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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy **Date:** February 2018

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203109N / (U) <i>Satellite Communications (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	37.836	39.174	-	39.174	47.333	48.223	52.908	53.996	Continuing	Continuing
0728: <i>EHF SATCOM Terminals</i>	0.000	0.000	22.361	17.729	-	17.729	32.801	33.363	38.993	39.809	Continuing	Continuing
2472: <i>Mobile User Objective Sys (MUOS)</i>	0.000	0.000	13.965	20.530	-	20.530	14.530	14.860	13.915	14.187	82.590	174.577
3398: <i>Enterprise SATCOM Gateway Modems (ESGMs)</i>	0.000	0.000	1.510	0.915	-	0.915	0.002	0.000	0.000	0.000	0.000	2.427

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 290, 345

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) program for enhancing protected and survivable satellite communications to Naval forces. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic nuclear operations, strategic defense, theater missile defense, and space operations and intelligence in support of Assured Command and Control (AC2) initiatives. The NMT system replenishes and improves on Navy terminal capabilities of the Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS) and Global Broadcast Service (GBS). The new system equips the warfighters with the assured, jam resistant, secure communications as described in the joint AEHF satellite communications system and WGS Operational Requirements Documents (ORD). The NMT provides multiband Satellite Communications (SATCOM) capability for ship, submarine, and protected MILSATCOM for shore sites.

The Navy Global Broadcast Service (GBS) Program is the Navy component of the Joint Military Satellite Communications (MILSATCOM) ACAT IC program that delivers the continuous flow of high-speed, high-volume communication and information flow for deploying, deployed, on the move, and garrisoned forces. The Joint GBS system supports the Navy Strategic Plan and equips warfighters with Assured Command and Control (AC2) communications. The Enterprise SATCOM Gateway Modem (ESGM) is the DoD Chief Information Officer directed solution to satisfy the Transmission Security (TRANSEC) requirement in place of the Joint Internet. Testing and fielding of the ESGM is a joint venture, operationally directed by the Defense Information Systems Agency (DISA) and the Air Force as the lead service. GBS augments and interfaces with other communications systems, provides relief to overburdened communications systems already in place, and provides information to previously unsupported users. GBS provides bandwidth five times any other system, up to 45 Mbps of forward link data (shore to ship) per WGS satellite transponder.

The Mobile User Objective System (MUOS) program provides for the development of the next generation Department of Defense (DoD) advanced narrowband communications satellite constellation. MUOS is the only UHF satellite system replacing the aging UHF Follow-on (UFO) system, which is currently beyond its design

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life. MUOS provides legacy UHF satellite communications as well as a Wideband Code Division Multiple Access (WCDMA) capability which significantly increases performance and capacity critical to support Combatant Command priorities.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	37.836	35.724	-	35.724
Current President's Budget	0.000	37.836	39.174	-	39.174
Total Adjustments	0.000	0.000	3.450	-	3.450
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	3.764	-	3.764
• Rate/Misc Adjustments	0.000	0.000	-0.314	-	-0.314

Change Summary Explanation

The FY19 adjustment includes a reduction of \$1.236M reduction to account for the availability of prior year execution balances; an increase of \$5.000M in support of UHF Narrowband SATCOM AoA, and \$0.314M for Rate and miscellaneous adjustments.

Schedule:

EHF SATCOM Terminals (Project 0728) - No change

Technical:

EHF SATCOM Terminals (Project 0728): No change

Projects 0728, 2472 and 3398 realigned from PE 0303109N beginning in FY 2018.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)				Project (Number/Name) 0728 / EHF SATCOM Terminals			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0728: EHF SATCOM Terminals	0.000	0.000	22.361	17.729	-	17.729	32.801	33.363	38.993	39.809	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 290												

