and International partners' ability to meet the National Security Agency (NSA) mandated timelines for Cryptographic Modernization (CM) and the National Telecommunications and Information Agency (NTIA) and Federal Aviation Agency (FAA) mandated timelines for Frequency Remapping (FR).

MIDS JTRS, designed as a Pre-Planned Product Improvement (P3I) and executed as an Engineering Change Proposal (ECP) to the production MIDS-LVT configuration, and is fully compatible with MIDS-LVT. The MIDS JTRS Core Terminal achieved Full Production & Fielding (FP&F) in March 2012. It facilitated the JTRS incremental approach for fielding advanced JTRS transformational networking capability and transformed the MIDS-LVT into a 4-channel, SW Communications Architecture (SCA) compliant, Joint Tactical Radio. A form-fit-function replacement to MIDS-LVT, MIDS JTRS also adds three programmable 2 Megahertz (MHz) to 2 Gigahertz (GHz) channels capable of hosting the JTRS legacy and networking waveforms. In addition to Link 16, Tactical Air Navigation (TACAN), and voice functionality found in MIDS-LVT, MIDS JTRS has four channels and adds capabilities such as Link 16 Enhanced Throughput (ET), Link 16 FR, SW programmability, CM, and Four Net Concurrent Multi-Netting with Concurrent Contention Receive (CMN-4).

MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal providing an Internet Protocol-based networking capability on tactical aircraft. TTNT is a low latency, high throughput waveform that has the capability to support data exchange between fast-moving tactical aircraft, weapons, and unmanned aircraft, in addition to air, land, and sea-based command and control nodes, in a variety of air-to-air and air-to-ground missions including time sensitive targeting, air warfare, close air support, non-traditional ISR, and anti-surface warfare. TTNT and MIDS JTRS CMN-4 directly supports Naval Integrated Fire

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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Control (NIFC) capability requirements. These capabilities provide Joint Airborne Network-Tactical Edge functionality to run advanced mission applications in a cross-platform/cross-domain tactical network enterprise.

The FY 2021 Budget funds the MIDS Modernization Software and Firmware development effort to maximize capabilities of the new Link 16 transceiver (Link 16 transceiver development completes in FY 2021). Development activities include rewriting of the software to include resiliency and interoperability upgrades in contested environments, baseline specifications and design reviews with Industry and the NSA requirements. The FY 2021 Budget also funds the development of Field Loadable capability for the MIDS JTRS terminal. Currently when updated software or any bug fixes are available, the warfighter must return the terminal to the vendor and pay for the labor to install the latest software push. With the new Field Loadable capability, the vendors will update the terminal's software to allow the warfighter to use the front panel of the terminal to load the latest software build in the field. The Field Downloadable capability entails updating and rewriting the specifications documents for the front panel, new software to enable users in the field to push updates and retrofitting government furnished equipment for use in the new testing environments.

The FY 2021 Budget funds the WIN10 upgrade/modernization of Special Test Equipment (STE) stations required for Link 16 and TTNT development efforts. System development and testing efforts cannot be executed without upgrading the STE stations. FY 2021 also funds the NSA mandated transition from Unified INFOSEC Criteria (UIC) requirements and derived specifications to full detailed specification tracing to the Information Assurance Security Requirements Document (IASRD). All MIDS development efforts are required to be in the new IASRD standard to receive NSA certification. The FY 2021 Budget also funds the purchase of more MIDS test equipment for a new government depot/test lab and the support for the depot/lab.

The FY 2021 Budget also completes the testing for transitioning Small Business Innovation Research efforts to the terminal for upgraded performance, the MIDS JTRS TTNT fixes discovered during testing, and completes the Consolidated Automated Support System for TTNT.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> MIDS	0.000	39.214	82.579	0.000	82.579
<b>Articles:</b>	-	-	-	-	-
<b>FY 2020 Plans:</b>					
Continue the MIDS JTRS Link 16 hardware transceiver upgrade development efforts. Conduct post PDR updates and develop the allocated and product baselines. Conduct Critical Design Review, build prototype hardware, perform integration and test with prototypes and build production representative hardware. Port the latest Link-16 SW to the new upgraded Link 16 transceiver hardware.					
Continue MIDS JTRS Tactical Targeting Network Technology (TTNT) testing and platform integration efforts to include full development contract and Problem Report fixes. Begin developing reliability growth testing for the TTNT components. Complete MIDS JTRS TTNT Government First Article Qualification Testing, Developmental Testing, and initiate Limited Production Award. Begin Consolidated Automated Support System (CASS) Test					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Program Sets (TPS) efforts for the MIDS JTRS TTNT terminal. This entails labor for developing a prototype, the purchase of parts, and developing a new case to house the CASS TPS for use in the field.</p> <p>Begin risk reduction work for the MIDS JTRS Field Loadable and Software/Firmware MIDS Modernization efforts. Risk reduction includes requirements gathering, modeling different solutions and predicted outcomes of different techniques.</p> <p>Transition of three Small Business Innovation Research (SBIR) efforts. Two SBIRs (Graphite Coating and Heat Pipes) targeted for transition include technology that improves the MIDS JTRS terminal internal heat transfer, resulting lower operation temperatures and increased reliability. The other SBIR planned for transition includes Chip Scale Atomic Clock (CSAC) technology, which will greatly increase the MIDS JTRS oscillator precision, while drawing less power. To transition these Small Business Innovation Research (SBIR) technologies, regression testing and material testing will be conducted to qualify the new parts for Production.</p> <p>Continue MIDS systems engineering, communication security, IA and program management support.</p> <p>Continue with Link 16 and TTNT Waveform development fixes and updates.</p> <p><b>FY 2021 Base Plans:</b> In FY 2021 there is an overall increase of \$43.4M comprised of five different efforts for the MIDS Program Office. The increase is attributed to the award of the MIDS Modernization Software (SW) and Firmware (FW) development efforts for the MIDS JTRS terminal (\$9.3M), the Field Loading Capability development (\$7M), upgrading/modernizing the MIDS Special Test Equipment (STE) (\$10M), updating to the NSA security IASRD requirements (\$12M), and the support and new test equipment for the new MIDS depot/lab testing center (\$13M).</p> <p>The FY 2021 plan includes the award of MIDS Modernization SW and FW development for the MIDS JTRS terminal to meet Joint Combatant Commanders' prioritized requirements for Integrated Fires Control and Joint Tactical Grid information exchange requirements at the Tactical Edge. MIDS JTRS industry will update the software and firmware requirements documentation with the new enhancements and Conduct System Requirements Review (SRR) to establish Level 0 requirements and mature the Functional Baseline (FBL) specifications. Industry will begin implementation of the FBL into the MIDS JTRS SW/FW, including SW/FW integration of enhancements with the existing code base and regression testing. MIDS Modernization requires</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>new developed Specialized Test Equipment (STE) to support the new SW/FW Integration and Test (I&amp;T). (\$9.3M)</p> <p>Award MIDS JTRS Field Loading capability. Field Loading directly enables rapid technology insertion and enhanced readiness, permitting significant capability upgrades without returns to the manufacturer. This capability enables increased operational availability, retrofit cost avoidance, and speeds fielding of SW upgrades. MIDS JTRS will conduct FBL specification updates, including joint Government/Industry review of the FBL and approve at SFR. Begin derivation of draft ABL specification updates. Begin initial SW/FW implementation and integration. Retrofit GFE units to support industry lab testing. (\$7.0M)</p> <p>Complete the MIDS JTRS Link 16 transceiver hardware upgrade development efforts by conducting Technology Readiness Review and executing Contractor First Article Qualification Testing (CFAQT) and Government First Article Qualification Testing (GFAQT). Transition new Link 16 transceiver hardware into Production. (\$16.1M)</p> <p>Upgrade/modernize the MIDS Special Test Equipment (STE) stations required for Link 16 and TTNT development efforts to be WIN10 compliant. System development and testing efforts cannot be executed without upgrading the STE stations. Operating systems on all the existing STE will be upgraded to allow for faster and compliant test procedures. (\$10M)</p> <p>Begin the NSA mandated transition from Unified INFOSEC Criteria (UIC) requirements and derived specifications to full detailed specification tracing to the Information Assurance Security Requirements Document (IASRD). All MIDS development efforts are required to be in the new IASRD standard to receive NSA certification. Review and update all specification documentation for functional and allocated baselines as well as development and testing procedures to adhere to the new standard. (\$12M).</p> <p>The FY 2021 Budget also funds the development and build/purchase of more MIDS test equipment for a new government depot/test lab and the support for the depot/lab. MIDS JTRS is undergoing Modernization efforts to outpace the future threats and capabilities. With that the numerous platforms with the older MIDS JTRS systems need to modernize their terminals but can do so with the new upgraded parts and software updates. The new depot/testing lab will have test stations specifically for the replacement of Shop Replaceable Assemblies to allow for faster upgrades to the modernized terminal. (\$13M)</p>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Complete MIDS JTRS Tactical Targeting Network Technology (TTNT) Problem Report fixes from testing. Update the TTNT Waveform with the fixes from testing and delta test the waveform with the completed TTNT terminal and amplifiers. Finish the reliability growth testing for the TTNT components. (\$8.6M)					
Complete Consolidated Automated Support System (CASS) Test Program Sets (TPS) efforts for the MIDS JTRS TTNT terminal. Complete design and testing of the CASS TPS; build and test the three prototypes for final qualification testing. (\$2.7M)					
Complete the testing and qualification of the SBIR efforts into the MIDS JTRS terminal (Graphite Coating, Heat Pipes and Oscillator Clock). (\$0.9M)					
Continue MIDS systems engineering, communication security, IA and program management support. (\$1.8M)					
Continue with Link 16 and TTNT Waveform development fixes and updates. (\$1.2M)					
<b><i>FY 2021 OCO Plans:</i></b> N/A					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY 2021 funding request was reduced by \$3.342 million to account for the availability of prior year execution balances. FY 2020 to FY 2021 funding request net increase of \$43.365 million funds the MIDS Modernization SW development contract and the MIDS JTRS Field Loading capability development contract. It funds the upgrade/modernization of the existing MIDS STE to WIN10, the update to the NSA IASRD and the new test equipment for the depot/lab. Labor for the MIDS JTRS Link 16 Transceiver hardware upgrade decreases while there is an increase in labor hours for industry to begin the two new development efforts, test equipment modernization and documentation updates. The increase is also due to the purchasing of hardware for the TTNT CASS TPS prototypes and the test equipment for the depot/lab.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	39.214	82.579	0.000	82.579

