Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604280N *I JT Tact Radio Sys (JTRS)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	41.173	5.172	3.272	192.345	-	192.345	183.047	134.904	121.604	124.613	Continuing	Continuing
0725: *Communication Automation*	0.000	0.000	0.000	3.114	-	3.114	0.505	0.562	0.620	0.652	Continuing	Continuing
0742: *Sub Integrated Ant System*	0.000	0.000	0.000	18.925	-	18.925	16.152	15.680	13.943	14.219	Continuing	Continuing
0921: *NAVSTAR GPS Equipment*	0.000	0.000	0.000	59.977	-	59.977	57.515	39.887	23.764	24.258	Continuing	Continuing
1411: *Sub Tact Comm System*	0.000	0.000	0.000	14.175	-	14.175	12.977	14.372	14.674	14.963	Continuing	Continuing
2126: *ATDLS Integration*	0.000	0.000	0.000	18.201	-	18.201	22.862	21.206	22.611	23.063	Continuing	Continuing
3020: *MIDS/JTRS*	0.000	0.000	0.000	39.214	-	39.214	31.198	29.480	30.515	31.673	Continuing	Continuing
3078: *Digital Modular Radio*	41.173	5.172	3.272	3.262	-	3.262	3.000	3.016	6.422	6.550	Continuing	Continuing
3341: *Network Tactical Common Data Link*	0.000	0.000	0.000	32.432	-	32.432	35.837	7.861	6.156	6.279	Continuing	Continuing
4011: *Naval Coastal Warfare Surv and C4I Sys*	0.000	0.000	0.000	3.045	-	3.045	3.001	2.840	2.899	2.956	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 RDTEN 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

(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 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.

FY 2020 BFTN efforts will focus on development efforts necessary to address capability gaps and test report recommendations, and commence studies to address High Frequency (HF) Line of Sight (LOS)/Beyond Line of Sight (BLOS) radio obsolescence issues and required upgrades to meet known threats.

(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.

(0921)Navigation Satellite Timing & Ranging (NAVSTAR) Global Positioning System (GPS) project 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 Position 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 Position, 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 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); and Network Tactical Common Data Link (NTCDL) Program which provides the ability to transmit/receive real-time intelligence, surveillance, and reconnaissance (ISR) data simultaneously from multiple sources (surface, air, sub-surface, man-portable), and exchange command and control information (voice, data, imagery, and full motion video (FMV)) across dissimilar joint, service, coalition, and civil networks. The program element also develops and tests tactical data link capability to distribute other data types to new and existing platforms.

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

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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 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 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).

MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal provides 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 capability integration into the MIDS JTRS 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.

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The FY20 Budget continues the development of the MIDS JTRS Link 16 transceiver hardware upgrade to allow for rapid field loadable updates. FY20 will include the Link 16 hardware Critical Design Review, Technical Readiness Review and the completion of the MIDS JTRS TTNT testing as well as the updates to the TTNT and Link 16 waveforms.

(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 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 2020 DMR will complete an assessment and test of the Military Standard mandated MUOS scanning requirements, develop a scanning Concept of Operations (CONOPS), and continue development of updated DMR Cryptographic Equipment Application (CEA) software to be compliant with the latest National Security Agency (NSA) cryptographic modernization specifications.

(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.

FY 2020 request is for NTCDL product development, to include continued development of two (2) NTCDL Engineering Development Models (EDMs) and associated software.

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(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 & 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.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	4.310	3.272	3.271	-	3.271
Current President's Budget	5.172	3.272	192.345	-	192.345
Total Adjustments	0.862	0.000	189.074	-	189.074
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.862	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	189.083	-	189.083
• Rate/Misc Adjustments	0.000	0.000	-0.009	-	-0.009

Change Summary Explanation

Communication Automation, Battle Force Tactical Network (BFTN) (0725):
$3.114 million was realigned from PE 0204163N PU 0725 into this PE due to budget line item consolidation. The funding in FY19 for BFTN in PE 0204163N PU 0725 is $0.5 million due to an internal fund realignment to continue to develop engineering solutions for end of life issues, obsolescence, and to increase system ease of use for operators. Funding increases by $2.614 million to $3.114 million in FY20. Funding increase is attributed to BFTN development efforts necessary to address capability gaps and test report recommendations and commence studies to address HF Line of Sight (LOS)/Beyond Line of Sight (BLOS) radio obsolescence issues and required upgrades to meet known threats.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604280N *I JT Tact Radio Sys (JTRS)*

Submarine Integrated Antenna System (0742):
The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

NAVSTAR GPS (0921):
$59.977 million from PE 0604777N PU 0921 was moved into this PE due to budget line item consolidation. The funding in FY19 for PE 0604777N PU 0921 is $80.675 million. The FY 2020 funding request was reduced by $12.132 million to account for the availability of prior year execution balances. Also, the FY 2020 funding request was reduced due to schedule delays of United States Air Force (USAF) MGUE development resulting in the delay of Prime Vendor Integration (PVI) of the EGI-M Global Positioning System (GPS) receivers. This has resulted in a U.S. Navy two year integration delay of CH-53K, a three year delay of KC-130J, a four year delay of E-2D, as well as a four year delay of F/A-18E/F and EA-18G air platforms equipped with ANAV GPS receivers.

Technical: Electromagnetic compatibility and shock improvement of the Submarine Anti-Jam GPS Enhancement (SAGE) antenna extended development and shifted test efforts to FY 2021. GPS Modernization in FY 2020 supports PVI and testing of MAGR2K-M GPS Receivers on three (3) air platforms; F/A-18E/F, 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 EGI-M GPS Receivers, prime vendor integration 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). Project will support critical risk reduction efforts to ensure Navy specific requirements are met throughout the development of EGI-M GPS Receivers for five (5) air platforms: F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J.

Navigation Satellite Timing & Ranging (NAVSTAR) Global Positioning System (GPS) Equipment(0921): F/A-18E/F, MV-22B, and CMV-22B air platforms equipped with MAGR2K-M GPS receivers will move forward with PVI efforts. F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J air platforms with EGI-M GPS Receivers will move forward with critical risk reduction efforts to ensure Navy specific requirements are met in support of hardware development and PVI efforts.

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

ATDLS Integration (2126):
$18.664 million was realigned from PE 0205604N PU 2126 into this PE due to budget line item consolidation. The funding in FY19 for PE 0205604N PU2126 is $31.295 million. FY 2020 funding request was reduced by $5.0 million to account for the availability of prior year execution balances. Also, FY 2020 Link 16 budget decreased as JTIDS CM/FR, MOS CM/FR and MOS Mod prepare for a FY20 FDR. Development efforts in FY20 are limited to deficiency correction as a result of Operational Test and integration/test of the CMN enabled MIDS JTRS terminal with C2P. Link 22 budget decreased due to testing and certification activities for FY20 that are significantly lesser in scope than prior year Link 22 related development activities. LMMT budget increased in FY20 due to the commencement of CD3 Build Decision and Build Technical Review.

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MIDS/JTRS (3020):
$39.214 million was realigned from PE 0205604N PU 3020 into this PE due to budget line item consolidation. The funding in FY19 for PE 0205604N PU 3020 is $43.798 million. FY20 funding decreased due to a delay from Q1FY19 to Q2FY19 in the contract award in MIDS Modernization development (now called the Link 16 hardware transceiver upgrade). As a result, some requirements were not funded in this request (all referenced in PE 0205604N/3020). TTNT testing and platform integration continues but the main development effort completes in FY19 decreasing TTNT's funding from FY19 to FY20.

Network Tactical Common Data Link (NTCDL) (3341)
$32.432 million was realigned from PE 0205604N PU 3341 into this PE due to budget line item consolidation. The funding in FY19 for PE 0205604N PU 3341 is $13.886 million. The FY 2020 funding request was reduced by $4.576 million due to the availability of prior year execution balances. The $18.546 million increase from FY 2019 to FY 2020 provides for the continued development of two (2) NTCDL EDMs and associated software, Government Furnished Software (GFS) development, contractor-developed software development, and systems engineering in addition to maintaining the current FY 2021 EDM delivery schedule. Furthermore, this increase supports $15.0 million of contractor hardware buys and installation subtasks.

Naval Coastal Warfare Surv and C4I Systems (4011):
$3.045 million was realigned from PE 0604230N PU 0411 into this PE due to budget line item consolidation. In FY19 the funding under PE 0604230N PU 4011 is $3.043 million. Funding does not appreciably change in FY20.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0725 / *Communication Automation*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0725: *Communication Automation*	0.000	0.000	0.000	3.114	-	3.114	0.505	0.562	0.620	0.652	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 Communication Automation, Battle Force Tactical Network (BFTN) program, is a continuing program that provides for automation and communications upgrades for fleet tactical users. The BFTN on each surface, subsurface, air, or fixed US Navy platform uses previously installed/existing Line of Sight (LOS)/Extended Line of Sight (ELOS) radios (a.k.a. Radio Frequency (RF)) to create a secure gateway that inter-connects all users into a common RF Tactical Network (a.k.a. wireless). BFTN enables war-fighters to digitally communicate National Atlantic Treaty Organization (NATO) Allied/Coalition and US-Only information necessary to execute and plan in a real-time operational environment without relying on ashore application server interaction. This RF Network separately supports US-Only Carrier and Expeditionary Strike Group Commanders and maintains the digital communication ability to execute and plan with other U.S. ships, submarines or aircraft, as well as with NATO Allied/ Coalition networks, even if Satellite Communication (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 2020 BFTN efforts will focus on development efforts necessary to address capability gaps and test report recommendations, and commence studies to address High Frequency (HF) Line of Sight (LOS)/Beyond Line of Sight (BLOS) radio obsolescence issues and required upgrades to meet known threats.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Battle Force Tactical Network (BFTN)	0.000	0.000	3.114	0.000	3.114
Articles:	-	-	-	-	-
Description: 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 SATCOM-denied environment and serves as a primary backup for SIPRNET (Secret Internet Protocol Router Network) in the absence of SATCOM.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0725 / *Communication Automation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY19 Plans funded under PE 0204163N, Project 0725. ***FY 2020 Base Plans:*** BFTN will 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 in satellite-denied environments. Begin identifying and developing system modifications necessary to address near-term and future communications threats. Efforts will focus on systems that utilize High Frequency (HF) Military Standard Waveform (MSW), such as BFTN, 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 BFTN's 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. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY19 funding under PE 0204163N, Project 0725 was $0.5 million due to internal realignments to continue to develop engineering solution for end of life issues, obsolescence, and to increase system ease of use for operators. Funding increases by $2.614 million to $3.114 million in FY20. Funding increase is attributed to BFTN development efforts necessary to address capability gaps and test report recommendations and commence studies to address HF Line of Sight (LOS)/Beyond Line of Sight (BLOS) radio obsolescence issues and required upgrades to meet known threats.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.114	0.000	3.114

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3057: *Battle Force Tactical Network (BFTN)*	1.078	9.723	14.561	-	14.561	20.290	21.405	9.887	10.085	Continuing	Continuing
• RDTEN/0204163N/0725: *Battle Force Tactical Network (BFTN)*	0.499	0.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	33.598

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0725 / *Communication Automation*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Battle Force Tactical Network (BFTN) - Develop the design of Full Rate Production (FRP) systems based on the High Frequency (HF) Strategy studies.

E. Performance Metrics

BFTN - Performance will be evaluated against defined and derived performance criteria determined from the High Frequency (HF) Strategy studies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0725 / *Communication Automation*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development - BFTN	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
Product Development - BFTN	TBD	FFRDC : TBD	0.000	0.000		0.000		2.114	Oct 2019	-		2.114	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.614		-		2.614	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
HF Strategy Study - BFTN	C/FFP	MIT/Lincoln Lab : Lexington, MA	0.000	0.000		0.000		0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.500		-		0.500	Continuing	Continuing	N/A

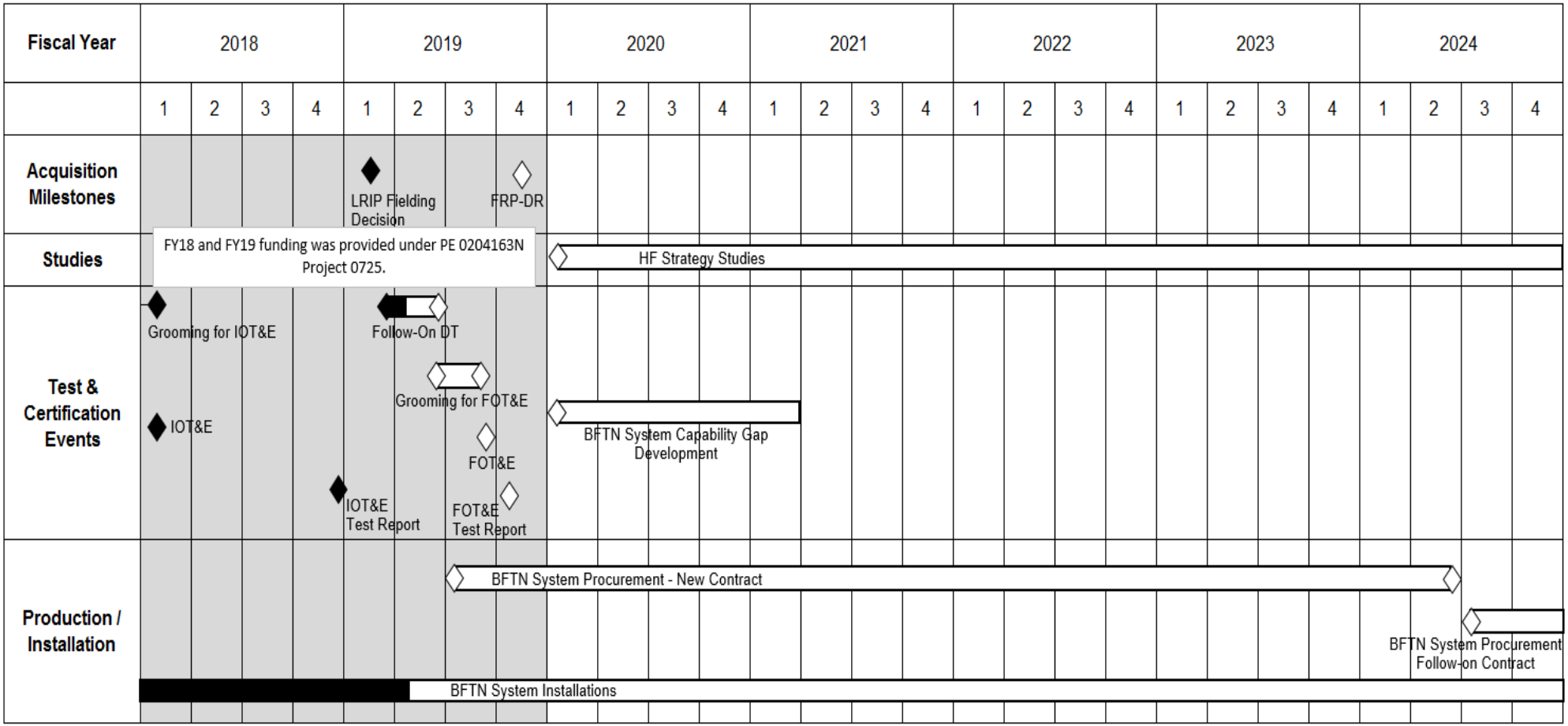
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		3.114		-		3.114	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data for BFTN is provided under PE 0204163N, Project 0725.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0725 / *Communication Automation*

BFTN



Note: Original FRP-DR has been updated to reflect LRIP Fielding Decision with FRP-DR in August FY 2019.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0725 / *Communication Automation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0725				
BFTN System Capability Gap Development	1	2020	1	2021
HF Strategy Studies	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0742 / *Sub Integrated Ant System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0742: *Sub Integrated Ant System*	0.000	0.000	0.000	18.925	-	18.925	16.152	15.680	13.943	14.219	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.