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) Program for enhancing protected and survivable satellite communications to Naval forces. Although development of the NMT terminal is complete, software and hardware upgrade development is ongoing to provide enhanced capabilities to the fleet. Development efforts, including Adaptive Coding (AC), Time of Day (TOD), and the Wideband Anti-Jam Modem System (WAMS) augment the baseline NMT system to pace the evolving threats to the warfighter. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas, and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic nuclear operations, strategic defense, theater missile defense, and space operations and intelligence. The NMT system replenishes and improves on Navy Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS), and Global Broadcast Service (GBS) terminal capabilities. The new system equips the warfighters with assured, jam resistant, secure communications as described in both the joint AEHF Satellite Communications System and the WGS Operational Requirement Documents (ORD). Mission requirements specific to Navy operations, including threat levels and scenarios, are contained in the ORD. The NMT provides multiband Satellite Communications (SATCOM) capability for ship, submarine, and protected MILSATCOM for shore sites.

The Wideband Anti-Jam Modem Systems (WAMS) enhances communication capability of shipboard and submarine NMTs by providing wideband Anti-Jam (AJ) Satellite Communication throughput over Wideband Global SATCOM (WGS). The United States Air Force (USAF) Protected Tactical Enterprise Service (PTES) program will provide the ground hub component of the WAMS communication system. This PTES joint hub will serve as a DoD enterprise service ground solution for the use of the Protected Tactical Waveform (PTW) of SATCOM communications. WAMS enables space segment AJ diversity (EHF/AEHF and WGS), thus enabling NMT ships and submarines equipped with the modem to operate in wideband links closer to threat jammers. WAMS will also include a Mini-Hub component to be fielded on all Force Level platforms to provide operations in the event Shore Communications are eliminated. WAMS enables the use of WGS X and Ka-band resources to assure access to mission critical communications to provide Assured Command and Control (AC2) capabilities in contested/degraded environments, formerly known as Anti-Access/Area Denial (A2AD). The use of WAMS Protected Tactical Waveform (PTW) on WGS will augment AEHF extended data rate (XDR) services to provide the information throughput capacity necessary to support critical Command and Control capability.

Joint Aerial Layer Network-Maritime (JALN-M) is the Navy implementation of the JALN architecture which provides assured communications in any environment, especially in a satellite denied environment. With disruption or loss of Space tier communications, JALN-M establishes and/or restores connectivity. A critical component of Assured Command and Control (AC2) capabilities is Adaptive Coding (AC) software development incorporation into the baseline NMT terminal

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy	Date: February 2018
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including the Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) in addition to supporting the JALN-M demonstration. This capability autonomously enhances maximum throughput and supports degraded conditions by adjusting End-to-End code rate to provide continuous, mission critical, and protected communications.

Development efforts, including Adaptive Coding, Time of Day, and the Wideband Anti-Jam Modem System (WAMS) augment the baseline NMT system to pace the evolving threats to the warfighter. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclement weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications.

Technology Insertion, studies and implementation is necessary for military satellite communications systems development to support emerging technologies for Commercial Broadband Satellite Program (CBSP) and Global Broadcast Service (GBS) Terminals in the out years.

The FY19 request will provide for the continuation of enhancements to the NMT system and to define the Navy's WAMS technical baseline for integration into NMT. NMT enhancements include the completion of both the Adaptive Coding and Time of Day (TOD) software design, development, integration and test.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: NMT Assured C2 Development	0.000	20.154	17.729	0.000	17.729
Articles:	-	-	-	-	-
<p>Description: Software and hardware upgrade development is ongoing to provide Assured Command and Control (AC2) capabilities to pace the evolving threats to the warfighter. These capabilities provide secure SATCOM access in contested/degraded environments by providing anti jam and improved bandwidth that supports increasing Fleet demands. The Wideband Anti-Jam Modem System (WAMS) will provide an anti-jamming capability that will counter various adversary threats and Adaptive Coding (AC) will autonomously maximize throughput in degraded or benign conditions. Adaptive Coding (AC) software development autonomously enhances maximum throughput and supports degraded conditions by adjusting End-to-End code rate to provide continuous, mission critical, and protected communications. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclement weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications.</p> <p>FY 2018 Plans: Begin major Time of Day (TOD) software design development efforts, which implements a more robust Adaptive Coding (AC) capability on the affected systems NMT, Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP), and KIV-7M. Raytheon and Comtech vendors supporting NMT, ATIP, and KIV-7M will work</p>					