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTEN/0205604N/3020: MIDS/JTRS	40.201	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	385.670

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

Multifunctional Information Distribution System Joint Tactical System (MIDS JTRS) development was initiated as a major modification to the MIDS-LVT using an Engineering Change Proposal to the existing production contracts. The U.S. prime contractors from the MIDS-LVT program, Data Link Solutions (DLS) and Viasat Inc., cooperatively designed and developed each of the MIDS JTRS terminal variants and Block Upgrade 2 for MIDS-LVT. The U.S. implemented a continuous competition strategy between DLS and ViaSat that will be maintained throughout the MIDS-LVT and MIDS JTRS production phases. This strategy has been successfully used on all MIDS variants.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 5				PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				3020 / MIDS/JTRS							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Link 16 Waveform Development	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.775	Jan 2020	0.775	Jan 2021	-		0.775	Continuing	Continuing	Continuing
TTNT Waveform Update	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		3.500	Dec 2020	-		3.500	0.000	3.500	3.500
TTNT Post Dev Problem Report Fixes	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.377	Jan 2020	1.481	Dec 2020	-		1.481	0.000	1.858	1.858
TTNT Post Dev Problem Report Fixes	C/CPFF	Viasat : San Diego, CA	0.000	0.000		0.377	Jan 2020	1.481	Dec 2020	-		1.481	0.000	1.858	1.858
TTNT Reliability Growth	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.233	Feb 2020	0.500	Jan 2021	-		0.500	0.000	0.733	0.733
TTNT Reliability Growth	C/CPFF	Viasat : San Diego, CA	0.000	0.000		0.233	Feb 2020	0.500	Jan 2021	-		0.500	0.000	0.733	0.733
MIDS JTRS L16 HW Upgrade	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		13.758	Oct 2019	9.491	Nov 2020	-		9.491	0.000	23.249	23.249
MIDS JTRS L16 HW Upgrade	C/CPFF	Viasat : San Diego, CA	0.000	0.000		9.172	Oct 2019	6.327	Nov 2020	-		6.327	0.000	15.499	15.499
MIDS JTRS Heat Pipes/ Graphite Coating Trans	C/CPFF	TBD : TBD	0.000	0.000		2.000	Jul 2020	0.661	Jul 2021	-		0.661	0.000	2.661	2.661
MIDS Mod SW/FW Risk Reduction	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		1.500	Oct 2019	0.000		-		0.000	0.000	1.500	1.500
MIDS Mod SW/FW Risk Reduction	C/CPFF	Viasat : San Diego, CA	0.000	0.000		1.500	Oct 2019	0.000		-		0.000	0.000	1.500	1.500
MIDS Mod SW/FW Full Development	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		4.657	Jan 2021	-		4.657	Continuing	Continuing	Continuing
MIDS Mod SW/FW Full Development	C/CPFF	Viasat : San Diego, CA	0.000	0.000		0.000		4.657	Jan 2021	-		4.657	Continuing	Continuing	Continuing
MIDS JTRS Oscillator/ Clock Upgrade	C/CPFF	TBD : TBD	0.000	0.000		0.250	Jul 2020	0.250	Jul 2021	-		0.250	0.000	0.500	0.500
Field Loadable Cap Risk Reduction	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		1.990	Jan 2020	0.000		-		0.000	0.000	1.990	1.990
Field Loadable Cap Risk Reduction	C/CPFF	Viasat : San Diego, CA	0.000	0.000		1.990	Jan 2020	0.000		-		0.000	0.000	1.990	1.990