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)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Transition Engineering	0.000	0.000	5.151	0.000	5.151
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 0742					
FY 2020 Base Plans: The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Submarine High Data Rate (SubHDR) Pre-Planned Product Improvement (P3I)	0.000	0.000	3.480	0.000	3.480
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 0742					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0742 / *Sub Integrated Ant System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Advanced High Data Rate (AdvHDR) ***Articles:*** ***FY 2019 Plans:*** FY19 Plans funded under PE 0604503N, Project 0742 ***FY 2020 Base Plans:*** The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.	0.000 -	0.000 -	3.459 -	0.000 -	3.459 -
Title: Towed Buoy Antenna (AN/BRR-6/6B) ***Articles:*** ***FY 2019 Plans:*** FY19 Plans funded under 0604503N, Project 0742 ***FY 2020 Base Plans:*** The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***	0.000 -	0.000 -	5.258 -	0.000 -	5.258 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0742 / *Sub Integrated Ant System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Antenna Improvements	0.000	0.000	1.577	0.000	1.577
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 0742					
FY 2020 Base Plans: The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The details of Program Element 0604280N, Project 0742 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.925	0.000	18.925

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0604503N/0742: *Submarine Integrated Antenna System*	15.267	15.426	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	341.577
• OPN/3130: *Submarine Communication Equipment*	76.327	78.580	69.643	-	69.643	62.380	65.201	65.927	67.081	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.

E. Performance Metrics

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0742 / *Sub Integrated Ant System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		15.316	Nov 2019	-		15.316	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		15.316		-		15.316	Continuing	Continuing	N/A

Remarks

- FY18 and 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.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		0.644	Feb 2020	-		0.644	0.000	0.644	-
		Subtotal	0.000	0.000		0.000		0.644		-		0.644	0.000	0.644	N/A

Remarks

- FY18 and 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.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		1.534	Oct 2019	-		1.534	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.534		-		1.534	Continuing	Continuing	N/A

Remarks

- FY18 and 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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0742 / *Sub Integrated Ant System*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		1.431	Feb 2020	-		1.431	0.000	1.431	-
		Subtotal	0.000	0.000		0.000		1.431		-		1.431	0.000	1.431	N/A

Remarks

- FY18 and 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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		18.925		-		18.925	Continuing	Continuing	N/A

Remarks

- FY18 and 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.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0742 / *Sub Integrated Ant System*

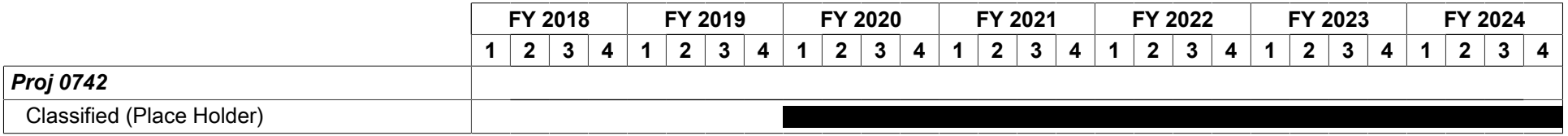


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0742 / *Sub Integrated Ant System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0742				
Classified (Place Holder)	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*				Project (Number/Name) 0921 / *NAVSTAR GPS Equipment*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0921: *NAVSTAR GPS Equipment*	0.000	0.000	0.000	59.977	-	59.977	57.515	39.887	23.764	24.258	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.

A. Mission Description and Budget Item Justification

The FY 2020 funding request was reduced by $12.132 million to account for the availability of prior year execution balances.

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 Position 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. GPS continues to be integrated in all Department of Defense (DoD) platforms and the development of enhanced and protected GPS is a national security priority. 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 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Sea Navigation Warfare (NAVWAR)	0.000	0.000	2.622	0.000	2.622
Articles:	-	-	-	-	-
Description: 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. The program is continuing the Submarine Anti-Jam GPS Enhancement (SAGE) antenna development, which integrates AJ capability into the submarine Multi-Function Mast (OE-538B). Sea NAVWAR will continue to research the viability and development of smaller AJ antennas for platforms with Size, Weight and Power and Cost (SWaP-C) restrictions and will ensure compatibility with the Military Code (M-Code) signal.					
FY 2019 Plans: FY 2019 Accomplishments funded under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).					
FY 2020 Base Plans: 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.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Begin integration testing and DT/OT preparation for smaller M-code capable AJ antennas for SWaP-C constrained surface platforms. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY 2019 funding under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment) Sea NAVWAR was $3.292 million. Funding decreases by $0.670 million to $2.622 million in FY 2020. Funding decrease is attributed to conducting final stages of development, integration testing and documentation of SAGE and OE-538B antenna system in FY 2020.					
Title: Global Positioning System (GPS) - Based Positioning, Navigation and Timing (PNT) Service (GPNTS) ***Articles:***	0.000 -	0.000 -	13.242 -	0.000 -	13.242 -
Description: 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. ***FY 2019 Plans:*** FY 2019 Accomplishments funded under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment). ***FY 2020 Base Plans:*** 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. Complete software enhancements associated with the Non-GPS Aided Positioning for Surface Ships (NoGAPSS) Future Navy Capability (FNC). Prepare for and conduct test demonstration of the NoGAPSS FNC					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
including coordination of available platforms, installation of the NoGAPSS modifications, 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&E) required to inform a fielding decision for the NoGAPSS capability. 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&E). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY 2019 funding under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment) GPNTS was $19.602 million. Funding decreases by $6.360 million to $13.242 million that is attributed to completion of the IOT&E.					
Title: Air Navigation Warfare (NAVWAR) ***Articles:*** ***Description:*** 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. ***FY 2019 Plans:*** FY 2019 Accomplishments funded under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment). ***FY 2020 Base Plans:*** Continue to fund the development and integration of miniaturized Anti-Jam (AJ) antennas to be used for various Size, Weight, and Power Constrained air platforms. Efforts include maturation of antenna solutions, chamber and flight testing, moving toward integration on specific platforms. Efforts will continue to determine air platform specific requirements and solutions.	0.000 -	0.000 -	6.667 -	0.000 -	6.667 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue developmental effort for AJ capability on AH-1Z, UH-1Y helicopters to include Non-Recurring Engineering (NRE) for platform interface modifications; software development, integration testing, and hardware integration. Continue to provide subject matter expertise to the MQ-4C platform as it continues integration testing, test plan development and updates; support integration and flight testing for the anti-jam capability on the MQ-4C air platform. Continue developmental effort for AJ capability on MQ-8B and MQ-8C to include hardware integration of Multi-Platform Anti-jam GPS Navigation Antenna Integrated (MAGNA-I) and commence laboratory, ground testing and aerial flight testing. Conduct lab testing of Global Positioning System (GPS) antennas, specifically MAGNA-I for MQ-8B/C 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). Commence integration, testing Environmental and Electromagnetic Interference (EMI) Compliance testing of HI-GAINS for UAS. Continue GPS Demonstrations and laboratory testing of GPS receivers with associated antennas at Facilities for Antenna and Radar Cross Section (RCS) Measurements (FARM), comparing performance between traditional nulling systems and new beam-steering antenna electronics to collect data to be used by platforms as they consider future antenna system updates. 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 to assist the Fleet with Global Positioning System (GPS) Enterprise Selective Availability Anti-Spoofing Module (SAASM) and Architecture Evolution Plan (AEP) developments, providing subject matter expertise to Naval Air Systems Command (NAVAIR) platforms for SAASM integration and monitor future GPS Directorate SAASM upgrades. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY 2019 funding under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment) Air NAVWAR was $10.041M. Funding decreases by $3.374M to $6.667M in FY 2020. Funding decrease is attributed to the completion of Y-Code Only signal mode software updates for several platforms and the completion of Anti-Jam antenna integration efforts for the E-6B air platform.					
Title: Global Positioning System (GPS) Modernization	0.000	0.000	37.446	0.000	37.446
Articles:	-	-	-	-	-
Description: 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. 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 Integrator for the platform. Project currently consists of seven (7) parallel efforts that integrate four (4) different M-Code GPS receivers into seven (7) different type model series aircraft. ***FY 2019 Plans:*** FY 2019 Accomplishments funded under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment). ***FY 2020 Base Plans:*** FY 2020 funding continues to support Prime Vendor Integration (PVI) and testing of Miniaturized Airborne GPS receiver 2000 - Modernization (MAGR2K-M) GPS Receivers on three (3) air platforms; F/A-18E/F, MV-22B, and CMV-22B. MAGR2K-M GPS Receivers required minimal enhanced functionality and kept the same aviation					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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 risk reduction efforts of EGI-M GPS Receivers for five (5) air platforms: F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J. Continue GPS Modernization efforts on the following three (3) air platforms, F/A-18E/F, MV-22B and CMV-22B, which require MAGR2K-M receivers: - Support United States Air Force (USAF) box level M-Code GPS receiver performance and certification testing. - Complete development of aircraft software modifications required for integrating Military Code (M-Code) Global Positioning System (GPS) receivers into aircraft - Begin laboratory testing of M-Code receivers in government and vendor aircraft systems integration labs. - Begin developmental flight testing of M-Code Miniaturized Airborne GPS receiver 2000 - Modernization (MAGR2K-M) GPS receivers for F/A-18E/F. - 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. Continue GPS Modernization efforts on the following five (5) air platforms, F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J, which require Embedded GPS/Inertial Navigation System (INS) (EGI) type of GPS receivers (ANAV, LN-351, H-764): - Continue Systems Engineering and Technical Reviews (SETR) including Preliminary Design Review (PDR) and Critical Design (CDR) review for aircraft software development efforts for all air platforms. - Start Non-recurring Engineering (NRE) efforts and software updates required for the design and testing of M-Code GPS receivers in for CH-53K and KC-130J. - Begin laboratory testing of M-Code receivers in E-2D aircraft systems integration labs. - Conduct hardware and software M-Code integration risk reduction studies to include environmental qualification assessment, System Integration Lab (SIL) stand-up, Electromagnetic Interference (EMI) qualification verification, engineering drawings update, analysis of potential support equipment changes, and product review of Engineering & Manufacturing Development (EMD) Contract Data Requirements List (CDRL) deliverables. - 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.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
OCO: N/A. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY 2019 funding under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment) GPS Modernization was $26.540 million. Funding increases by $10.906 million to $37.446 million in FY 2020. Funding increase supports PVI and testing of MAGR2K-M GPS Receivers on three (3) air platforms; F/A-18E/F, MV-22B, and CMV-22B. FY 2020 will also support critical risk reduction efforts of Embedded Global Position System (GPS) Inertial - M-Code (EGI-M) GPS Receivers for five (5) air platforms: F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	59.977	0.000	59.977

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2657: *NAVSTAR GPS Receivers (Space)*	15.923	10.703	32.674	-	32.674	33.721	29.977	22.938	23.394	Continuing	Continuing
• APN/0577: *Common Avionics Changes*	12.431	7.543	8.118	-	8.118	7.991	19.193	41.139	45.712	245.777	778.432

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.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

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.

E. Performance Metrics

The primary metric used for the Air NAVWAR Program is acceptable system performance in a GPS denied environment which is defined by classified values of jamming to signal ratio (J/S) identified in the Enhanced GPS User Equipment (UE) Operational Requirements Document (ORD) 562-06-00 of 7 June 2000. The performance goal is met if acceptable system performance is achieved in the threshold J/S environment cited in the classified appendix.

The primary metric used for the Sea NAVWAR is acceptable system performance in a GPS denial environment defined by classified values of jamming to J/S identified in the Sea NAVWAR Increment 2 Capabilities Production Document (CPD) (12/2008). The performance goal is met if acceptable system performance is achieved in the threshold J/S environment cited in the CPD.

The primary metric used for the GPNTS is successful completion of the system development as outlined in the GPNTS Technical Requirements Document (TRD).