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>parallel Engineering Change Proposals (ECPs) to design and ensure interoperability on development efforts for Adaptive Coding software TOD encryption to enable a more robust, lower code rate when the link margin is degraded. This will ensure ADNS/ATIP interface data rates changes commensurate with code rate changes are optimized to ensure maximum user data throughput. The program will undertake NSA certification of AC TOD encryption. These modifications will allow the ATIP to support TOD for KIV-7M use to prevent crypto losing synchronization during degraded link environment. Start the development of integration and testing plans for the TOD encryption solution and perform technical and system risk reduction.</p> <p>NMT will be conducting Operational Test-E1 to evaluate the operational effectiveness and operational suitability of the Enhanced Polar System (EPS) modified NMT which utilizes the protected high frequency (EHF) satellite communications in the North Polar. In addition, NMT will support Air Force Lead Developmental Test Organization (LDTO) EPS events and EPS Multi-Service Operational Test and Evaluation (MOT&E).</p> <p>Continue development of the WAMS technical baseline for use in NMT and complete Systems Engineering Technical Review (SETR) activities. Develop requirements and NMT specification changes and commence NMT design changes to improve performance when operating with the WAMS. Develop design of the Modem Mission Management System (MMS) and Key Management System (KMS) as well as integration strategies for MMS/KMS operational compatibility with DoD enterprise Protected Tactical Enterprise Service (PTES) (which is the Air Force ground system for waveform operations over the Wideband Global SATCOM (WGS) ground solution architecture. Obtain and certify space assets and ground facilities to support testing and assessment of Engineering Design Model (EDM) modems. Develop test plans and procedures to commence Navy testing of USAF EDM modems after delivery. Testing will include analysis of three separate vendor EDM designs procured from the USAF Protected Tactical Field Service Demonstration (PTSFD) effort. The testing process will verify and validate the vendor designs ensuring that Navy unique performance (antenna handover) and environmental (shock, vibration, temperature, and humidity) requirements are addressed in the design. Further refinement of technical and pre-award acquisition documentation for the Modem and Mini-Hub contracts of the WAMS effort including RFP development and coordination as well as technical specifications. Initiate modem certification and coordination process through NSA. Documentation development will include the WAMS Specification, WAM Mini-Hub specification, Cyber strategy to support the Clinger Cohen Act and Information Support Plan (ISP).</p> <p>FY 2019 Base Plans: Complete major Time of Day (TOD) software design development efforts on the affected systems, NMT and ATIP, to implement the more robust AC capability. The NMT and ATIP vendors will develop parallel Engineering</p>					

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Change Proposals (ECPs) to design and ensure the interoperability of AC software and TOD encryption that will enable a more robust, lower code rate when the link margin is degraded. The program will undertake NSA certification of AC TOD encryption solution and author a Key Management Plan (KMP) to support key generation, distribution and operation of the AC TOD encryption. The ToD encryption functionality will be hosted in the ATIP and allow for continued operations during degraded link environments using lower code rate / data rate without dropping the communications link. The program will develop test plans and execute test events to verify system of systems capability. This includes the development of the network interface of Automated Digital Network System (ADNS) to support a dynamic bandwidth capability on the radio to router interface. This will complete the integration and testing of NMT and ATIP design development as well as development plans for TOD encryption solution and associated technical and system risk reduction.					
Define the Navy's WAMS technical baseline for integration into NMT. Continue to develop and design the Modem Mission Management System interim (MMSi) and Key Management System interim (KMSi), including integration strategies for MMS/KMS operational compatibility with the DoD Protected Tactical Enterprise Service (PTES) ground solution architecture. This will also include Navy specification development and review of the Air Force Technical Requirements Documents (TRD). Continue Navy testing of both surface and submarine terminal variant EDM WAMS modems in Navy Labs. Testing will verify and validate waveform and system specification compliance and help refine the Navy test plan and schedule which will allow for the coordination of joint Initial Operational Capability (IOC) test events with the Air Force.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease of \$2.425M from FY18 to FY19 is due to Engineering Design Modems (EDM) Hardware procured in FY18 and associated test plan development that is not required in FY19. The FY19 funding request was reduced by \$1.236M to account for the availability of prior year execution balances.					
Title: Joint Aerial Layer Network Maritime (JALN-M)	0.000	2.107	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2018 Plans: Complete system of systems integration and testing of NMT and ATIP Adaptive Coding during pre-demonstration flights. This includes completion of design verification of JALN-M capabilities of NMT by testing with the Airborne XDR payload. Perform systems engineering, test support and document analytical data and					