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 5				PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				3020 / MIDS/JTRS							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Field Loadable Capability Dev	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		3.500	Jan 2021	-		3.500	Continuing	Continuing	Continuing
Field Loadable Capability Dev	C/CPFF	Viasat : San Diego, CA	0.000	0.000		0.000		3.500	Jan 2021	-		3.500	Continuing	Continuing	Continuing
Modernize Special Test Equipment WIN10	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		6.000	Nov 2020	-		6.000	0.000	6.000	6.000
Modernize Special Test Equipment WIN10	C/CPFF	ViaSat : San Diego, CA	0.000	0.000		0.000		4.000	Nov 2020	-		4.000	0.000	4.000	4.000
NSA Security Requirement Update	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		7.000	Dec 2020	-		7.000	0.000	7.000	7.000
NSA Security Requirement Update	C/CPFF	ViaSat : San Diego, CA	0.000	0.000		0.000		5.000	Dec 2020	-		5.000	0.000	5.000	5.000
Test Equipment for depot/lab	C/FFP	TBD : TBD	0.000	0.000		0.000		5.000	Dec 2020	-		5.000	0.000	5.000	5.000
<b>Subtotal</b>			0.000	0.000		34.155		68.280		-		68.280	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
CSS TPS	WR	NAVAIR : North Island San Diego, CA	0.000	0.000		2.200	Jan 2020	2.700	Jan 2021	-		2.700	0.000	4.900	4.900
Modeling and Sim Suppt TTNT	WR	NAVAIR : China Lake, CA	0.000	0.000		0.000		0.700	Dec 2020	-		0.700	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		2.200		3.400		-		3.400	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
JTEL	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.205	Dec 2019	0.205	Dec 2020	-		0.205	Continuing	Continuing	Continuing
JTEL Testing Support	C/CPFF	G2 : San Diego, CA	0.000	0.000		0.095	Mar 2020	0.095	Mar 2021	-		0.095	Continuing	Continuing	Continuing
COMOPTEVFOR Testing	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.150	Jan 2020	0.000	Jan 2021	-		0.000	0.000	0.150	1.500
TTNT DT/OT Support	WR	TBD : TBD	0.000	0.000		0.850	Feb 2020	0.500	Feb 2021	-		0.500	0.000	1.350	1.350
MIDS JTRS Link 16 Hardware GFAQT	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.000		0.300	Nov 2020	-		0.300	0.000	0.300	0.300
Depot/Lab Support	MIPR	TBD : TBD	0.000	0.000		0.000		8.000	Oct 2020	-		8.000	0.000	8.000	-
<b>Subtotal</b>			0.000	0.000		1.300		9.100		-		9.100	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering Support	MIPR	MITRE : Bedford, MA	0.000	0.000		1.000	Dec 2019	0.800	Dec 2020	-		0.800	Continuing	Continuing	Continuing
Government Engineering Support	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.259	Nov 2019	0.699	Nov 2020	-		0.699	Continuing	Continuing	Continuing
Information Assurance	MIPR	CERDEC : Aberdeen Proving Ground, MD	0.000	0.000		0.300	Dec 2019	0.300	Dec 2020	-		0.300	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		1.559		1.799		-		1.799	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	0.000	39.214	82.579	-	82.579	Continuing	Continuing	N/A

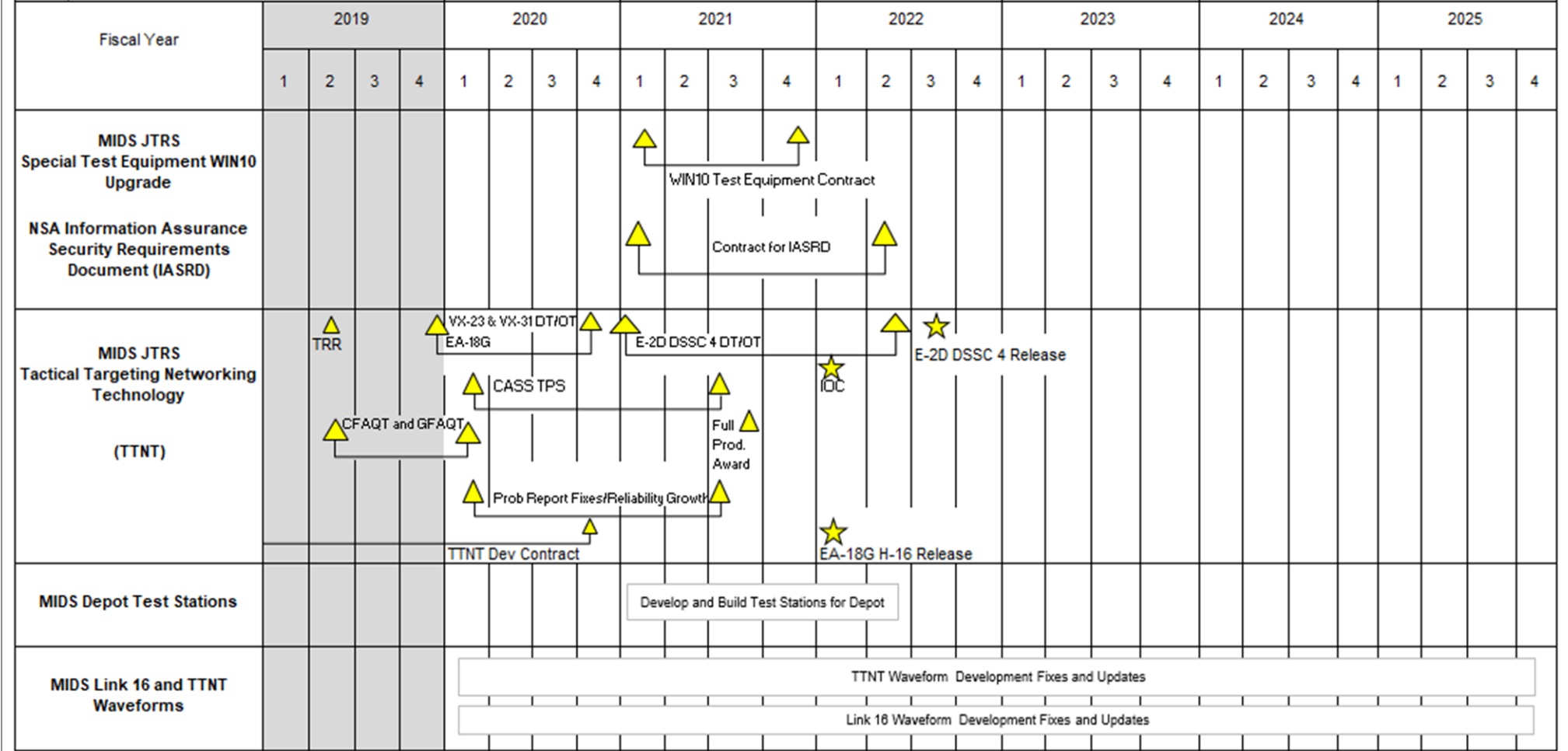
**Remarks**  
FY19 cost data is provided under PE 0205604N Project 3020



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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FY19 funding was provided under PE 0205604N Project 3020

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Navy</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 3020</b>				
MIDS JTRS Modernization Link 16 Hardware Transceiver Upgrade: Development Contract	1	2020	3	2021
MIDS JTRS Modernization Link 16 Hardware Transceiver Upgrade: Critical Design Review	2	2020	2	2020
MIDS JTRS Modernization Link 16 Hardware Transceiver Upgrade: Technology Readiness Review	1	2021	1	2021
MIDS JTRS Modernization Link 16 Hardware Transceiver Upgrade: Contractor and Government First Article Qualification Test (CFAQT and GFAQT)	1	2021	3	2021
MIDS JTRS Modernization Software/Firmware: Risk Reduction Work	1	2020	1	2020
MIDS JTRS Modernization Software/Firmware: MIDS Modernization SW/FW development contract	3	2021	3	2024
MIDS JTRS Modernization Software/Firmware: Preliminary Design Review	1	2022	1	2022
MIDS JTRS Modernization Software/Firmware: Critical Design Review	3	2022	3	2022
MIDS JTRS Modernization Software/Firmware: Technology Readiness Review	4	2023	4	2023
Field Loadable Capability: Risk Reduction Work	1	2020	1	2020
Field Loadable Capability: Field Loadable Capability Contract	2	2021	4	2022
SBIR Transition: Testing/Qualifying	2	2020	3	2021
MIDS JTRS CMN-4 Enhancements/SW Baseline: Enhancements/SW Merge Contract	1	2023	4	2025
MIDS JTRS Modernization Special Test Equipment (STE): STE Update WIN10 Contract	1	2021	4	2021
NSA Information Assurance Security Requirements Document (IASRD): IASRD Contract	1	2021	2	2022
MIDS JTRS Tactical Targeting Network Technology (TTNT): CFAQT and GFAQT	1	2020	1	2020