The primary metric used for the GPS Modernization is successful completion of the system development as outlined in the Project Definition Document (PDD) for GPS Modernization.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0921 / *NAVSTAR GPS Equipment*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Air NAVWAR Development Support	WR	NAWC : Pax River, MD	0.000	0.000		0.000		1.900	Nov 2019	-		1.900	Continuing	Continuing	Continuing
Air NAVWAR Govt Eng Support	WR	NAWC : Pax River, MD	0.000	0.000		0.000		2.000	Dec 2019	-		2.000	Continuing	Continuing	Continuing
Sea NAVWAR Development Support	WR	SSC PAC, NUWC : San Diego, Newport	0.000	0.000		0.000		0.365	Dec 2019	-		0.365	Continuing	Continuing	Continuing
GPNTS SW / NoGAPSS Development	C/CPFF	TBD : TBD	0.000	0.000		0.000		6.900	Jan 2020	-		6.900	Continuing	Continuing	Continuing
GPNTS Development Support	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		1.365	Dec 2019	-		1.365	Continuing	Continuing	Continuing
GPNTS Govt Eng Support	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		1.800	Dec 2019	-		1.800	Continuing	Continuing	Continuing
GPS Mod Development F/A-18E/F MAGR2K-M	C/CPIF	Boeing : St Louis, MO	0.000	0.000		0.000		9.500	Dec 2019	-		9.500	Continuing	Continuing	Continuing
GPS Mod Development F/A-18E/F & EA-18G ANAV	C/CPIF	Boeing : St Louis, MO	0.000	0.000		0.000		0.700	Nov 2019	-		0.700	Continuing	Continuing	Continuing
GPS Mod Development E-2D	C/CPIF	Northup Gruman : Pax River, MD	0.000	0.000		0.000		1.200	Nov 2019	-		1.200	Continuing	Continuing	Continuing
GPS Mod Development MV-22B,CMV-22B	C/CPIF	Bell Boeing : Amarillo, TX	0.000	0.000		0.000		4.800	Feb 2020	-		4.800	Continuing	Continuing	Continuing
GPS Mod Development CH-53K	C/CPIF	Sikorsky : Stratford, CT	0.000	0.000		0.000		1.400	Nov 2019	-		1.400	Continuing	Continuing	Continuing
GPS Mod Development KC-130J	C/CPIF	Lockheed Martin : Not Specified	0.000	0.000		0.000		1.400	Nov 2019	-		1.400	Continuing	Continuing	Continuing
GPS Mod Development Support	WR	SSC PAC, NAWC : San Diego, Pax River	0.000	0.000		0.000		2.250	Nov 2019	-		2.250	Continuing	Continuing	Continuing
GPS Mod Govt Eng Support	WR	SSC PAC, NAWC : San Diego, Pax River	0.000	0.000		0.000		4.200	Nov 2019	-		4.200	Continuing	Continuing	Continuing
Product Development	WR	GPS Directorate : Los Angeles, CA	0.000	0.000		0.000		0.950	Dec 2019	-		0.950	Continuing	Continuing	Continuing
Systems Engineering	WR	Govt, Contractor : San Diego, Newport	0.000	0.000		0.000		0.250	Nov 2019	-		0.250	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 0921 / *NAVSTAR GPS Equipment*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	0.000	0.000		0.000		40.980		-		40.980	Continuing	Continuing	N/A

Remarks

FY 2018 and FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment). FY 2020 increase in funding requirements is for development, test planning and integration of MAGR2K-M GPS Receivers on three (3) air platforms; F/A-18E/F, MV-22B, and CMV-22B; and critical risk reduction efforts of EGI-M GPS Receivers for five (5) air platforms: F/A-18E/F, EA-18G, E-2D, CH-53K, and KC-130J.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Engineering Services	WR	BAH : San Diego, Pax River, China Lake	0.000	0.000		0.000		1.450	Nov 2019	-		1.450	Continuing	Continuing	Continuing
Enginering Services	WR	SSC PAC, NAWC : San Diego, Pax River	0.000	0.000		0.000		2.442	Nov 2019	-		2.442	Continuing	Continuing	Continuing
Integrated Logistics Support	WR	SSC PAC, NAWC : San Diego, Pax River	0.000	0.000		0.000		1.500	Dec 2019	-		1.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		5.392		-		5.392	Continuing	Continuing	N/A

Remarks

FY 2018 and FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Air NAVWAR Test & Evaluation	WR	NAWC : Pax River	0.000	0.000		0.000		1.100	Nov 2019	-		1.100	Continuing	Continuing	Continuing
Sea NAVWAR Test & Evaluation	WR	SSC PAC, NUWC : San Diego, Newport	0.000	0.000		0.000		2.000	Nov 2019	-		2.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPNTS Test & Evaluation	WR	SSC PAC : San Diego	0.000	0.000		0.000		1.100	Nov 2019	-		1.100	Continuing	Continuing	Continuing
GPS Mod Test & Evaluation	WR	SSC PAC, NAWC : San Diego, Pax River	0.000	0.000		0.000		4.500	Nov 2019	-		4.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		8.700		-		8.700	Continuing	Continuing	N/A

Remarks

FY 2018 and FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	BAH : San Diego, Pax River, China Lake	0.000	0.000		0.000		4.905	Nov 2019	-		4.905	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		4.905		-		4.905	Continuing	Continuing	N/A

Remarks

FY 2018 and FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		59.977		-		59.977	Continuing	Continuing	N/A

Remarks

FY 2018 and FY 2019 cost data is provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment).

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

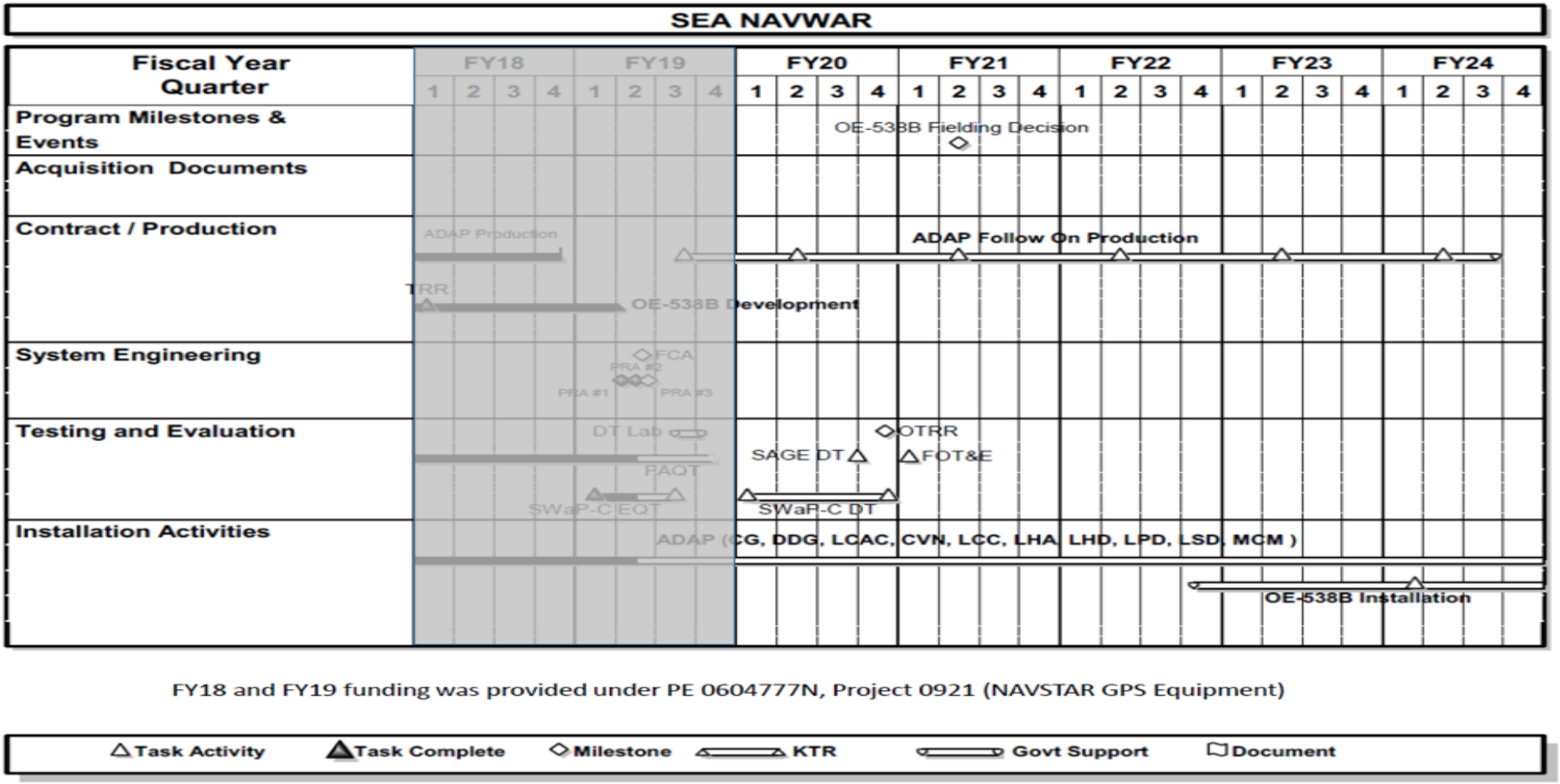


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

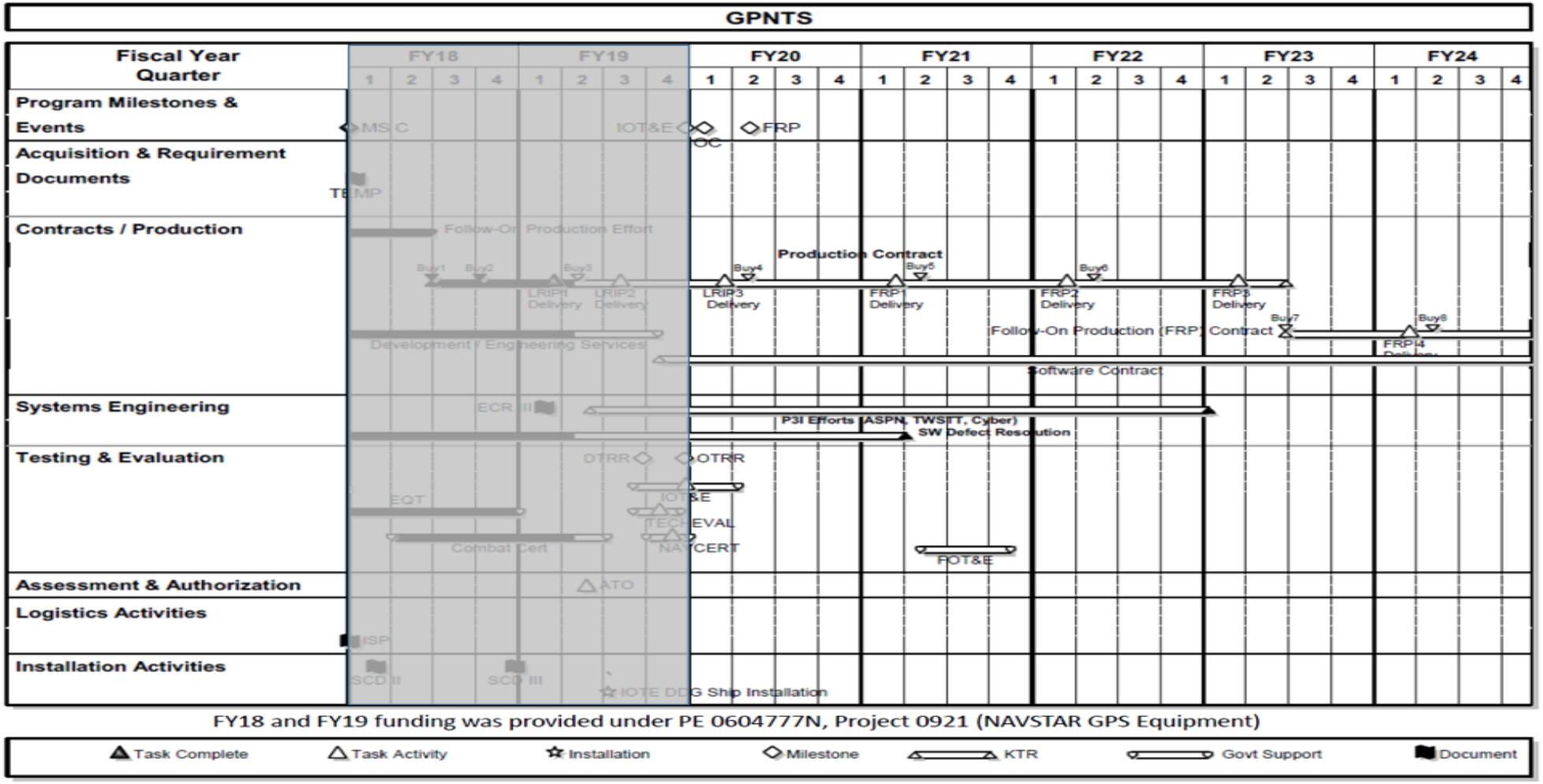
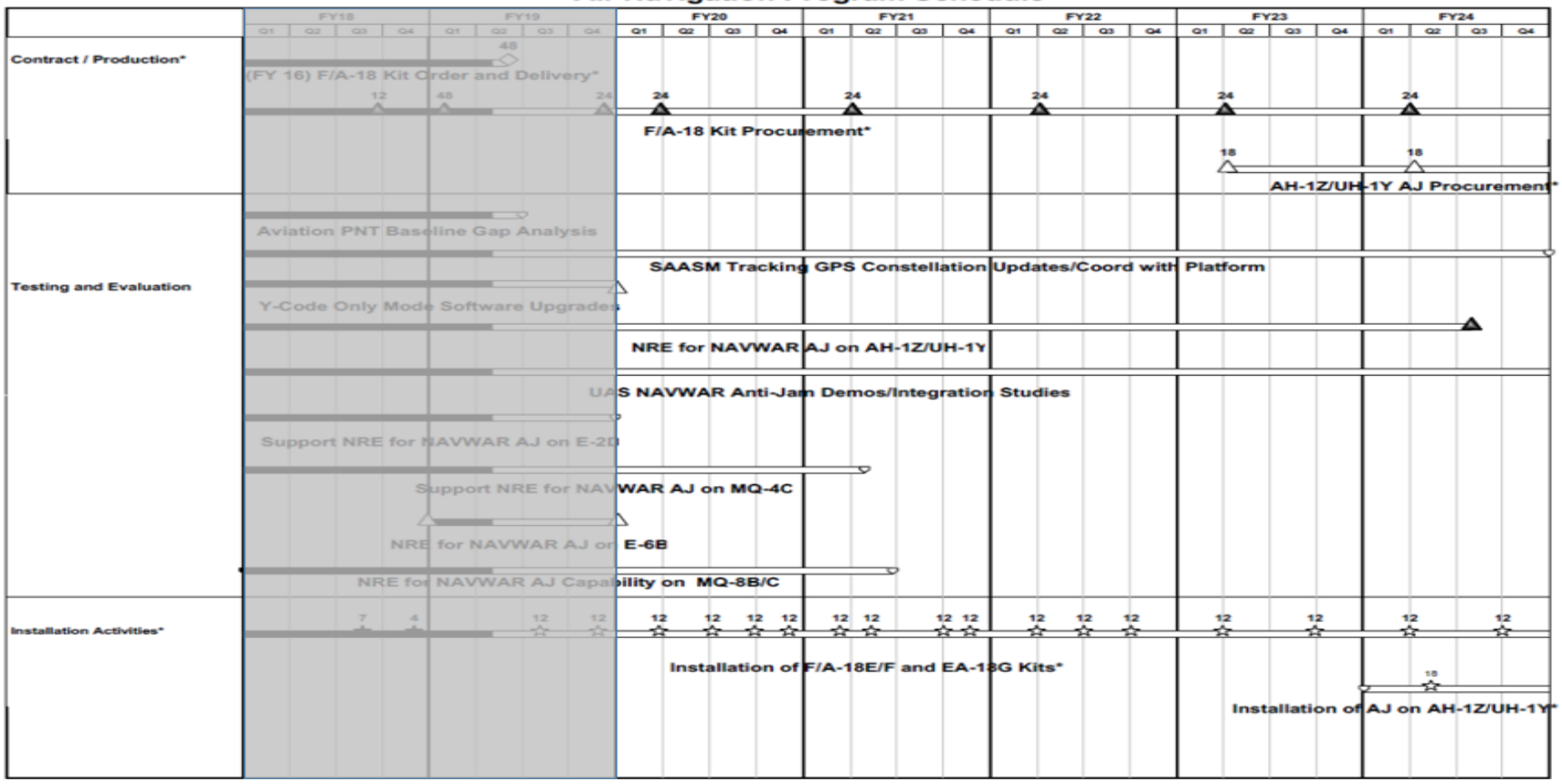