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Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 0728 / EHF SATCOM Terminals			
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
findings. Complete installation of the JALN-M capabilities and execute shipboard/site verification by using the AEHF satellite for End-to-End SATCOM Adaptive Coding.					
FY 2019 Base Plans: N/A					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease of \$2.107M from FY18 to FY19 is due to the completion of the JALN-M Demonstration in FY18.					
Title: Technology Insertion					
Articles:					
	0.000	0.100	0.000	0.000	0.000
	-	-	-	-	-
Description: Overall program efforts include technology insertion implementation and associated testing required to support satellite communications.					
FY 2018 Plans: Perform Joint SATCOM Engineering Center (JSEC) testing and certification of the Assured Command and Control (AC2) modems to prepare for operation in the Wideband Global SATCOM system (WGS) in support of Commercial Broadband Spectrum (CBSP) and Navy Multiband Terminal (NMT) programs.					
FY 2019 Base Plans: N/A					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease of -0.1 from FY2018 to FY2019 is due to the completion of JSEC testing and certification of the AC2 modems.					
Accomplishments/Planned Programs Subtotals					
	0.000	22.361	17.729	0.000	17.729

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• OPN/3216: NAVY <i>MULTIBAND TERMINAL (NMT)</i>	33.992	69.764	113.885	-	113.885	92.150	21.536	31.279	19.072	73.062	1,508.298

Remarks

The Other Appropriation represents remaining procurement and installation of NMT production units for Afloat and Shore requirements to reach Full Operational Capability. Funding also includes the procurement and installation of Assured Command and Control (AC2) modems as well as the installation of Advanced Time Division Multiple Access (TDMA) Interface Processors (ATIPs), X/KA Back-Fits, and Ashore Antennas.

D. Acquisition Strategy

The NMT Follow-On Full Deployment (FOFD) contract will continue NMT production for Afloat platforms and Shore locations, in support of the Chief of Naval Operations and the Department of the Navy (DON), and will allow the NMT Program to complete Full Operational Capability (FOC). The competitive contract awarded to COMTECH supports the development of Assured Command and Control (AC2) enhancements.

E. Performance Metrics

The RDT&E goal for the NMT program is to create a military satellite communications system that consolidates capabilities of current and future satellite systems into a single terminal.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 0728 / EHF SATCOM Terminals
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development Time of Day (TOD)	C/CPAF	RAYTHEON : Marlborough, MA	0.000	0.000		3.140	Dec 2017	2.870	Dec 2018	-		2.870	Continuing	Continuing	Continuing
Software Development ATIP Adaptive Coding (AC) /Time of Day (TOD)	C/CPFF	COMTECH : Tempe, AZ	0.000	0.000		3.756	Dec 2017	2.246	Dec 2018	-		2.246	Continuing	Continuing	Continuing
Software Development Engineering	C/CPFF	NUWC : Newport, RI	0.000	0.000		3.062	Jan 2018	3.598	Jan 2019	-		3.598	Continuing	Continuing	Continuing
Software Development Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.581	Jan 2018	0.490	Jan 2019	-		0.490	Continuing	Continuing	Continuing
WAMS EDM Hardware	C/CPIF	RATYTHEON : Marlborough, MA	0.000	0.000		0.550	Jan 2018	0.000		-		0.000	0.000	0.550	-
WAMS EDM Hardware	C/CPIF	L3 Systems West : Salt Lake City, UT	0.000	0.000		0.485	Jan 2018	0.000		-		0.000	0.000	0.485	-
WAMS EDM Hardware	C/CPIF	ViaSat : Carlsbad, CA	0.000	0.000		0.317	Jan 2018	0.000		-		0.000	0.000	0.317	-
Subtotal			0.000	0.000		11.891		9.204		-		9.204	Continuing	Continuing	N/A