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3020 / MIDS/JTRS
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<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
MIDS JTRS Tactical Targetting Network Technology (TTNT): VX-23 & VX-31 Developmental Test (DT) and Operational Test (OT) EA-18G	1	2020	4	2020
MIDS JTRS Tactical Targetting Network Technology (TTNT): Problem Report Fixes/Reliability Growth Contract	1	2020	3	2021
MIDS JTRS Tactical Targetting Network Technology (TTNT): Consolidated Automated Support System (CASS) Test Program Sets (TPS)	1	2020	3	2021
MIDS JTRS Tactical Targetting Network Technology (TTNT): E-2D DSSC 4 DT/OT	1	2021	2	2022
MIDS JTRS Tactical Targetting Network Technology (TTNT): Full Production Award	3	2021	3	2021
MIDS JTRS Tactical Targetting Network Technology (TTNT): Initial Operating Capability	1	2022	1	2022
MIDS JTRS Tactical Targetting Network Technology (TTNT): EA-18G H16 Release	1	2022	1	2022
MIDS JTRS Tactical Targetting Network Technology (TTNT): DSSC 4 Release	3	2022	3	2022
MIDS Depot Test Stations: Test Station	1	2021	2	2022
MIDS Link 16 and TTNT Waveforms: TTNT Waveform Development Fixes and Updates	1	2020	4	2025
MIDS Link 16 and TTNT Waveforms: Link 16 Waveform Development Fixes and Updates	1	2020	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 3078 / Digital Modular Radio			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
3078: <i>Digital Modular Radio</i>	46.345	3.178	3.262	2.770	-	2.770	3.162	6.521	6.555	6.686	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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

Digital Modular Radio (DMR) with Integrated Waveform (IW) and Mobile User Objective System (MUOS) capable hardware is the Navy's technical solution for the IW/MUOS requirement. The DMR AN/USC-61(C), is the first software defined radio to become a communications system standard for the U.S. Military. The compact, multi-channel DMR provides 3G, Wideband Code Division Multiple Access (WCDMA) technology, for high speed/capacity voice and data satellite communications. DMR radios currently operate aboard U.S. Navy surface and subsurface vessels, fixed-sites and other Department of Defense (DoD) communication platforms using frequencies ranging from 2 MHz to 2 GHz. Certified to pass secure voice and data at Multiple Independent Levels of Security (MILS) over High Frequency (HF), Very High Frequency (VHF), Ultra High Frequency (UHF), and Satellite Communications (SATCOM) channels, the DMR system was developed to the U.S. Navy's specifications and meets all the stringent environmental, Electromagnetic Interference (EMI) and performance requirements for use in the U.S. Fleet. This system is formally specified by both Fleet Commanders as a threshold capability, for global maritime command control and communications in a Distributed Maritime Environment, to execute current warfighting plans and is required for National Command and Control capability. This program is for continued development/integration of the IW and MUOS waveforms into the DMR in accordance with Military Standards 188-181,2,3. Additionally, the enhancements of High Frequency Distribution Amplifier Group (HFDAG) and HF Automated Link Establishment (ALE) will also be developed/integrated into the DMR. HFDAG is a follow-on HF solution to fulfill transmit and receive HF communication capability with various modes of operation, such as ALE, for Navy platforms. HFDAG will utilize the existing DMR as the exciter/receiver. Generation 3 (GEN 3) HF ALE/HF wideband provides Navy users with improved HF communications, increased transmission rates from radio to radio, and serves as a supplement to SATCOM when SATCOM networks are overloaded or unavailable. IW uses a Time Division Multiple Access (TDMA) communication system in an attempt to improve satellite bandwidth utilization over legacy SATCOM waveforms. This enables demand assigned services on UHF SATCOM networks to support new applications that require better performance and higher channel throughput. The MUOS waveform will enable MUOS satellites to provide worldwide communication satellite coverage for DoD requirements. MUOS will provide functionality comparable to commercial mobile phone systems.

FY 2021 DMR will complete Advanced High Frequency (AHF) Functionality Development, conduct submarine Emissions Control (EMCON) testing, complete the MUOS Development and continue development of updated DMR Single Channel Ground and Airborne Radio System (SINCGARS) 3.1 Cryptographic Equipment Application (CEA) software to be compliant with the latest National Security Agency (NSA) cryptographic modernization specifications.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> DMR	3.178	3.262	2.770	0.000	2.770
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> Overall program efforts include investigation of emerging technologies through study, development and associated testing for feasibility of program insertion. DMR, with IW and MUOS capable hardware, is					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3078 / Digital Modular Radio

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>the Navy's technical solution for the IW/MUOS requirement. As the Navy's primary technical solution, DMR provides the UHF SATCOM IW and MUOS waveform capability to the Fleet. The MUOS waveform enables MUOS satellites to provide worldwide communication satellite coverage for DoD requirements, with functionality comparable to commercial mobile phone systems.</p> <p><b>FY 2020 Plans:</b> Conduct High Frequency (HF) Automated Link Establishment (ALE) Generation 3 (GEN 3) lab testing. Complete Program Development Testing of the Integrated Waveform (IW) and Mobile User Objective System (MUOS) waveform into the DMR system. Complete MUOS ship and submarine point to net testing and MUOS ship and submarine test report. Assess SINCGARS 3.1 for cryptographic modernization specifications, and develop DMR specific specifications. Evaluate the current DMR cryptographic capability to determine the technical detail and scope required for the integration efforts with new and legacy Cryptographic Equipment Application (CEA).</p> <p><b>FY 2021 Base Plans:</b> Commence Advanced HF (AHF) Functionality Development. Conduct MUOS submarine Emissions Control (EMCON) testing to meet core capability requirements for submarines. Complete the assessment and specification development of the latest MUOS Information Repository (IR) software release for porting into DMR. Complete the assessment of SINCGARS 3.1 CEA software to be compliant with the latest National Security Agency (NSA) cryptographic modernization specifications. Upon receipt of SINCGARS 3.1 cryptographic modernization software from the Army, commence integration with DMR in compliance with DMR specifications.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY 2021 funding request was reduced by \$0.238 million to account for the availability of prior year execution balances. Funding decrease of \$0.490 million from FY 2020 to FY 2021 is attributed to the completion of HF ALE GEN3 lab testing and MUOS point-to-net testing.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	3.178	3.262	2.770	0.000	2.770

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• OPN/3010: DMR OPN	43.196	47.811	56.106	-	56.106	69.643	64.378	63.026	64.019	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3078 / Digital Modular Radio