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

Air Navigation Program Schedule



* These Schedule activities are funded with APN

FY18 and FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment)

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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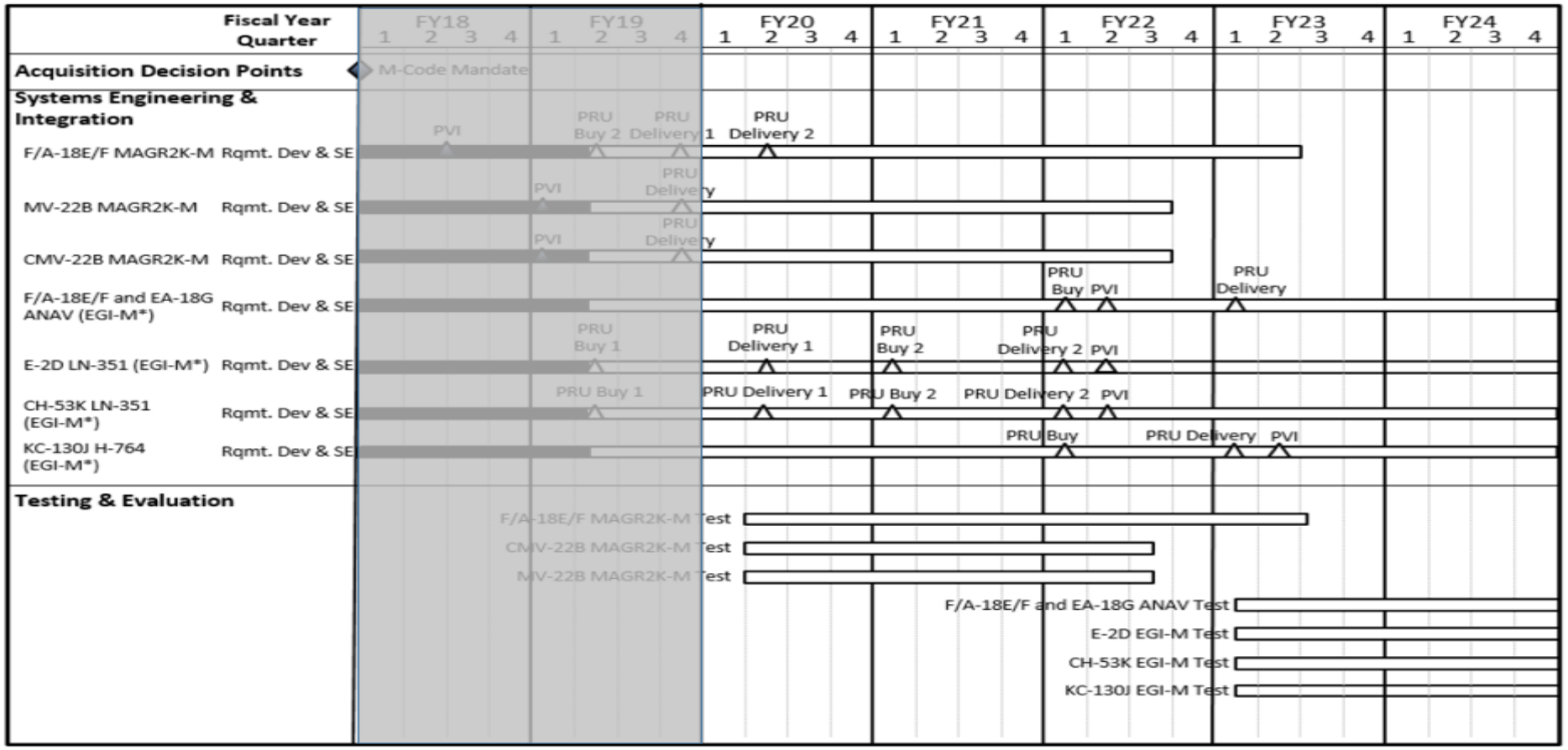
GPS Modernization



* EGI-M Platforms will conduct critical Risk Reduction Studies in FY19 and FY20

FY18 and FY19 funding was provided under PE 0604777N, Project 0921 (NAVSTAR GPS Equipment)

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0921				
Sea NAVWAR: Sea Navigation OE-538B Fielding Decision	2	2021	2	2021
Sea NAVWAR: Sea Navigation ADAP Follow On Production	1	2020	3	2024
Sea NAVWAR: Sea Navigation Operational Test Readiness Review (OTRR)	4	2020	4	2020
Sea NAVWAR: Sea Navigation SAGE Development Test (DT)	3	2020	3	2020
Sea NAVWAR: Sea Navigation Full Operational Test & Evaluation (FOT&E)	1	2021	1	2021
Sea NAVWAR: Sea Navigation SWaP-C DT	1	2020	4	2020
Sea NAVWAR: Sea Navigation ADAP Installations	1	2020	4	2024
Sea NAVWAR: Sea Navigation OE-538B Installations	4	2022	4	2024
GPS-based PNT Service (GPNTS): GPNTS Initial Operational Capability (IOC)	1	2020	1	2020
GPS-based PNT Service (GPNTS): GPNTS Full Rate Production (FRP)	2	2020	2	2020
GPS-based PNT Service (GPNTS): GPNTS Production Contract	1	2020	2	2023
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 Follow On Production Contract	2	2023	4	2024
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 Software Contract	1	2020	4	2024
GPS-based PNT Service (GPNTS): GPNTS P3I Efforts	1	2020	1	2023
GPS-based PNT Service (GPNTS): GPNTS SW Defect Resolution	1	2020	1	2021
GPS-based PNT Service (GPNTS): GPNTS Initial Operational Test and Evaluation (IOT&E)	1	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GPS-based PNT Service (GPNTS): GPNTS Follow-on Operational Test and Evaluation (FOT&E)	2	2021	4	2021
Air NAVWAR: Air Navigation F/A-18 Kit Procurement 2020	1	2020	1	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	2	2024	2	2024
Air NAVWAR: Air Navigation AH-1Z/UH-Y AJ Procurement 2023	2	2023	2	2023
Air NAVWAR: Air Navigation AH-1Z/UH-Y AJ Procurement 2024	2	2024	2	2024
Air NAVWAR: Air Navigation SAASM Tracking GPS Constellation Updates	1	2020	4	2024
Air NAVWAR: Air Navigation NRE Integration for NAVWAR AJ on AH-1 Z/UH-1Y	1	2020	3	2024
Air NAVWAR: Air Navigation UAS NAVWAR Anti-Jam Demos/Integration Studies	1	2020	4	2024
Air NAVWAR: Air Navigation Support NRE for NAVWAR AJ on MQ-4C	1	2020	2	2021
Air NAVWAR: Air Navigation Support NRE for NAVWAR AJ on MQ-8B/8C	1	2020	2	2021
Air NAVWAR: Air Navigation Installation of F/A-18E/F & EA-18G Kits	1	2020	4	2024
Air NAVWAR: Air Navigation Installation of AJ on AH-1Z/UH-1Y	1	2024	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization F/A-18E/F MAGR2K-M Rqmt. Dev & SE	1	2020	2	2023
Air NAVWAR: GPS Modernization: GPS Modernization F/A-18E/F MAGR2K-M PRU Delivery 2	2	2020	2	2020
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M Rqmt. Dev & SE	1	2020	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M Rqmt. Dev & SE	1	2020	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization F/A18-E/F & EA-18G ANAV Rqmt. Dev & SE	1	2020	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization F/A18-E/F & EA-18G ANAV PRU Buy	1	2022	1	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Air NAVWAR: GPS Modernization: GPS Modernization F/A18-E/F & EA-18G ANAV Prime Vender Integration	2	2022	2	2022
Air NAVWAR: GPS Modernization: GPS Modernization F/A18-E/F & EA-18G ANAV PRU Delivery	1	2023	1	2023
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 Rqmt. Dev & SE	1	2020	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Delivery 1	2	2020	2	2020
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Buy 2	1	2021	1	2021
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 PRU Delivery 2	1	2022	1	2022
Air NAVWAR: GPS Modernization: GPS Modernization E-2D LN-351 Prime Vendor Integration	2	2022	2	2022
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 Rqmt. Dev & SE	1	2020	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Delivery 1	2	2020	2	2020
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Buy 2	1	2021	1	2021
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K LN-351 PRU Delivery 2	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 KC-130J H-764 Rqmt. Dev & SE	1	2020	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization KC-130J H-764 PRU Buy	1	2022	1	2022
Air NAVWAR: GPS Modernization: GPS Modernization KC-130J H-764 PRU Delivery	1	2023	1	2023
Air NAVWAR: GPS Modernization: GPS Modernization KC-130J H-764 Prime Vendor Integration	2	2023	2	2023
Air NAVWAR: GPS Modernization: GPS Modernization F/A-18E/F MAGR2K-M Test	2	2020	3	2023
Air NAVWAR: GPS Modernization: GPS Modernization CMV-22B MAGR2K-M Test	2	2020	3	2022
Air NAVWAR: GPS Modernization: GPS Modernization MV-22B MAGR2K-M Test	2	2020	3	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 0921 / *NAVSTAR GPS Equipment*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Air NAVWAR: GPS Modernization: GPS Modernization F/A-18E/F and EA-18G ANAV Test	1	2023	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization E-2D EGI-M Test	1	2023	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization CH-53K EGI-M Test	1	2023	4	2024
Air NAVWAR: GPS Modernization: GPS Modernization KC 130J EGI-M Test	1	2023	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*				Project (Number/Name) 1411 / *Sub Tact Comm System*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
1411: *Sub Tact Comm System*	0.000	0.000	0.000	14.175	-	14.175	12.977	14.372	14.674	14.963	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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Common Submarine Radio Room (CSRR)	0.000	0.000	10.126	0.000	10.126
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 1411					
FY 2020 Base Plans: The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Undersea Assured Command & Control (UAC2)	0.000	0.000	0.652	0.000	0.652
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 1411					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 1411 / *Sub Tact Comm System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Link 16	0.000	0.000	3.397	0.000	3.397
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0604503N, Project 1411 ***FY 2020 Base Plans:*** The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of Program Element 0604280N, Project 1411 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	14.175	0.000	14.175

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0604503N/1411: *Submarine Tactical Communication System*	14.443	16.068	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	258.848
• OPN/3130: *Submarine Communication Equipment*	76.327	78.580	69.643	-	69.643	62.380	65.201	65.927	67.081	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 1411 / *Sub Tact Comm System*

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.

E. Performance Metrics

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 1411 / *Sub Tact Comm System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		11.032	Dec 2019	-		11.032	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		11.032		-		11.032	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.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		2.006	Nov 2019	-		2.006	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.006		-		2.006	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.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		0.143	Nov 2019	-		0.143	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.143		-		0.143	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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 1411 / *Sub Tact Comm System*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	0.000	0.000		0.000		0.994	Nov 2019	-		0.994	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.994		-		0.994	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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		14.175		-		14.175	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.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 1411 / *Sub Tact Comm System*

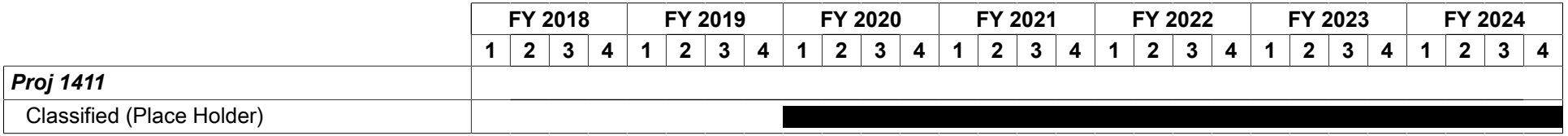


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 1411 / *Sub Tact Comm System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1411				
Classified (Place Holder)	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*				Project (Number/Name) 2126 / *ATDLS Integration*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2126: *ATDLS Integration*	0.000	0.000	0.000	18.201	-	18.201	22.862	21.206	22.611	23.063	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned into PE 0604280N from PE 0205604N Project 2126 as part of the 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

FY 2020 funding request was reduced by $5.0 million to account for the availability of prior year execution balances.

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 Technology Refresh (TR) and C2P Interoperability will modernize legacy C2P processing components to address C2P component obsolescence and fleet interoperability issues. C2P is a critical component in the Aegis Ballistic Missile Defense (BMD) architecture. C2P Modernization is a service life extension program required to sustain C2P support of Naval Integrated Air and Missile Defense (IAMD) and BMD capabilities. Link 22 development and integration into the C2P allows for standard data link communication with Coalition forces. LMMT will upgrade commercial off-the-shelf hardware and modernize software operating systems. LMMT will improve TDL performance monitoring and management 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 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.