Remarks
 FY19 Increase to Software Development Engineering and the continuation of efforts within the NMT Product Development focuses on the completion of software design development across systems and vendors for Adaptive Coding (AC) and Time of Day (TOD) Encryption and finalize development of WAMS technical baseline. The program will perform Navy testing of the PTSFD EDM modems to verify and validate waveform and specification compliance. FY18 Software Development TOD Plan is a program directed update and aligns funds from Raytheon to COMTECH. FY18 funding assigned to WAMS EDM Hardware Contracts due to delayed Air Force contract negotiations. FY17 funds were previously assigned in PE 0303109N.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Integration/ Government Oversight	WR	NUWC : Newport, RI	0.000	0.000		1.254	Nov 2017	1.066	Nov 2018	-		1.066	Continuing	Continuing	Continuing
Software Integration Support	WR	SSC PAC : San Diego, CA	0.000	0.000		0.793	Nov 2017	0.675	Nov 2018	-		0.675	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
1319 / 7				PE 1203109N / (U)Satellite Communications (SPACE)					0728 / EHF SATCOM Terminals						
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Engineering Support	C/CPFF	SYSTECH : San Diego, CA	0.000	0.000		2.348	Nov 2017	1.998	Nov 2018	-		1.998	Continuing	Continuing	Continuing
WAMS Studies and Design	FFRDC	MIT/LL : Marlborough, MA	0.000	0.000		0.500	Jan 2018	0.421	Jan 2019	-		0.421	0.000	0.921	-
Subtotal			0.000	0.000		4.895		4.160		-		4.160	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
EPS & JALN-M Development Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		3.728	Nov 2017	3.006	Nov 2018	-		3.006	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.009	Nov 2017	0.000		-		0.000	0.000	0.009	-
Subtotal			0.000	0.000		3.737		3.006		-		3.006	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Management	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.232	Nov 2017	0.170	Nov 2018	-		0.170	Continuing	Continuing	Continuing
Program Management	C/CPFF	BAH : San Diego, CA	0.000	0.000		1.556	Nov 2017	1.139	Nov 2018	-		1.139	Continuing	Continuing	Continuing
Travel	Various	SPAWAR : Various	0.000	0.000		0.050	Nov 2017	0.050	Nov 2018	-		0.050	Continuing	Continuing	Continuing
Subtotal			0.000	0.000		1.838		1.359		-		1.359	Continuing	Continuing	N/A
Project Cost Totals			0.000	0.000		22.361		17.729		-		17.729	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy **Date:** February 2018

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 0728 / EHF SATCOM Terminals
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	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
SATELLITE LAUNCHES AEHF Launches		✦ SV-5	✦ SV-6			
MILESTONES						✦ WAMS IOC FY23 ✦ → NMT FOC FY24
DEVELOPMENT		Adaptive Coding/Time of Day Development				
	Wideband AJ Modem System (WAMS) Development					
TESTING		Adaptive Coding/JALN-M Demo Int & Test		WAMS Integration & Test		
PROCUREMENTS	PY8 ✦	PY9 ✦	PY10 ✦			
NMT DELIVERIES	PY7 ✦	PY8 ✦	PY9 ✦	PY10 ✦		
INSTALLATIONS	NMT Terminal Installations					

Note: FY17 NMT funding profile resides in PE 0303109N.