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

General Dynamics Mission Systems (GDMS), formerly General Dynamics C4 Systems (GDC4S), owns the technical data rights to the Digital Modular Radio (DMR). Due to this fact, they are the only contractor with the unique capabilities and technical know-how to perform the required design work to complete the Integrated Waveform (IW) upgrade, the Mobile User Objective System (MUOS) interoperability efforts, and cryptographic modernization development.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 5				PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				3078 / Digital Modular Radio							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
IW/MUOS Development	C/CPIF	GDMS : Scottsdale, AZ	24.671	0.000		0.000		0.000		-		0.000	0.000	24.671	-
HF ALE Development	C/CPIF	GDMS : Scottsdale, AZ	8.348	1.721	Oct 2018	0.000		0.860	Oct 2020	-		0.860	Continuing	Continuing	Continuing
IW/MUOS Development	WR	SSC PAC : San Diego, CA	0.600	0.000		0.000		0.000		-		0.000	0.000	0.600	-
HF ALE Development	WR	SSC PAC : San Diego, CA	0.369	0.130	Apr 2019	0.693	Oct 2019	0.350	Oct 2020	-		0.350	Continuing	Continuing	Continuing
Cryptographic Modernization Development	C/CPIF	GDMS : Scottsdale, AZ	0.000	0.259	Apr 2019	0.400	Oct 2019	0.300	Oct 2020	-		0.300	Continuing	Continuing	Continuing
Cryptographic Modernization Development	WR	SSC PAC : San Diego, CA	0.000	0.000		0.100	Dec 2019	0.200	Dec 2020	-		0.200	Continuing	Continuing	Continuing
MUOS Scanning	C/CPIF	GDMS : Scottsdale, AZ	0.000	0.150	Sep 2019	0.000		0.350	Jan 2021	-		0.350	Continuing	Continuing	Continuing
<b>Subtotal</b>			33.988	2.260		1.193		2.060		-		2.060	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering Support	Various	SSC PAC : San Diego, CA	7.117	0.565	Apr 2019	0.515	Dec 2019	0.400	Dec 2020	-		0.400	Continuing	Continuing	Continuing
<b>Subtotal</b>			7.117	0.565		0.515		0.400		-		0.400	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing	Various	SSC PAC : San Diego, CA	2.326	0.298	Apr 2019	0.000		0.000		-		0.000	0.000	2.624	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 5				PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				3078 / Digital Modular Radio							
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
JITC Testing	WR	JITC : Ft. Huachuca, AZ	0.469	0.000		0.100	Sep 2020	0.200	Sep 2021	-		0.200	Continuing	Continuing	Continuing
Interoperability Testing	WR	SSC PAC : San Diego, CA	0.000	0.000		1.100	Nov 2019	0.055	Nov 2020	-		0.055	Continuing	Continuing	Continuing
Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.248	Nov 2019	0.000		-		0.000	0.000	0.248	-
Certification Authorization	WR	NSA : Ft. Meade, MD	0.030	0.000		0.050	Jan 2020	0.000		-		0.000	0.000	0.080	-
<b>Subtotal</b>			2.825	0.298		1.498		0.255		-		0.255	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	BAH : San Diego, CA	2.415	0.055	Nov 2018	0.056	Nov 2019	0.055	Nov 2020	-		0.055	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.415	0.055		0.056		0.055		-		0.055	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			46.345	3.178		3.262		2.770		-		2.770	Continuing	Continuing	N/A
<b>Remarks</b>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

Date: February 2020

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604280N / JNT Tactical Radio System -  
Maritime/Fixed Station

Project (Number/Name)  
3078 / Digital Modular Radio

**DMR**

Fiscal Year	2019				2020				2021				2022				2023				2024				2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Development	HF ALE GEN 3 SW Development (v6.5.3)																				Next Generation Waveform Development							
			6.5.3 Engineering Release																									
Contract		Ordering Period 2 Production DMR																										
						Ordering Period 3 Production DMR				Ordering Period 4 Production DMR				Ordering Period 5 Production DMR				Ordering Period 1 Production DMR				Ordering Period 2 Production DMR						Ordering Period 3 Production DMR
Testing																												
Installation (OPN-3010)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3078 / Digital Modular Radio

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 3078</b>				
HF ALE GEN 3 Software Development (v6.5.3)	1	2019	3	2019
Production Deliveries	1	2019	4	2025
DMR Installations	1	2019	4	2025
MUOS Scanning Assessment	2	2019	2	2019
HF ALE GEN 3 Engineering Release (v6.5.3)	3	2019	3	2019
MUOS Submarine Point to Net Testing	4	2019	2	2020
MUOS Ship Point to Net Testing	1	2020	3	2020
HF ALE GEN 3 Lab Test	1	2020	1	2021
Crypto Mod SINCGARS 3.1 Assessment	2	2020	1	2021
MUOS Sub Test Report	2	2020	2	2020
IW/MUOS Program DT	2	2020	2	2020
MUOS Ship Test Report	4	2020	4	2020
Crypto Mod SINCGARS 3.1 Integration	2	2021	4	2021
Submarine EMCON Testing	2	2021	4	2021
MUOS SW Assessment	2	2021	4	2021
HF ALE GEN 3 AHF Functionality Development (v6.5.3)	3	2021	1	2022
MUOS SW Integration and Porting	1	2022	2	2023
Crypto Mod Assessment for KIV 7 & VACM	1	2022	4	2022
MUOS Sub EMCON Test Report	2	2022	2	2022
Crypto Mod SW Development for KIV 7 & VACM	1	2023	2	2024
Crypto SW Drop	2	2024	2	2024

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3078 / Digital Modular Radio

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Next Generation Waveform Development	2	2024	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
3341: Network Tactical Common Data Link	0.000	0.000	30.776	34.520	-	34.520	8.887	6.889	6.424	6.554	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0205604N Project 3341 as part of RDTEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

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

Network Tactical Common Data Link (NTCDL) provides the ability to transmit/receive real-time Intelligence, Surveillance, and Reconnaissance (ISR) data simultaneously from multiple sources (surface, airborne, sub-surface, man-portable), and exchange command and control information (voice, data, imagery, and Full Motion Video) across dissimilar joint, service, coalition, and civil networks. NTCDL provides warfighters with the capability to support multiple, simultaneous, networked operations with currently fielded Common Data Link (CDL)-equipped air platforms (e.g. F/A-35, P-3, and MH-60R), in addition to next generation manned and unmanned platforms (e.g., P-8, Triton, MQ-25 (Stingray), small tactical unmanned aircraft systems (STUAS) and Fire Scout). NTCDL is an incremental capability (surface, airborne, sub-surface, man-portable) providing modular, scalable, multiple-link networked communications. NTCDL benefits the fleet by providing a horizon extension for line-of-sight sensor systems for use in time-critical strike missions and supports tasking, collection, processing, exploitation, and dissemination (TCPED) via its ISR networking capability. NTCDL supports Resilient Command and Control (RC2) through its relay capability, and supports TCPED through its ISR networking capability.