FY2020 Justification: Complete JTIDS CM/FR shipboard integrated testing and data reduction including operational test. Continue preparations and conduct JTIDS CM/FR Fielding Decision Review (FDR). Complete MOS CM/FR integrated testing and data reduction including operational test. Continue preparations and conduct

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

MOS CM/FR Fielding Decision Review (FDR). Complete government testing and data reduction including for operational testing of MOS Mod. Continue preparations and conduct MOS Mod FDR fielding decision review. Develop C2P software update to implement CMN capability. Initiate government integration and testing of CMN capability with MOS Mod and C2P. Continue Link 16 Network integration logistics support.

Command and Control Processor (C2P) Technology Refresh (TR) funds a product improvement effort to the legacy C2P hardware components and allows legacy C2P software to execute on modern processors, thereby extending its effective service life. Product improvement efforts will include C2P software development, hardware integration, update of the C2P development environment to promote sustainability and testing to include follow-on test and evaluation (FOT&E) of the C2P TR baseline. Software development contractors will transform C2P legacy software code with modern supportable software code. "C2P, Phase 3", Increment 2 is planned to include Link 22, which is a modernized replacement for Link 11, providing beyond line of sight (BloS) tactical data communication system utilizing fixed frequency or frequency hopping techniques in the high frequency (HF) (3-30 Megahertz (MHz)) and/or the ultra high frequency (UHF) (225-400 MHz) bands. C2P Modernization is required to address Cybersecurity challenges, Operational Availability (Ao) challenges and sustainment issues associated with the current C2P system configurations. C2P Modernization funds the transition of the C2P's 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 address growing cybersecurity and Ao challenges and to enable more affordable transition to new hardware processing components as a result of commercial off the shelf processor obsolescence.

FY2020 Justification (C2P): Continue C2P Link 22 Aegis combat system testing, conduct developmental testing and prepare for Link 22 Follow-on Test and Evaluation (FOT&E). Continue C2P Modernization engineering assessment and design. Conduct C2P Modernization design reviews in preparation for C2P Modernization development.

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 planning, monitoring, management, data forwarding between the TDLs and providing tactical data to the 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 2020 Justification (LMMT): Conduct Capability Drop (CD) 3 Build Decision and commence CD 3 development.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Link 16 Network Increment II - Cryptographic Modernization (CM) / Frequency Remapping (FR)	0.000	0.000	3.384	0.000	3.384
Articles:	-	-	1	-	1
FY 2019 Plans: FY19 Plans funded under PE 0205604N, Project 2126					
FY 2020 Base Plans: 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).					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete MOS CM/FR integrated testing and data reduction including for operational test. Continue preparations and conduct MOS CM/FR Fielding Decision Review (FDR). Complete government testing and data reduction including for operational testing of MOS Mod. Continue preparations and conduct 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 Continue Link 16 Network integration logistics support. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY19 funding under PE 0205604N, Project 2126 Link 16 Increment II was $10.937 million. Funding decreases by $7.553 million to $3.384 million in FY20. Link 16 budget requirement decreased from FY19 to FY20 as JTIDS CM/FR, MOS CM/FR and MOS Mod conduct Operational Test in FY19 with preparation for a FY20 FDR. Development efforts in FY20 are limited to deficiency correction as result of Operational Test and integration/test of the CMN enabled MIDS JTRS terminal with C2P.					
Title: Command and Control Proecessor (C2P)	0.000	0.000	12.590	0.000	12.590
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0205604N, Project 2126 ***FY 2020 Base Plans:*** Conduct C2P Link 22 Aegis combat system testing and prepare for Link 22 Follow-on Test and Evaluation (FOT&E). Conduct C2P Modernization design reviews in preparation for C2P Modernization development. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY19 funding under PE 0205604N, Project 2126 was $18.707 million. Funding decreased by $6.117 million to $12.590 million in FY20. Funding decrease is attributed to the Link 22 development phase completing in FY19					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and transitioning to testing and certification activities for FY20 that are significantly lesser in scope than prior year Link 22 related development activities.					
Title: Link Monitoring and Management Tool (LMMT)	0.000	0.000	2.227	0.000	2.227
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0205604N, Project 2126					
FY 2020 Base Plans: Conduct Capability Drop 3 (CD3) Build Decision and commence CD3 development. Conduct Build Technical Review (BTR) for CD3.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: In FY19 funding under PE 0205604N, Project 2126 was $1.651 million. Funding increased by $0.576 million to $2.227 million in FY20 due to the commencement of CD3 Build Decision and Build Technical Review.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.201	0.000	18.201

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2614: *Adv Tact Data Link Sys (ATDLS)*	34.873	30.085	52.753	-	52.753	66.952	82.338	57.660	61.728	Continuing	Continuing
• RDTEN/0205604N/2126: *Adv Tact Data Link Sys (ATDLS)*	21.012	31.295	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	848.673

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). The associated production contract for JTIDS CM/FR will be competitively awarded to support procurement after decision review. Multifunctional Information Distribution System (MIDS) on Ship (MOS) CM/FR will be accomplished through integration of the MIDS LVT Block Upgrade 2 (BU) into the existing MOS cabinet and development of a High-Power Amplifier (HPA) bypass switch. HPA bypass switch development was conducted by SSC Pacific. Production of HPA Switch will be performed by SSC 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 will be 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.

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 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.

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 Space and Naval Warfare (SPAWAR) System Center (SSC).

E. Performance Metrics

Link 16 Network Dynamic Network Management (DNM): Successfully achieve initial operational capability. Successfully conduct full deployment decision review. Successfully complete operation test readiness review (OTRR). Successfully complete developmental test / operational test.

Link 16 Network Cryptographic Modernization: Successful implementation of updated cryptographic algorithm as specified by National Security Agency (NSA) certification in Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ship (MOS), and MOS Modernization (MOS Mod) Link 16 terminals.

Link 16 Network Frequency Remapping: Successful implementation of a frequency remapping capability as specified in Department of Defense/Department of Transportation Memorandum of Agreement regarding the 960-1215 MHz frequency band of 31 Dec 02 in Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ship (MOS) and MOS Modernization (MOS Mod) Link 16 Terminals.

Link 16 Antenna: Meet existing antenna performance specifications.

Link 16 Network Production Capability: Production shipboard Link 16 terminals available to meet new construction shipboard requirements.

Command and Control Processor (C2P): Successfully achieve C2P Technology Refresh fielding and thereby maintain operational availability.

Link 22: Successfully achieve Link 22 implementation fielding, meeting operational requirement.

LMMT: Successfully meet operational requirements and achieve fielding decision reviews (FDR) for Capability Drops 1, 2 and 3.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 2126 / *ATDLS Integration*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Link 16 Network Technical Design Agents	C/CPFF	SeaPort-E : San Diego, CA	0.000	0.000		0.000		0.832	Oct 2019	-		0.832	Continuing	Continuing	Continuing
Link 16 Network Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		1.103	Oct 2019	-		1.103	Continuing	Continuing	Continuing
C2P Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		5.397	Oct 2019	-		5.397	Continuing	Continuing	Continuing
C2P IV&V	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		0.506	Oct 2019	-		0.506	Continuing	Continuing	Continuing
C2P Development & Integration	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		3.288	Oct 2019	-		3.288	Continuing	Continuing	Continuing
LMMT Development	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		0.955	Oct 2019	-		0.955	Continuing	Continuing	Continuing
LMMT Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		0.594	Oct 2019	-		0.594	Continuing	Continuing	Continuing
LMMT IV&V	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		0.197	Oct 2019	-		0.197	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		12.872		-		12.872	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0205604N Project 2126

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Link 16 Network T&E	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		1.310	Oct 2019	-		1.310	Continuing	Continuing	Continuing
C2P T&E	WR	SPAWARSYSCEN PAC : San Diego, CA	0.000	0.000		0.000		1.800	Oct 2019	-		1.800	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.110		-		3.110	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0205604N Project 2126

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 2126 / *ATDLS Integration*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Link 16 Network Program Management Support	C/CPFF	SeaPort-E : San Diego, CA	0.000	0.000		0.000		0.139	Oct 2019	-		0.139	Continuing	Continuing	Continuing
C2P Program Management Support	C/CPFF	SeaPort-E : San Diego, CA	0.000	0.000		0.000		0.800	Oct 2019	-		0.800	Continuing	Continuing	Continuing
C2P Systems Engineering Support	C/CPFF	SeaPort-E : San Diego, CA	0.000	0.000		0.000		0.800	Oct 2019	-		0.800	Continuing	Continuing	Continuing
LMMT Program Management	C/CPFF	SeaPort-E : San Diego, CA	0.000	0.000		0.000		0.480	Oct 2019	-		0.480	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.219		-		2.219	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0205604N Project 2126

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		18.201		-		18.201	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0205604N Project 2126

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

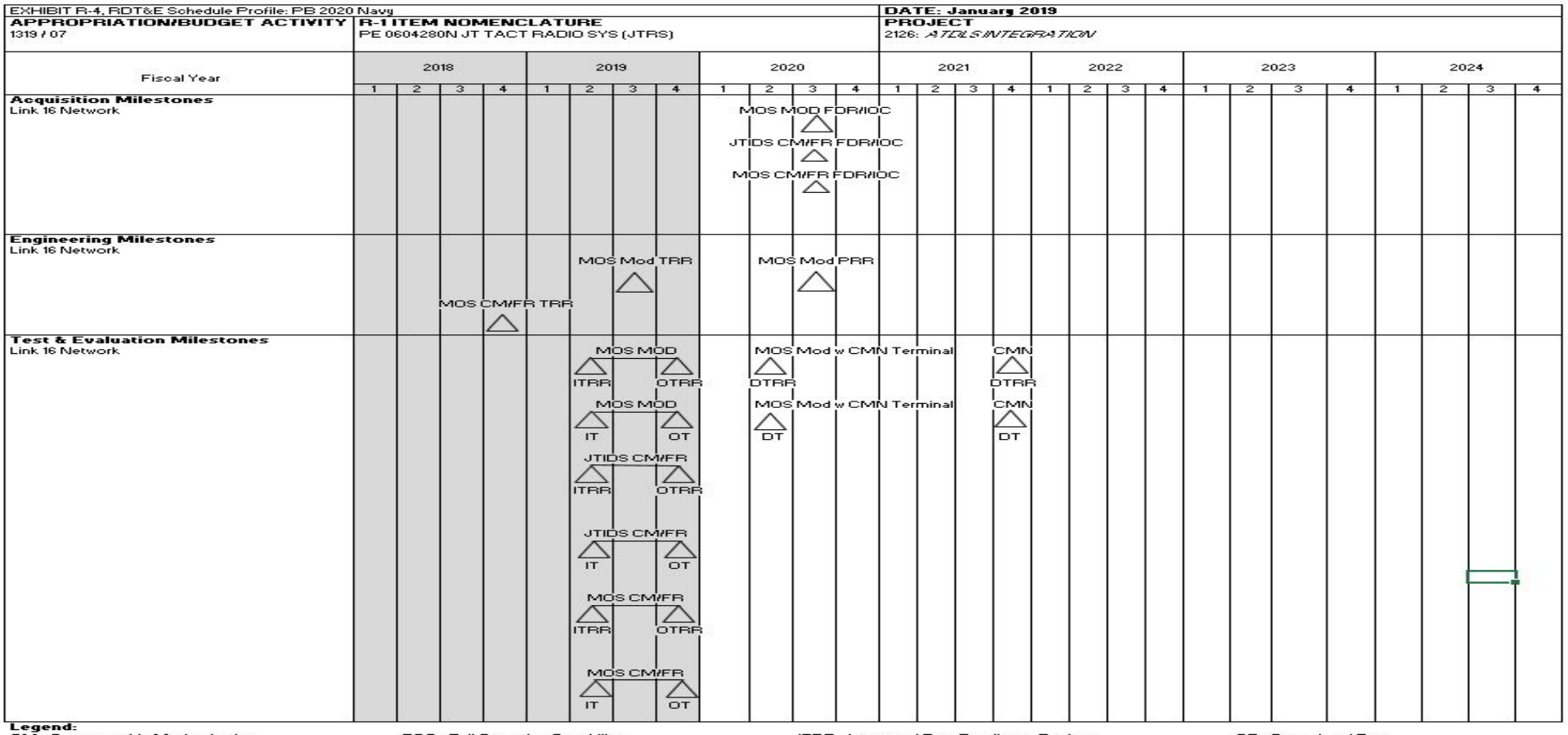
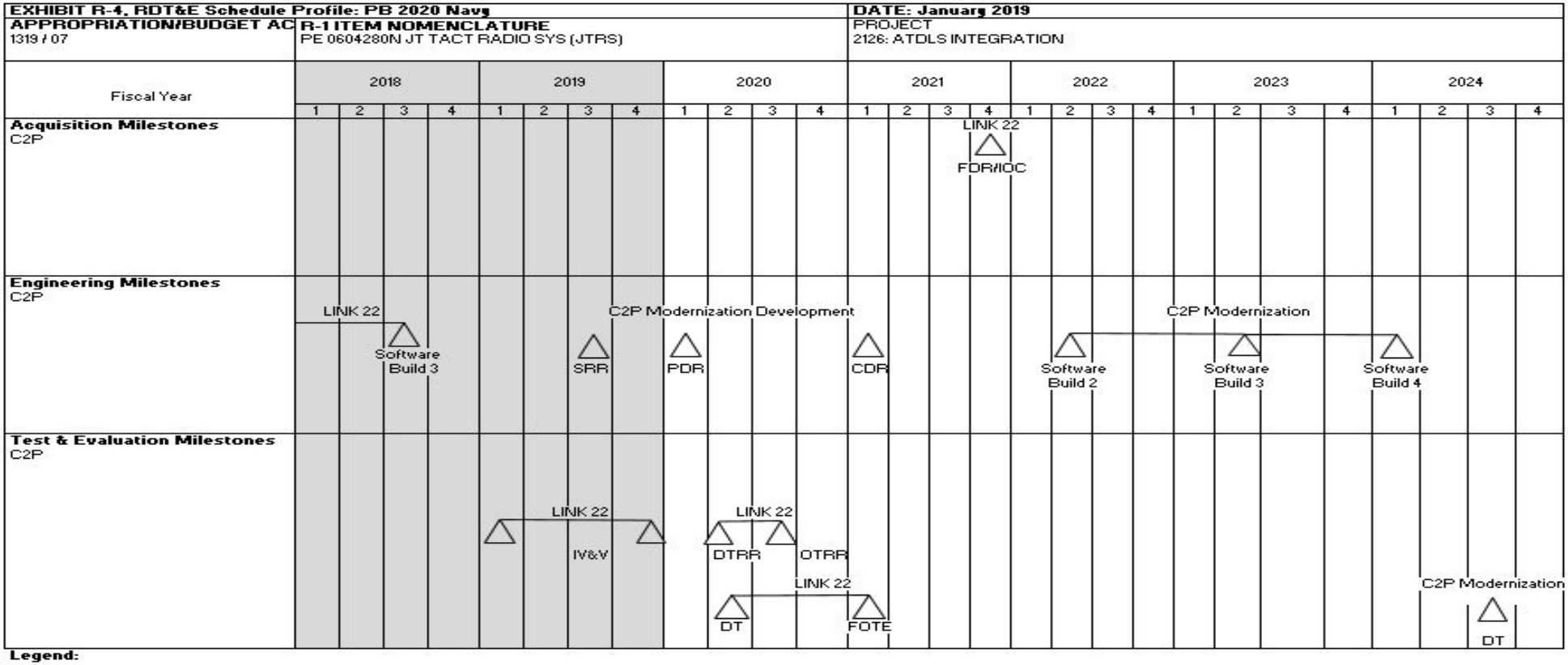