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 0728 / EHF SATCOM Terminals

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 0728				
AEHF Launch SV-5	1	2019	1	2019
A2AD Adaptive Coding & JALN-M Integration & Testing	1	2018	4	2018
A2AD Wideband AJ Modem Development	1	2018	3	2022
Procurement Year (PY8)	2	2018	2	2018
Procurement Year (PY9)	2	2019	2	2019
Procurement Year (PY10)	2	2020	2	2020
FRP PY7 Delivery	3	2018	3	2018
FRP PY8 Delivery	3	2019	3	2019
FRP PY9 Delivery	3	2020	3	2020
WAM Integration & Testing	2	2021	4	2022
FRP PY10 Delivery	3	2021	3	2021
AEHF Launch SV-6	4	2019	4	2019
A2AD Adaptive Coding/Time of Day	1	2018	4	2019
WAMS IOC	4	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)				Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
2472: Mobile User Objective Sys (MUOS)	0.000	0.000	13.965	20.530	-	20.530	14.530	14.860	13.915	14.187	82.590	174.577
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 345												

A. Mission Description and Budget Item Justification

In June 2016, based on the results of the Multi-Service Operational Test and Evaluation-2 (MOT&E-2), Director, Operational Test & Evaluation (DOT&E) assessed the Mobile User Objective System (MUOS) not operationally effective or suitable. Increase of funds from FY18 to FY19 is required to conduct Multi-Service Operational Test and Evaluation-2B (MOT&E-2B) in FY19. As a result of the program addressing findings and preparing for MOT&E-2B in FY19, Full Operational Capability (FOC) has been moved to FY20. The MUOS Key Performance Parameter Threshold requires 70% constellation availability through 2030 (FOC + 10 years). Recent analysis predicts that MUOS Wideband Code Division Multiple Access (WCDMA) will fall below this requirement in 2028, therefore an Ultra-High Frequency (UHF) Narrowband satellite communications (SATCOM) Analysis of Alternatives (AoA) is required to satisfy Narrowband requirements beyond the MUOS service life. The increase of funds from FY18 to FY19 funds the AoA.

MUOS provides a worldwide, multi-service population of mobile and fixed-site terminal users with UHF Narrowband, beyond line of sight SATCOM. MUOS significantly increases performance and capacity in support of critical Combatant Command SATCOM priorities. MUOS is the replacement system for the UHF Follow-on (UFO) system, which is currently beyond its design life. MUOS consists of Space, Ground, and User Entry Segments. The Space Segment consists of 5 geosynchronous satellites, one which is an on-orbit spare, and provides both a legacy UHF payload, which is backward compatible with UFO, and a WCDMA payload, which provides 3G cellular-like capability. The Ground Segment consists of four world-wide Radio Access Facilities (RAFs) and two satellite control facilities. Each RAF includes three 60 ft. antennas, and numerous racks of equipment. The RAF in Hawaii includes a Network Management Facility (NMF). The RAFs in Hawaii and Virginia each include a Switching Facility (SF). The User Entry Segment consists of the MUOS waveform that is ultimately integrated into MUOS-capable terminals. The MUOS legacy capability has been in operational use since 2012, and the WCDMA capability transitioned to Early Combatant Command Use in July 2016.

In addition to providing UHF SATCOM for the Department of Defense, the Navy has the overall responsibility to deliver the End-to-End MUOS capability to the warfighter. This responsibility involves systems engineering, integration, and test management of all MUOS system of system activities, to include the integration of the MUOS waveform into MUOS-capable terminals and the subsequent terminal certification testing.