FY 2021 request is for NTCDL product development, to include continued development of two (2) NTCDL Engineering Development Models (EDMs) and associated software, conduct testing to support EDM delivery, and preparations for Operational Assessment.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Network Tactical Common Data Link (NTCDL)	0.000	30.776	34.520	0.000	34.520
<b>Articles:</b>	-	-	2	-	2
<b>Description:</b> NTCDL is the only High Data Rate (HDR), Line of Sight (LOS) solution delivering Intelligence, Surveillance, and Reconnaissance (ISR), sensor control information and unmanned aircraft system (UAS) command and control. NTCDL uses Joint Department of Defense specifications for Common Data Link (CDL) waveforms and LOS networks across the allocated CDL frequency spectrum. New technical specifications require increasing number of simultaneous CDL links to support increasing number of CDL/ISR platforms and missions. The software for NTCDL is developed by both contractor and government. The contractor software development is responsible for the internal control of the NTCDL hardware whereas the Government Furnished					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>Software (GFS) is responsible for interfacing with various external networks (e.g. Automated Digital Network System (ADNS)) and users (e.g. Consolidated Afloat Networks and Enterprise Services (CANES)). Engineering Development Model (EDM) development is a multi-year effort that includes two EDMs being delivered in FY21. EDM 1 will undergo Development Test for Operational Assessment, and EDM 2 will go through shock, environmental, and cyber testing. At the same time the two EDMs are going through testing, BAE Systems will continue development of the X/Ku antennas. EDM 2 will be repaired after testing and given the X/Ku antennas. Both EDMs will provide Full Capability and will be installed in FY23.</p> <p><b>FY 2020 Plans:</b>                      FY 2020 plans include the continued development, integration, and test of the Engineering Development Models (EDMs) and the contractor-developed Link Control Subsystem (LCS) software, as well as the continuation of Government Furnished Software (GFS). Begin integration of multiple subsystems to include: Phased Array Antenna (PAA), X/Ku-band dish antenna, End Cryptographic Unit (ECU), Below Deck Equipment (BDE) racks, and radio terminals. Conduct subsystem testing, Joint Interoperability Test Command (JITC) Common Data Link (CDL) waveform compliance testing, attain National Security Agency (NSA) Type 1 certification of ECU, and Test Readiness Review (TRR). Conduct delta Critical Design Review (CDR) for X/Ku-band dish antenna. Complete documentation development to include subsystem Interface Design Description (IDD), Communication Security (COMSEC) certification documents, Electromagnetic Interference (EMI) test and Electromagnetic Environmental Effects (E3) integration and analysis report, spectrum certification, Safety Assessment Report (SAR), and health hazard analysis. Conduct end-to-end system testing. Completion of incremental capability of government developed software will include integration with contractor hardware and software. Develop software documentation to include Software Version Description (SVD), Software Test Plan / Description (STP/ D), Requirement Traceability Matrix (RTM), and Software User Manual (SUM). Conduct a Field Technical Release (FTR) for delivery of GFS incremental capability. Complete the Risk Management Framework (RMF) process in support of cybersecurity requirements and complete Interim Authorization To Test (IATT). Complete external networks application integration testing (i.e. Consolidated Afloat Networks and Enterprise Service (CANES) and Automated Digital Network System (ADNS)).</p> <p><b>FY 2021 Base Plans:</b>                      FY 2021 plans include Engineering Design Model (EDM) delivery. Conduct Developmental Test (DT) and begin preparations for Operational Assessment (OA). Continue development and integration of the EDMs, including shock. Complete integration of multiple subsystems to include: Phased Array (PAA), X/Ku-band dish antenna, End Cryptographic Unit (ECU), Below Deck Equipment (BDE) racks and radio terminals.</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Conduct Test Readiness Review for Development Test, First Article Test, Cyber Development Test and Evaluation, and Operation Test Readiness Review. Continue development of Government Furnished Software (GFS), development of software documentation to include Software Version Description (SVD), Requirement Traceability Matrix (RTM) and Software User Manual (SUM), and development of an EDM backfit kit.					
<b><i>FY 2021 OCO Plans:</i></b> N/A					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY 2021 funding request was reduced by \$1.500 million to account for the availability of prior year execution balances. The \$3.744 million increase from FY 2020 to FY 2021 provides for the delivery of two (2) Network Tactical Common Data Link (NTCDL) Engineering Design Models (EDM) Phased Array Antennas (PAA); EDM PAA #1 will undergo Development Test for Operational Assessment; EDM PAA #2 is planned to complete shock, cyber, and environmental testing; while continuing the development of NTCDL X/Ku antennas and associated software, Government Furnished Software (GFS) development, contractor-developed software development, and systems engineering.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	30.776	34.520	0.000	34.520

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

Line Item	FY 2019	FY 2020	FY 2021			FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RD TEN/0205604N/3341: Network Tactical Common Data Link	31.943	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	135.078
• OPN/2950: Network Tactical Common Data Link (CDL)	6.223	5.193	4.150	-	4.150	22.511	20.699	20.980	21.394	Continuing	Continuing

**Remarks**

The OPN dollars in FY19-FY21 is the funding for the CDLS Tech Refresh. NTCDL is the follow-on program and the OPN for this program starts in FY22.

**D. Acquisition Strategy**

NTCDL will utilize the evolutionary acquisition approach for: surface, air, sub-surface, man-portable.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
1319 / 5				PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station					3341 / Network Tactical Common Data Link						
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Product Development	C/CPIF	BAE Systems, Int : Wayne, NJ	0.000	0.000		24.901	Oct 2019	27.471	Oct 2020	-		27.471	Continuing	Continuing	Continuing
NTCDL Software Development	WR	NIWC PAC : San Diego, CA	0.000	0.000		2.114	Nov 2019	2.524	Nov 2020	-		2.524	Continuing	Continuing	Continuing
NTCDL Software Development	C/IDIQ	Technology Unlimited Group : San Diego, CA	0.000	0.000		0.654	Mar 2020	0.726	Mar 2021	-		0.726	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		27.669		30.721		-		30.721	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Systems Engineering	WR	NIWC PAC : San Diego, CA	0.000	0.000		1.288	Nov 2019	1.430	Nov 2020	-		1.430	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		1.288		1.430		-		1.430	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Test and Evaluation	WR	NIWC PAC : San Diego, CA	0.000	0.000		0.926	Nov 2019	1.028	Nov 2020	-		1.028	Continuing	Continuing	Continuing
NTCDL Test and Review	MIPR	JITC : Fort Huachuca, AZ	0.000	0.000		0.044	Dec 2019	0.045	Dec 2020	-		0.045	Continuing	Continuing	Continuing
NTCDL Waveform Certification	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.132	Dec 2019	0.500	Dec 2020	-		0.500	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		1.102		1.573		-		1.573	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link
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<b>Management Services (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
NTCDL Program Management Support	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.717	Nov 2019	0.796	Nov 2020	-		0.796	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.717		0.796		-		0.796	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			0.000	0.000		30.776		34.520		-		34.520	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data for NTCDL is provided under PE 0205604N, Project 3341.