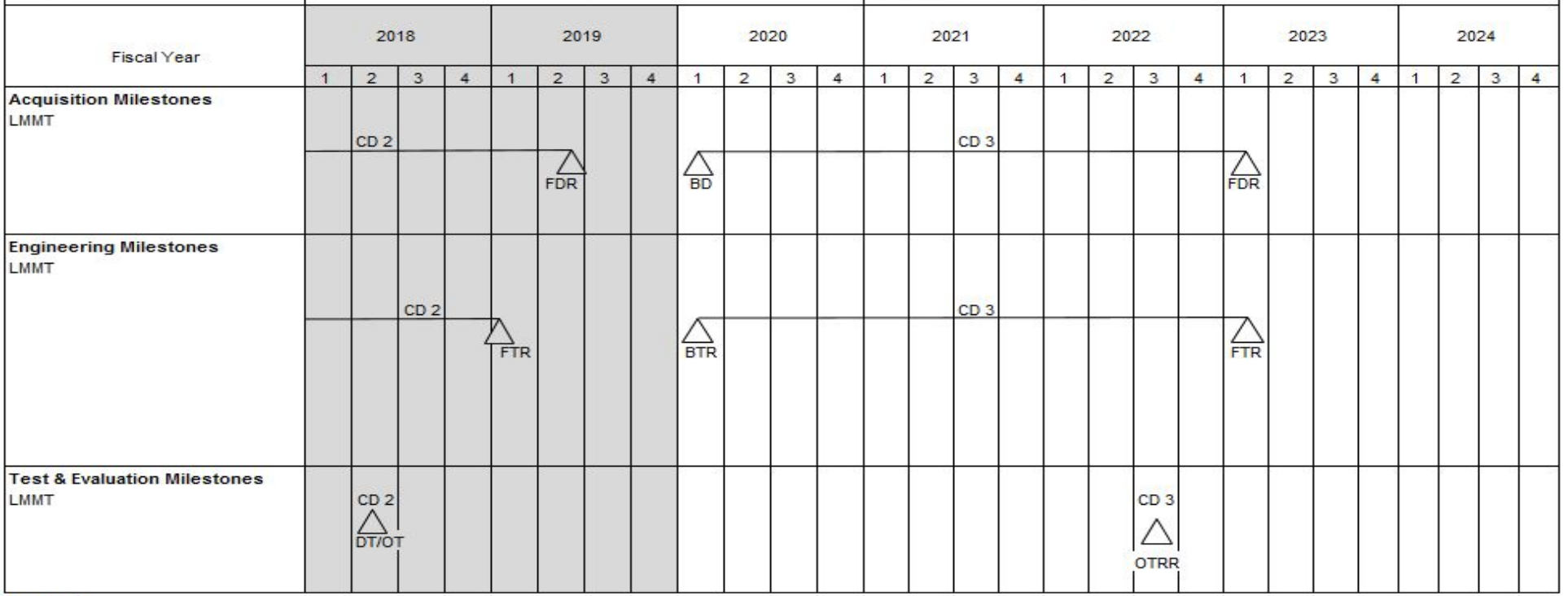
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*



FY18 and FY19 funding was provided under PE 0205604N Project 2126

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

EXHIBIT R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: January 2019
APPROPRIATION/BUDGET ACTIVITY 1319 / 07	R-1 ITEM NOMENCLATURE PE 0604280N JT TACT RADIO SYS (JTRS)	PROJECT 2126: ATDLS INTEGRATION



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

FY18 and FY19 funding was provided under PE 0205604N Project 2126

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2126				
C2P Modernization Development Preliminary Design Review	1	2020	1	2020
LMMT CD 3 Build Decision	1	2020	1	2020
LMMT CD 3 Build Technical Review	1	2020	1	2020
Link 16 MOS Mod with CMN Terminal Developmental Test Readiness Review	2	2020	2	2020
Link 16 MOS Mod with CMN Terminal Developmental Test	2	2020	2	2020
C2P Link 22 Developmental Test Readiness Review	2	2020	2	2020
C2P Link 22 Developmental Test	2	2020	2	2020
Link 16 MOS Mod Production Readiness Review	3	2020	3	2020
Link 16 MOS Mod Fielding Decision Review / Initial Operating Capability	3	2020	3	2020
Link 16 JTIDS CM/FR Fielding Decision Review / Initial Operating Capability	3	2020	3	2020
Link 16 MOS CM/FR Fielding Decision Review / Initial Operating Capability	3	2020	3	2020
C2P Modernization Development Critical Design Review	1	2021	1	2021
C2P Link 22 Operational Test Readiness Review	3	2020	3	2020
C2P Link 22 Follow on Test and Evaluation	1	2021	1	2021
LMMT CD 3 Operational Test Readiness Review	3	2021	3	2021
Link 16 CMN Development Test Readiness Review	4	2021	4	2021
Link 16 CMN Development Test	4	2021	4	2021
C2P Link 22 Fielding Decision Review / Initial Operating Capability	4	2021	4	2021
C2P Modernization Software Build 2	2	2022	2	2022
LMMT CD 3 Fielding Technical Review	1	2023	1	2023
LMMT CD 3 Fielding Decision Review	1	2023	1	2023
C2P Modernization Software Build 3	2	2023	2	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 2126 / *ATDLS Integration*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
C2P Modernization Build 4	1	2024	1	2024
C2P Modernization Development Test	3	2024	3	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*				Project (Number/Name) 3020 / *MIDS/JTRS*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3020: *MIDS/JTRS*	0.000	0.000	0.000	39.214	-	39.214	31.198	29.480	30.515	31.673	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 554												

Note

Funding has been realigned into PE 0604280N from PE 0205604N Project 3020 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 Multifunctional Information Distribution System (MIDS) program office is the 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 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).

MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal provides 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 capability integration into the MIDS JTRS 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.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

The FY20 Budget continues the development of the MIDS JTRS Link 16 transceiver hardware upgrade (formerly MIDS Modernization) to allow for field loadable updates. FY20 will include the Link 16 hardware Critical Design Review, Technical Readiness Review and the completion of the MIDS JTRS TTNT testing as well as the updates to the TTNT and Link 16 waveforms.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MIDS	0.000	0.000	39.214	0.000	39.214
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0205604N, Project 3020					
FY 2020 Base Plans: Continue the MIDS JTRS Link 16 hardware transceiver upgrade development efforts (MIDS Modernization). Conduct a Critical Design Review post Preliminary Design Review (PDR) and PDR updates, perform Technology Readiness Review and kick off Contractor First Article Qualification testing. Port the Block Cycle 3 software into the new upgraded Link 16 hardware transceiver. Continue MIDS JTRS Tactical Targeting Network Technology (TTNT) testing and platform integration efforts to include full development contract and Problem Report fixes. Complete MIDS JTRS TTNT Government First Article Qualification Testing, Developmental Testing, and initiate Limited Production Award. Begin Consolidated Automated Support System (CASS) Test Program Sets (TPS) efforts for the MIDS JTRS TTNT terminal. Continue MIDS systems engineering, communication security, IA and program management support. Continue with Link 16 Waveform development fixes and updates.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: In FY19 funding under PE 0205604N, Project 3020 was $43.798 million. Funding decreases by $4.584 million to $39.214 million in FY20. MIDS RDTE funding decrease attributed to the completion of the full development of the Tactical Targeting Network Technology (TTNT) contract. TTNT testing and platform integration continues but the main development effort completes in FY19 decreasing TTNT's funding from FY19 to FY20. FY20 budget					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
supports MIDS JTRS Link 16 transceiver hardware upgrade to include the porting of the Link 16 waveform to the new hardware and the Block Cycle 3 software into the new hardware.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	39.214	0.000	39.214

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0205604N/3020: *MIDS/JTRS*	38.876	43.798	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	389.267

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.

E. Performance Metrics

The MIDS-LVT and MIDS JTRS programs are employing mature, software-defined radio technologies and developing hundreds of thousands of lines of code. These software metrics are used to quantify the quality and progress of each software product's development over time. MIDS employs earned value metrics to monitor contract performance on its prime development contracts, as required.

MIDS-LVT: The 11 performance measures are: Link 16 Waveform Compatibility, Link 16 Message Standards, Link 16 IER; Interoperability, Link 16 Coded Error Message Probability, Weight/Volume, Link 16 JAM Resistance, Link 16 Voice Channels, Link 16 Communication Range Data, Link 16 Communications Range Voice, Link 16 Relay.

MIDS JTRS: The 15 performance measures are: Link 16 Waveform Compatibility, Link 16 Waveform Standards, Link 16 Coded Error Message Probability, Link 16 Jamming Resistance, Link 16 Communication Range-Data, Link 16 Communications Range-Voice, Link 16 Relay, Start-up (Terminal Single Channel), Operational Communications - Passive Synchronization, Operational Communications - Automatic Message Acknowledgement, Operational Communications - Multi-Net, Operational Communications, Crypto Control, Navigation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3020 / *MIDS/JTRS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Link 16 Waveform Development	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.775	Nov 2019	-		0.775	Continuing	Continuing	Continuing
TTNT Post Development Problem Report Fixes	TBD	TBD : TBD	0.000	0.000		0.000		0.330	Dec 2019	-		0.330	Continuing	Continuing	Continuing
TTNT Reliability Growth	TBD	TBD : TBD	0.000	0.000		0.000		1.100	Jan 2020	-		1.100	Continuing	Continuing	Continuing
MIDS JTRS Link 16 Hardware Upgrade	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		0.000		18.121	Nov 2019	-		18.121	Continuing	Continuing	Continuing
MIDS JTRS Link 16 Hardware Upgrade	C/CPFF	Viasat : San Diego, CA	0.000	0.000		0.000		12.488	Nov 2019	-		12.488	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		32.814		-		32.814	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CSS TPS	WR	NAVAIR : North Island San Diego, CA	0.000	0.000		0.000		2.791	Jan 2020	-		2.791	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.791		-		2.791	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JTEL	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.205	Dec 2019	-		0.205	Continuing	Continuing	Continuing
JTEL Testing Support	C/CPFF	G2 : San Diego, CA	0.000	0.000		0.000		0.095	Mar 2020	-		0.095	Continuing	Continuing	Continuing
COMOPTEVFOR Testing	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.000		0.150	Jan 2020	-		0.150	0.000	0.150	-
TTNT DT/OT Support	WR	TBD : TBD	0.000	0.000		0.000		1.600	Nov 2019	-		1.600	0.000	1.600	-
		Subtotal	0.000	0.000		0.000		2.050		-		2.050	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3020 / *MIDS/JTRS*	

Management Services ($ in Millions)

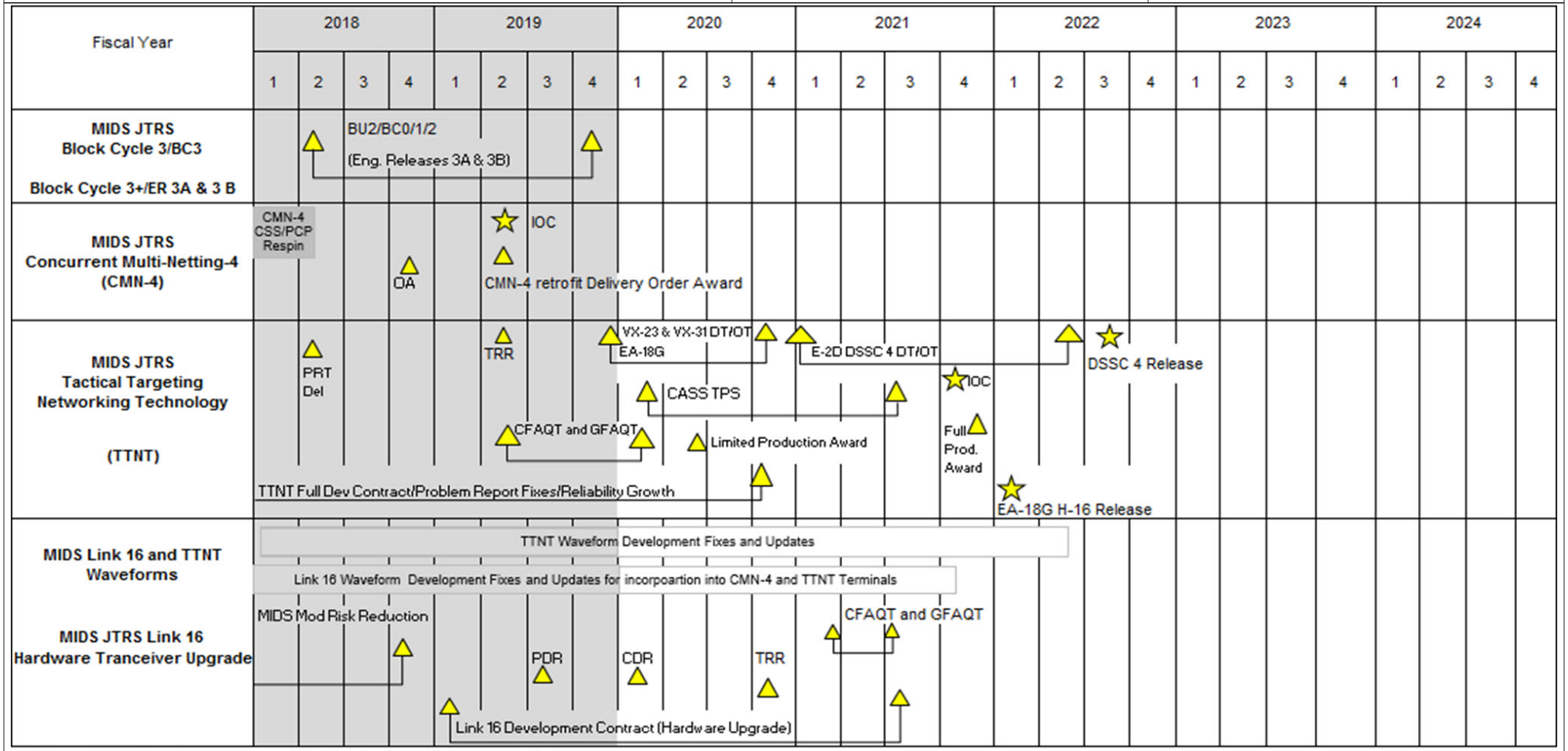
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering Support	MIPR	MITRE : Bedford, MA	0.000	0.000		0.000		1.000	Dec 2019	-		1.000	Continuing	Continuing	Continuing
Government Engineering Support	WR	SSC PAC : San Diego,CA	0.000	0.000		0.000		0.259	Nov 2019	-		0.259	Continuing	Continuing	Continuing
Information Assurance	MIPR	CERDEC : Aberdeen Proving Ground, MD	0.000	0.000		0.000		0.300	Dec 2019	-		0.300	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.559		-		1.559	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		39.214		-		39.214	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0205604N Project 3020