The budget line in FY19 and out is dedicated to completion of the MOT&E-2B activities, system optimization to address the dynamic, worldwide electromagnetic and cybersecurity environment in which MUOS operates, testing to support certification of MUOS-capable terminals, and the UHF Narrowband SATCOM AoA.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
	<p>Title: Mobile User Objective Sys (MUOS)</p> <p align="right">Articles:</p> <p>FY 2018 Plans: FY18 addresses operational test deficiencies and preparation for FY19 Multi-service Operational Test and Evaluation-2B (MOT&E-2B) activities, particularly addressing the capability to monitor system status and provide situational awareness for system operators. Execute 5 developmental test assist events in preparation for FY19 MOT&E-2B. Address emerging cybersecurity requirements. Support integration of the MUOS waveform into MUOS-capable terminals and execution of certification testing of MUOS-capable terminals in support of Department of Defense terminal programs. Develop a modernized geolocation Ground Segment subsystem in order to meet baseline requirements. Address the dynamic, worldwide electronic magnetic environment through system optimization to ensure capacity is available to the end user.</p> <p>FY 2019 Base Plans: FY19 funds activities to prepare for and conduct MOT&E-2B, due to the June 2016 Director, Operational Test & Evaluation (DOT&E) assessment that found MUOS not operationally effective or suitable. These activities include Development and Operational Test Readiness Reviews, Cooperative Vulnerability Penetration Assessment, formal MOT&E-2B, and Adversarial Assessment. Additionally, FY19 funds support the engineering and research efforts as part of the Ultra-High Frequency (UHF) Narrowband satellite communications (SATCOM) Analysis of Alternatives (AoA) initiative. FY19 continues support of integration of the MUOS waveform into MUOS-capable terminals and execution of certification testing of MUOS-capable terminals in support of Department of Defense terminal programs. Continue to address operational test deficiencies, particularly addressing the capability to monitor system status and provide situational awareness for the system operators. Continue to address emerging cybersecurity requirements. Continue development of a modernized geolocation Ground Segment subsystem in order to meet baseline requirements. Continue to address the dynamic, worldwide electronic magnetic environment through system optimization to ensure capacity is available to the end user.</p> <p>FY 2019 OCO Plans: N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: The increase in FY19 funds activities to prepare for and conduct MOT&E-2B, due to the June 2016 DOT&E assessment that found MUOS not operationally effective or suitable. These activities include Development and Operational Test Readiness Reviews, Cooperative Vulnerability Penetration Assessment, formal</p>	0.000	13.965	20.530	0.000
	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
MOT&E-2B, and Adversarial Assessment. Additionally, the FY19 funding increase supports activities for the UHF Narrowband SATCOM AoA: with subject matter experts in support of Space, Ground, Terminal, and Cyber Security, modeling and simulation efforts, research and analysis on the industrial base, contracting options, affordability, concept of operations, and payload alternatives.					
Accomplishments/Planned Programs Subtotals	0.000	13.965	20.530	0.000	20.530

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

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• WPN/2433: Fleet Satellite Comm Follow-On	33.723	46.357	66.779	-	66.779	67.380	53.460	45.985	46.907	617.197	3,044.814

Remarks

D. Acquisition Strategy

Currently sustainment and engineering activities are procured via the baseline MUOS Risk Reduction and Design Development contract. The program is working to transition these activities to dedicated sustainment contracts for the Space, Ground and User Entry Segments. Integration of the MUOS waveform into MUOS-capable terminals and execution of certification testing of MUOS-capable terminals are executed primarily by the Navy Working Capital Funded SPAWAR Systems Center Pacific.

E. Performance Metrics

MUOS Goal: Achieve Full Operational Capability in FY 2020.

Metric: Successfully complete 5 developmental test assist events in FY18, and Multi-Service Operational Test and Evaluation-2B FY19.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Contract	C/CPAF	Lockheed Martin : Sunnyvale, CA	0.000	0.000		7.700	Oct 2017	7.850	Oct 2018	-		7.850	0.000	15.550	-
Subtotal			0.000	0.000		7.700		7.850		-		7.850	0.000	15.550	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		1.515	Oct 2017	1.104	Oct 2018	-		1.104	0.000	2.619	-
Operational Test & Evaluation	WR	COTF : Norfolk, VA	0.000	0.000		0.250	Oct 2017	2.048	Oct 2018	-		2.048	0.000	2.298	-
Subtotal			0.000	0.000		1.765		3.152		-		3.152	0.000	4.917	N/A