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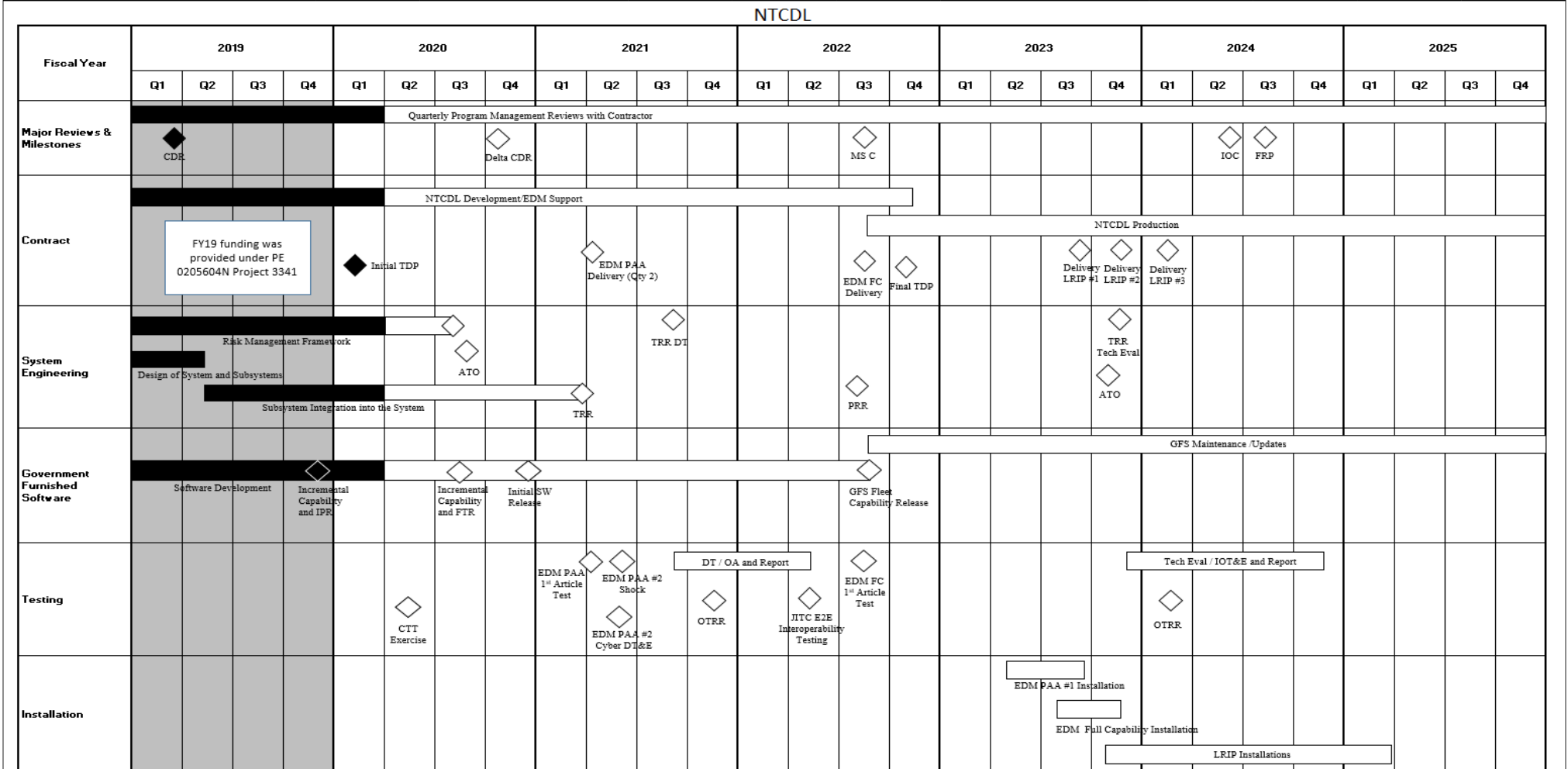
**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy**

**Date: February 2020**

**Appropriation/Budget Activity**  
1319 / 5

**R-1 Program Element (Number/Name)**  
PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station

**Project (Number/Name)**  
3341 / Network Tactical Common Data Link



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 3341</b>				
Government Furnished Software (GFS) Development	1	2020	3	2022
Development Contract	1	2020	4	2022
Risk Management Framework (RMF)	1	2020	3	2020
Quarterly Program Management Review with Contractor	1	2020	4	2025
Subsystem Integration into the System	1	2020	1	2021
Initial Technical Data Package (TDP)	1	2020	1	2020
Cyber Table Top (CTT) Exercise	2	2020	2	2020
Delta Critical Design Review (CDR)	4	2020	4	2020
GFS Incremental Capability and Field Technical Release (FTR)	3	2020	3	2020
Authority to Operate (ATO) 1	3	2020	3	2020
Initial Software Release	4	2020	4	2020
Test Readiness Review (TRR)	1	2021	1	2021
First Article Test (FAT) - Engineering Design Model (EDM) Phased Array Antenna (PAA)	2	2021	2	2021
EDM PAA #2 Cyber Development, Testing, and Evaluation (DT&E)	2	2021	2	2021
EDM PAA Delivery (Qty 2)	2	2021	2	2021
EDM PAA #2 Shock	2	2021	2	2021
TRR Development Testing (DT)	3	2021	3	2021
Development Testing (DT) / Operational Assessment (OA) and Report	3	2021	2	2022
Operational Test Readiness Review (OTRR) 1	4	2021	4	2021
JITC E2E Interoperability Testing	2	2022	2	2022

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Navy **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 3341 / Network Tactical Common Data Link
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
EDM PAA #1 Installation Planning	3	2022	2	2023
FAT - EDM FC	3	2022	3	2022
Production Readiness Review (PRR)	3	2022	3	2022
EDM Full Capability (FC) Delivery	3	2022	3	2022
Milestone C	3	2022	3	2022
GFS Fleet Capability Release	3	2022	3	2022
GFS Maintenance/Updates	3	2022	4	2025
NTCDL Production Contract	3	2022	4	2025
Final Technical Data Package (TDP)	4	2022	4	2022
EDM PAA #1 Installation	2	2023	3	2023
EDM Full Capability Installation	3	2023	4	2023
Low Rate Initial Production (LRIP) 1 Delivery	3	2023	3	2023
LRIP 2 Delivery	4	2023	4	2023
ATO 2	4	2023	4	2023
TRR Tech Eval	4	2023	4	2023
Test Evaluation / IOT&E and Report	4	2023	4	2024
LRIP Installation	4	2023	1	2025
LRIP 3 Delivery	1	2024	1	2024
OTRR 2	1	2024	1	2024
Initial Operational Capability (IOC)	2	2024	2	2024
Full Rate Production (FRP)	3	2024	3	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
4011: <i>Naval Coastal Warfare Surv and C4I Sys</i>	0.000	0.000	3.045	3.038	-	3.038	2.877	2.934	2.993	3.053	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Funding has been realigned into PE 0604280N from PE 0604230N Project 4011 as part of RDTEN PE consolidation starting in FY20. There are not new starts associated with this realignment.

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

The Navy Expeditionary project supports the Navy Expeditionary Combat Command (NECC) mission to detect, deter or interdict potential threats to DoN assets using agile, modular and scalable technology. NECC units have a number of current and future Command, Control, Communications, Computers & Intelligence (C4I) technological requirements for Tactical/Command Operations Center, tactical vehicles, combatant craft, and dismounted personnel. NECC operations require units to maintain effective command and control, develop and display a common tactical picture, and share intelligence and current operational information with higher headquarters, subordinate units, joint forces and coalition allies. Small, Medium and Large Scale Communication Systems (LSCS) are the C4I hub for the NECC; Navy Enterprise Tactical Command and Control (NETC2) is the converged LSCS baseline. Future C4I research and development include enhanced information transport, network cyber security posture, cloud-based architecture, assured communications in denied environments along with agility and mobility. Funding also supports testing and evaluation of cyber security issue associated with obsolescence of network items and if not addressed will impact the ability of the Program Office to maintain system accreditation under Risk Management Framework (RMF) revoking multiple LSCS assets authority to connectivity on the Department of Defense Information Network (DoDIN). Efforts are in alignment with NECC's strategic Expeditionary Warfare Improvement Program (EXWIP) Integrated Priority Capability List (IPCL) priorities and maintain alignment with greater DoD initiatives, such as Joint Information Environment (JIE), Mission Partner Environment (MPE) in order to maintain interoperability and drive down DoN enterprise costs.