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3020 / *MIDS/JTRS*



FY18 and FY19 funding was provided under PE 0205604N Project 3020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3020				
MIDS JTRS Tactical Targetting Network Technology (TTNT): CFAQT and GFAQT	1	2020	1	2020
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	4	2020
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): Limited Production Award	2	2020	2	2020
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	4	2021	4	2021
MIDS JTRS Tactical Targetting Network Technology (TTNT): Initial Operating Capability	4	2021	4	2021
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 Link 16 and TTNT Waveforms: TTNT Waveform Development Fixes and Updates	1	2020	2	2022
MIDS Link 16 and TTNT Waveforms: Link 16 Waveform Development Fixes and Updates	1	2020	4	2021
MIDS JTRS Link 16 Hardware Transceiver Upgrade: Development Contract	1	2020	3	2021
MIDS JTRS Link 16 Hardware Transceiver Upgrade: Critical Design Review	1	2020	1	2020
MIDS JTRS Link 16 Hardware Transceiver Upgrade: Technology Readiness Review	4	2020	4	2020
MIDS JTRS Link 16 Hardware Transceiver Upgrade: Contractor and Government First Article Qualification Test (CFAQT and GFAQT)	1	2021	2	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3078: *Digital Modular Radio*	41.173	5.172	3.272	3.262	-	3.262	3.000	3.016	6.422	6.550	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 multiple waveforms and multi-level information security for voice and data 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 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 2020 DMR will complete an assessment and test of the Military Standard mandated MUOS scanning requirements, develop a scanning Concept of Operations (CONOPS), and continue development of updated DMR 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)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: DMR	5.172	3.272	3.262	0.000	3.262
Articles:	-	-	-	-	-
Description: Overall program efforts include investigation of emerging technologies through study, development and associated testing for feasibility of program insertion. DMR is the Navy's primary solution for providing the UHF SATCOM IW and MUOS waveform to the Fleet.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete at-sea Program Developmental Testing (DT) of the IW/MUOS waveforms into the DMR system. Conduct a Government Run for Record in support of HF ALE software. Complete the development of DMR HF ALE GEN3 software efforts and Joint Integration Test Command (JITC) interoperability certification. Receive HF ALE GEN3 software drop from vendor for testing and RRR efforts. Provide engineering support services for reviewing cryptographic modernization specifications and evaluating the current DMR cryptographic capability to ensure integration with new and legacy Cryptographic Equipment Application (CEA). ***FY 2020 Base Plans:*** Conduct HF ALE GEN3 lab testing. Complete an assessment and test of the Military Standard mandated MUOS scanning requirement for DMR. Develop a DMR technical solution and concept of operations (CONOPS) for meeting the Military Standard mandated MUOS scanning requirement. Develop and update software to ensure DMR Cryptographic Equipment Application (CEA) is compatible with National Security Administration certified software. Continue to provide engineering support services for cryptographic modernization specifications and evaluating the current DMR cryptographic capability to ensure integration with new and legacy CEA. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding does not appreciably change from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	5.172	3.272	3.262	0.000	3.262

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3010: *DMR OPN*	23.695	45.450	55.853	-	55.853	61.870	65.792	61.409	62.637	Continuing	Continuing

Remarks

D. Acquisition Strategy

General Dynamics Mission Systems (GDMS), formerly General Dynamics C4 Systems (GDC4S), owns the technical data rights to the 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.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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E. Performance Metrics

Military Standard (MIL-STD) conformance to meet Joint Integration Test Command (JITC) certification for High Frequency Amplifier Link Establishment (HF ALE) waveform.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3078 / *Digital Modular Radio*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IW/MUOS Development	C/CPIF	GDMS : Scottsdate, AZ	21.232	3.439	Oct 2017	0.000		0.000		-		0.000	0.000	24.671	-
HF ALE Development	C/CPIF	GDMS : Scottsdale, AZ	7.646	0.702	Oct 2017	1.965	Oct 2018	0.000		-		0.000	0.000	10.313	-
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	0.242	0.127	Oct 2017	0.130	Oct 2018	0.000		-		0.000	0.000	0.499	-
Cryptographic Modernization Development	C/CPIF	GDMS : Scottsdale, AZ	0.000	0.000		0.259	Apr 2019	1.693	Oct 2019	-		1.693	Continuing	Continuing	Continuing
Cryptographic Modernization Development	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.400	Dec 2019	-		0.400	Continuing	Continuing	Continuing
MUOS Scanning	C/CPIF	GDMS : Scottsdale, AZ	0.000	0.000		0.000		0.150	Jan 2020	-		0.150	Continuing	Continuing	Continuing
		Subtotal	29.720	4.268		2.354		2.243		-		2.243	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering Support	Various	SSC PAC : San Diego, CA	6.561	0.556	Nov 2017	0.565	Dec 2018	0.515	Dec 2019	-		0.515	Continuing	Continuing	Continuing
		Subtotal	6.561	0.556		0.565		0.515		-		0.515	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing	Various	SSC PAC : San Diego, CA	2.196	0.130	Feb 2018	0.298	Dec 2018	0.000		-		0.000	0.000	2.624	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3078 / *Digital Modular Radio*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JITC Testing	WR	JITC : Ft. Huachuca, AZ	0.330	0.139	Nov 2017	0.000		0.000		-		0.000	0.000	0.469	-
Interoperability Testing	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.150	Nov 2019	-		0.150	Continuing	Continuing	Continuing
Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.248	Nov 2019	-		0.248	Continuing	Continuing	Continuing
Certification Authorization	WR	NSA : Ft. Meade, MD	0.000	0.030	Apr 2018	0.000		0.050	Jan 2020	-		0.050	0.000	0.080	-
		Subtotal	2.526	0.299		0.298		0.448		-		0.448	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	BAH : San Diego, CA	2.366	0.049	Feb 2018	0.055	Nov 2018	0.056	Nov 2019	-		0.056	Continuing	Continuing	Continuing
		Subtotal	2.366	0.049		0.055		0.056		-		0.056	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	41.173	5.172		3.272		3.262		-		3.262	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3078 / *Digital Modular Radio*

DMR

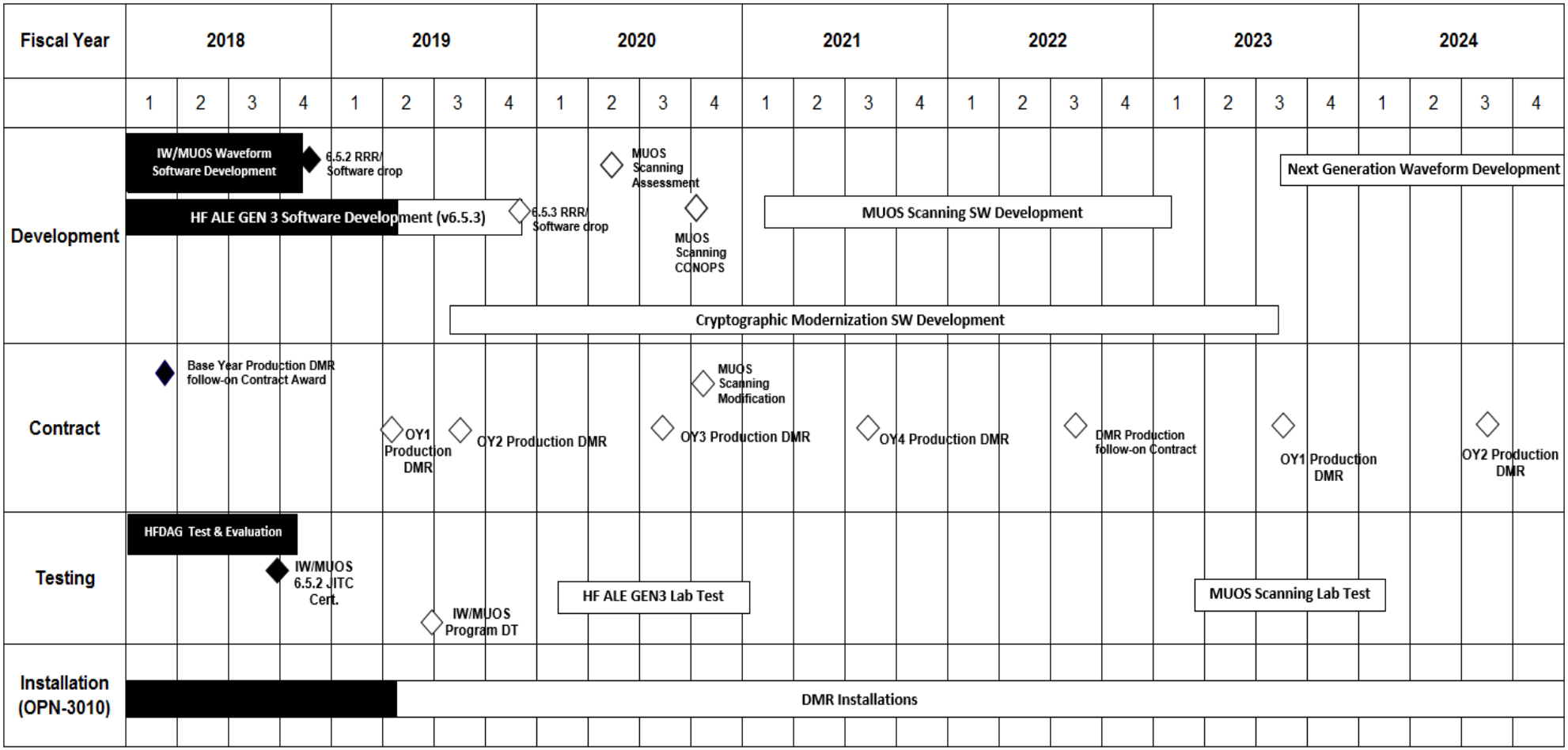

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3078 / *Digital Modular Radio*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3078				
IW Development	1	2018	4	2018
MUOS Waveform Development	1	2018	4	2018
HFDAG Test and Evaluation	1	2018	4	2018
HF ALE GEN 3 Software Development	1	2018	4	2019
Production Deliveries	1	2018	4	2024
DMR Installations	1	2018	4	2024
MUOS Release Requirements Review Software Drop (v6.5.2)	4	2018	4	2018
IW/MUOS JITC Certification (v6.5.2)	3	2018	3	2018
IW/MUOS Program Development Testing (DT)	3	2019	3	2019
Cryptographic Modernization SW Development	3	2019	3	2023
HF ALE GEN 3 Release Requirements Review Software Drop (v6.5.3)	4	2019	4	2019
HF ALE GEN 3 Lab Test	1	2020	1	2021
MUOS Scanning Assessment	2	2020	2	2020
MUOS Scanning CONOPS	4	2020	4	2020
MUOS Scanning Modification	4	2020	4	2020
MUOS Scanning Software Development	1	2021	1	2023
MUOS Scanning Lab Test	1	2023	1	2024
Next GEN Waveform Development	3	2023	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3341: *Network Tactical Common Data Link*	0.000	0.000	0.000	32.432	-	32.432	35.837	7.861	6.156	6.279	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

The FY 2020 funding request was reduced by $4.576 million due to the availability of prior year execution balances.

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 2020 request is for NTCDL product development, to include continued development of two (2) NTCDL Engineering Development Models (EDMs) and associated software.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Network Tactical Common Data Link (NTCDL)	0.000	0.000	32.432	0.000	32.432
Articles:	-	-	-	-	-
Description: 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					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
development is responsible for the internal control of the NTCDL hardware whereas the Government Furnished 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)). EDM development is a multi-year effort with delivery planned in FY 2021. ***FY 2019 Plans:*** FY19 Plans funded under PE 0205604N, Project 3341 ***FY 2020 Base Plans:*** 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) CDL waveform compliance testing, attain National Security Agency (NSA) Type 1 certification of ECU, and Test Readiness Review (TRR). Commence installation planning efforts in support of FY 2021 EDM delivery. Complete documentation development to include subsystem Interface Design Description (IDD), Installation Requirements Drawings (IRD), 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). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY19 funding under PE 0205604N, Project 3341 was $13.886 million. The FY 2020 funding request was reduced by $4.576 million due to the availability of prior year execution balances. Funding increases by $18.546 million to $32.432 million in FY20. The increase from FY19 to FY20 provides for continued development of two (2) NTCDL EDMs and associated software, Government Furnished Software (GFS) development, contractor-					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
developed software development, and systems engineering in addition to maintaining the current FY21 EDM delivery schedule. Furthermore, this increase supports $15.0 million of contractor hardware buys and installation subtasks.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	32.432	0.000	32.432

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2950: *NTCDL*	0.000	0.000	0.000	-	0.000	0.000	20.052	20.456	20.865	Continuing	Continuing
• RDTEN/0205604N/3341: *Network Tactical Common Data Link*	15.135	13.886	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	82.754

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

Conformance to meet Joint Interoperability Test Command (JITC) Certification requirements for CDL waveforms.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Product Development	C/CPIF	BAE Systems, Int : Wayne, NJ	0.000	0.000		0.000		24.326	Oct 2019	-		24.326	Continuing	Continuing	Continuing
NTCDL Software Development	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		1.901	Nov 2019	-		1.901	Continuing	Continuing	Continuing
NTCDL Software Development	WR	Technology Unlimited Group : San Diego, CA	0.000	0.000		0.000		1.257	Nov 2019	-		1.257	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		27.484		-		27.484	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Systems Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		1.915	Nov 2019	-		1.915	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.915		-		1.915	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		1.260	Nov 2019	-		1.260	Continuing	Continuing	Continuing
NTCDL Test and Review	MIPR	JITC : Fort Huachuca, AZ	0.000	0.000		0.000		0.209	Dec 2019	-		0.209	Continuing	Continuing	Continuing
NTCDL Waveform Certification	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.000		0.164	Dec 2019	-		0.164	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.633		-		1.633	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Program Management Support	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		1.400	Nov 2019	-		1.400	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.400		-		1.400	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		32.432		-		32.432	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data for NTCDL is provided under PE 0604280N, Project 3341.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

NTCDL

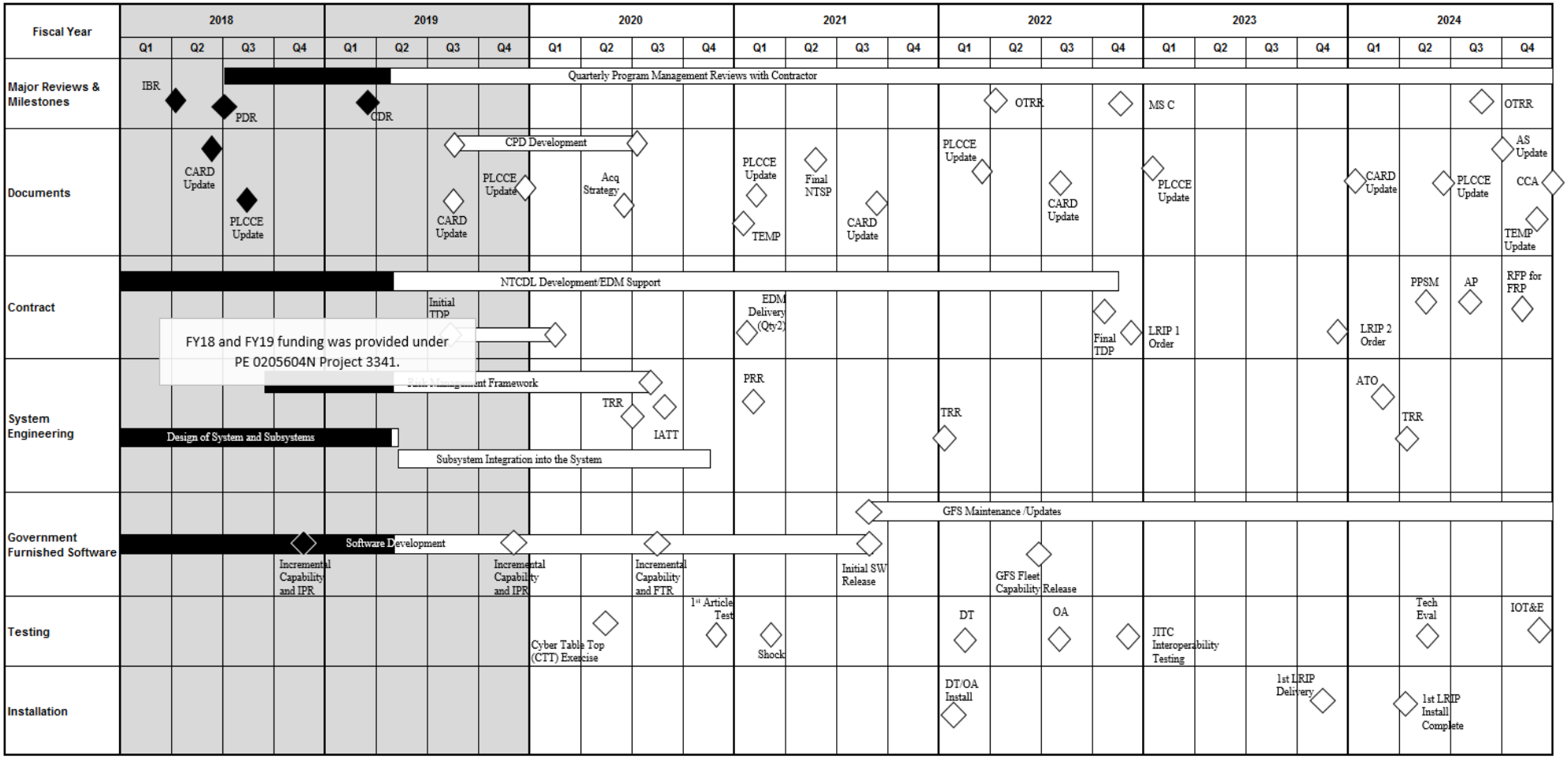

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3341				
Government Furnished Software (GFS) Development	1	2020	3	2021
Development Contract	1	2020	4	2022
Risk Management Framework (RMF)	1	2020	3	2020
Quarterly Program Management Review with Contractor	1	2020	4	2024
Subsystem Integration into the System	1	2020	4	2020
Initial Technical Data Package (TDP)	1	2020	1	2020
Capability Production Ducment (CPD) Development	1	2020	3	2020
Cyber Table Top (CTT) Exercise	2	2020	2	2020
Acquisition Strategy	2	2020	2	2020
Interim Authorization to Test (IATT)	3	2020	3	2020
Test Readiness Review (TRR) 1	3	2020	3	2020
Incremental Capability and Field Technical Release (FTR)	3	2020	3	2020
First Article Test	4	2020	4	2020
Program Life Cycle Cost Estimate (PLCCE) Update 3	1	2021	1	2021
Production Readiness Review (PRR)	1	2021	1	2021
Test and Evaluation Master Plan (TEMP)	1	2021	1	2021
Engineering Development Models (EDMs) Delivery	1	2021	1	2021
Final Navy Training Systems Plan (NTSP)	2	2021	2	2021
Initial Software Release	3	2021	3	2021
Cost Analysis Requirements Document (CARD) Update 3	3	2021	3	2021
GFS Maintenance/Updates	3	2021	4	2024
TRR 2	1	2022	1	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Development Testing (DT)	1	2022	1	2022
Operational Test Readiness Review (OTRR)	2	2022	2	2022
GFS Fleet Capability Release	2	2022	2	2022
Operational Assessment (OA)	3	2022	3	2022
Final Technical Data Package (TDP)	4	2022	4	2022
JITC Interoperability Testing	4	2022	4	2022
Milestone C	4	2022	4	2022
Low Rate Initial Production (LRIP) Order 1	4	2022	4	2022
First LRIP Delivery	4	2023	4	2023
LRIP Order 2	4	2023	4	2023
Authority to Operate	1	2024	1	2024
TRR 3	2	2024	2	2024
Procurement Planning and Strategy Meeting (PPSM)	2	2024	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604280N / *JT Tact Radio Sys (JTRS)*	Project (Number/Name) 4011 / *Naval Coastal Warfare Surv and C4I Sys*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4011: *Naval Coastal Warfare Surv and C4I Sys*	0.000	0.000	0.000	3.045	-	3.045	3.001	2.840	2.899	2.956	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned into PE 0604230N from PE 0604280N Project 0411 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 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), Assured Command and Control (AC2), will be converging to a Common Expeditionary and Shore Baseline (CESB) 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.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 4011 / *Naval Coastal Warfare Surv and C4I Sys*

Funding has been realigned into PE 0604230N from PE 0604280N Project 0411 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: NECC C4ISR Modernization	0.000	0.000	3.045	0.000	3.045
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 plans funded under PE 0604230N, Project 4011					
FY 2020 Base Plans: 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. 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. Investigate the use of Development Operations (DevOps) in order to insert new technology enhancements via incremental software & hardware upgrades and deliver rapid build releases.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: In FY19 funding under PE 0604230N, Project 4011 was $3.043 million. Funding does not appreciably change from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.045	0.000	3.045

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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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.

E. Performance Metrics

The Navy Expeditionary program continues to identify, evaluate and test a minimum of 3-5 new technologies or configurations per year for potential insertion into the Technical Refresh
Plan, to be demonstrated at Fleet Demonstrations.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering - Expeditionary	WR	NSWC : PANAMA CITY, FL	0.000	0.000		0.000		0.832	Nov 2019	-		0.832	Continuing	Continuing	Continuing
Hardware/Software Development	C/CPAF	GTRI : ATLANTA, GA	0.000	0.000		0.000		1.300	Nov 2019	-		1.300	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.132		-		2.132	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0604230 Project 0411

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation - Expeditionary	WR	NSWC : PANAMA CITY, FL	0.000	0.000		0.000		0.654	Nov 2019	-		0.654	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.654		-		0.654	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support - Expeditionary	WR	SSC SD : SSC SAN DIEGO	0.000	0.000		0.000		0.259	Nov 2019	-		0.259	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.259		-		0.259	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		3.045		-		3.045	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604280N / *JT Tact Radio Sys (JTRS)*	**Project (Number/Name)** 4011 / *Naval Coastal Warfare Surv and C4I Sys*

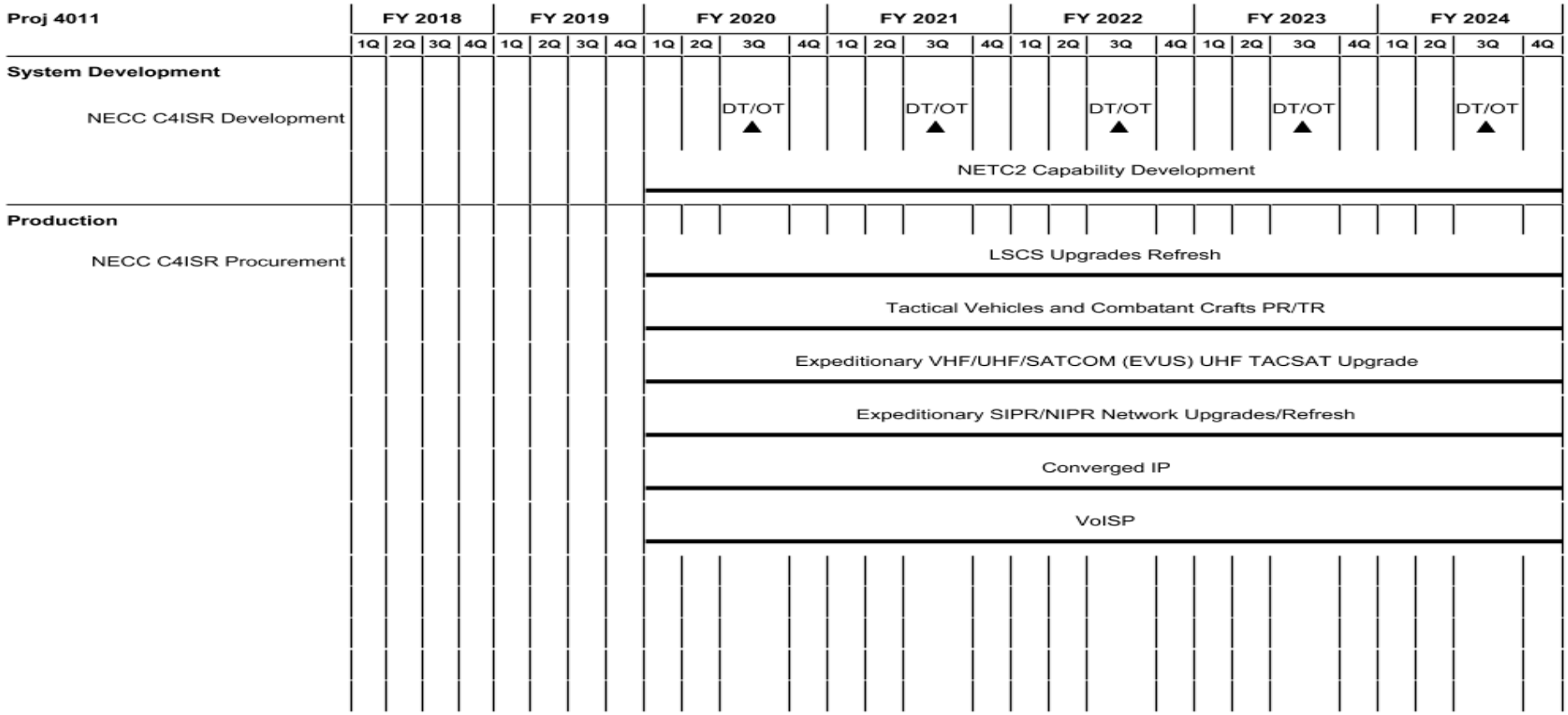

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4011				
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: NETC2 Capability Development	1	2020	4	2024
Production: NECC C4ISR Procurement: LSCS Upgrades Refresh	1	2020	4	2024
Production: NECC C4ISR Procurement: Tactical Vehicles and Combatant Crafts PR/TR	1	2020	4	2024
Production: NECC C4ISR Procurement: Expeditionary VHF/UHF/SATCOM (EVUS) UHF TACSAT Upgrade	1	2020	4	2024
Production: NECC C4ISR Procurement: Expeditionary SIPR/NIPR Network Upgrades/Refresh	1	2020	4	2024
Production: NECC C4ISR Procurement: Converged IP	1	2020	4	2024
Production: NECC C4ISR Procurement: VoISP	1	2020	4	2024