The future of large scale communications assets such as Navy Enterprise Tactical Command and Control (NETC2) (V) 1 and 2, Expeditionary Mine Countermeasures (ExMCM) referred to as Expeditionary Carry-on Network (ExCON), Assured Command and Control (AC2), will be converging to a Common Expeditionary and Shore Baseline culminating in a single RMF Authority to Operate (ATO). Next generation air, surface and subsurface surveillance systems, as well as enhanced C4I capabilities, are required to meet operational objectives. Future technologies are being evaluated as enabling capabilities to expand situational awareness, providing additional tactical decision aids to the local area commander. Future C4I research and development efforts will be identified within NECC strategic Expeditionary Warfare Improvement Program (EXWIP) Integrated Priority Capability List (IPCL) priorities to increase agility, mobility and network security posture. Additional efforts will be driven by greater DoD initiatives, such as Joint Information Environment (JIE) Inc II, in order to maintain interoperability and drive down DoN enterprise costs.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Navy	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys
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Funding has been realigned into PE 0604280N from PE 0604230N Project 4011 as part of RDTEN PE consolidation starting in FY20. There are no new starts associated with this realignment.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> NECC C4ISR Modernization</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2020 Plans:</b> Investigating Cloud Technologies to include Software Defined Networking (SDN), Micro segmentation and Episodic Enclaves in order to pace the threat and support speed to capability utilizing a transformational and streamlined application integration process in support of information warfare and rapid program insertion. Through the use of common and automated baselines, implementing new technologies in order to enable rapid introduction of new products and technology, preventing obsolescence, and end of support issues. Investigating the use of Development Operations (DevOps) in order to insert new technology enhancements via incremental software &amp; hardware upgrades and deliver rapid build releases.</p> <p><b>FY 2021 Base Plans:</b> Further investigation of Cloud Technologies to include Software Defined Networking (SDN), Micro segmentation and Episodic Enclaves in order to pace the threat and support speed to capability. Continue to utilize a transformational and streamlined application integration process in support of information warfare and rapid program insertion. Through the use of common and automated baselines, implement new technologies in order to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues. Continue to research the use of Development Operations (DevOps) in order to insert new technology enhancements via incremental software &amp; hardware upgrades and deliver rapid build releases.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> There is no change for the funding request from FY 2020 to FY2021.</p>	0.000	3.045	3.038	0.000	3.038
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	3.045	3.038	0.000	3.038

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

N/A

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	Project (Number/Name) 4011 / Naval Coastal Warfare Surv and C4I Sys

**D. Acquisition Strategy**

Funding supports an evolutionary acquisition strategy supporting the dynamically evolving rapid action mission of Navy Expeditionary Forces. Small, Medium and Large Scale Communication Systems (LSCS) funding will align LSCS to the Deployable Joint Command and Control (DJC2) product baseline. The project will continuously analyze operational utilization of the systems and will roll analysis results into periodic system upgrades to address cyber security vulnerabilities, obsolescence, and maximize operational effectiveness. The intent of this strategy is to drive down development, production, and logistics costs, while leveraging technologies developed for other agencies to increase the capabilities of Navy Expeditionary Forces. The baseline configuration for Large Scale Communication Systems (LSCS) is the Navy Enterprise Tactical Command and Control (NETC2), a system scalable to Adaptive Force Package (AFP) levels. Efforts include development of capabilities based on emergent requirements, operational feedback, alignment with Dept. of Defense initiatives such as Joint Information Environment (JIE) / Mission Partner Environment, and identification through strategic Expeditionary and Warfare Improvement Program (EXWIP) Integrated Priority Capability List (IPCL) priorities to include reach back for tactical vehicles and craft, blue force tracking, tactical data link capability, and sensor technologies in support of surveillance and reconnaissance missions.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys
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<b>Product Development (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Systems Engineering - Expeditionary	WR	NSWC : PANAMA CITY, FL	0.000	0.000		0.832	Nov 2019	0.830	Nov 2020	-		0.830	Continuing	Continuing	Continuing
Hardware/Software Development	C/CPAF	GTRI : ATLANTA, GA	0.000	0.000		1.300	Nov 2019	1.298	Nov 2020	-		1.298	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		2.132		2.128		-		2.128	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0604230N Project 0411

<b>Test and Evaluation (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Test & Evaluation - Expeditionary	WR	NSWC : PANAMA CITY, FL	0.000	0.000		0.654	Nov 2019	0.650	Nov 2020	-		0.650	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.654		0.650		-		0.650	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0604230N Project 0411

<b>Management Services (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Program Management Support - Expeditionary	WR	NIWC PAC : SAN DIEGO, CA	0.000	0.000		0.259	Nov 2019	0.260	Nov 2020	-		0.260	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.000	0.000		0.259		0.260		-		0.260	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0604230N Project 0411

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Navy</b>								<b>Date:</b> February 2020					
<b>Appropriation/Budget Activity</b> 1319 / 5				<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station				<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys					
	<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	0.000	0.000		3.045		3.038		-		3.038	Continuing	Continuing	N/A

**Remarks**  
FY19 cost data is provided under PE 0604230N Project 0411

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys
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Proj 4011	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				
<b>System Development</b>																																
NECC C4ISR Development							DT/OT ▲				DT/OT ▲				DT/OT ▲				DT/OT ▲				DT/OT ▲				DT/OT ▲				DT/OT ▲	
	NETC2 Capability Development																															
<b>Production</b>																																
NECC C4ISR Procurement																																
	LSCS Upgrades Refresh																															
	Tactical Vehicles and Combatant Crafts PR/TR																															
	Expeditionary VHF/UHF/SATCOM (EVUS) UHF TACSAT Upgrade																															
	Expeditionary SIPR/NIPR Network Upgrades/Refresh																															
	Converged IP																															
	VoISP																															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Navy		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604280N / JNT Tactical Radio System - Maritime/Fixed Station	<b>Project (Number/Name)</b> 4011 / Naval Coastal Warfare Surv and C4I Sys

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b>Proj 4011</b>				
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY20	3	2020	3	2020
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY21	3	2021	3	2021
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY22	3	2022	3	2022
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY23	3	2023	3	2023
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY24	3	2024	3	2024
System Development: NECC C4ISR Development: Navy C4I Test and Certification Events FY25	3	2025	3	2025
System Development: NECC C4ISR Development: NETC2 Capability Development	1	2020	4	2025
Production: NECC C4ISR Procurement: LSCS Upgrades Refresh	1	2020	4	2025
Production: NECC C4ISR Procurement: Tactical Vehicles and Combatant Crafts PR/TR	1	2020	4	2025
Production: NECC C4ISR Procurement: Expeditionary VHF/UHF/SATCOM (EVUS) UHF TACSAT Upgrade	1	2020	4	2025
Production: NECC C4ISR Procurement: Expeditionary SIPR/NIPR Network Upgrades/Refresh	1	2020	4	2025
Production: NECC C4ISR Procurement: Converged IP	1	2020	4	2025
Production: NECC C4ISR Procurement: VoISP	1	2020	4	2025