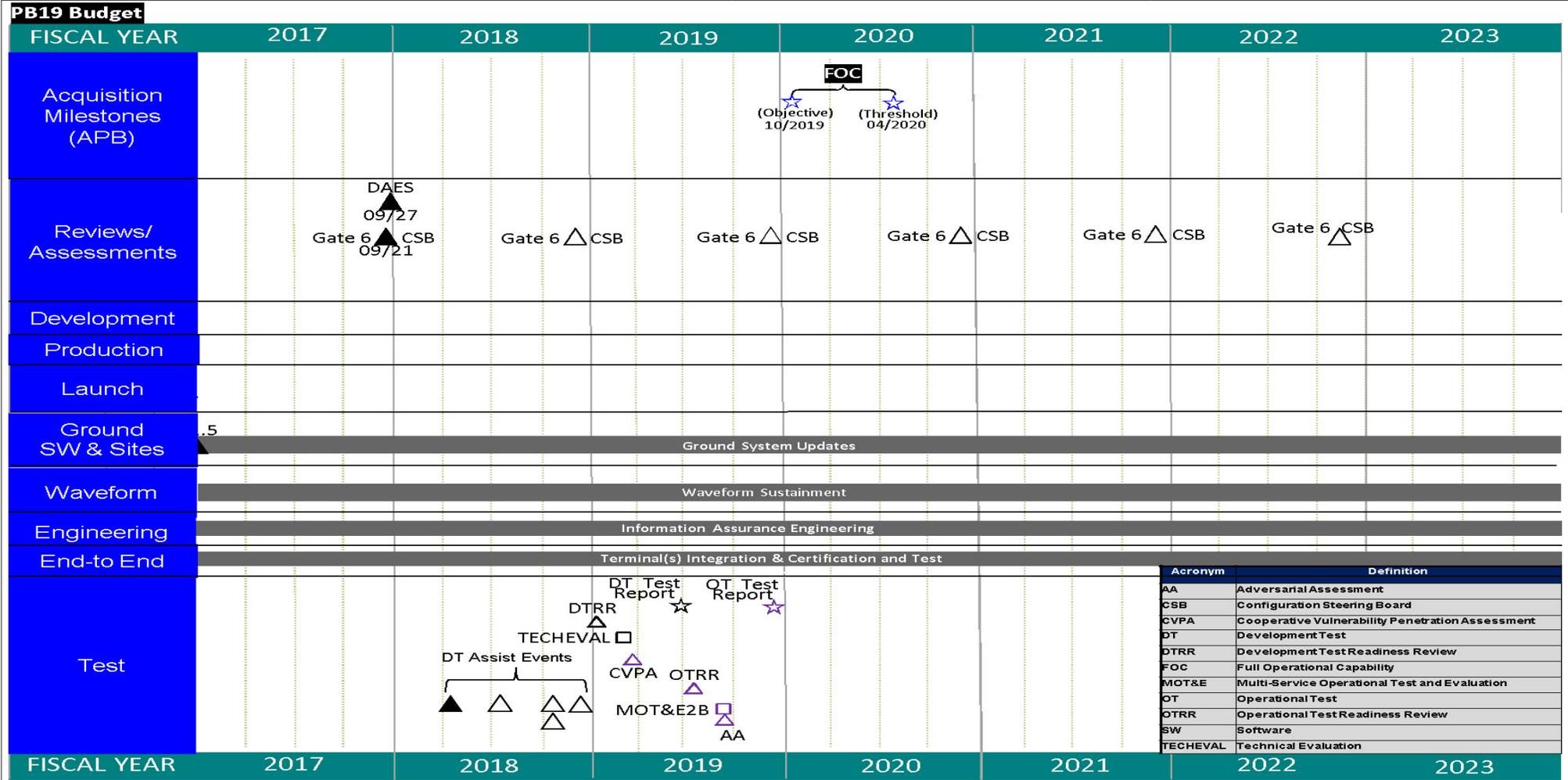
Remarks
Increase in Test and Evaluation efforts from FY18 to FY19 funds Test events in preparation for and conduct of MOT&E-2B.

Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contract Engineering Support	C/CPFF	SBG : Alexandria, VA	0.000	0.000		3.000	Oct 2017	7.000	Oct 2018	-		7.000	0.000	10.000	-
Government Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		1.500	Oct 2017	2.528	Oct 2018	-		2.528	0.000	4.028	-
Subtotal			0.000	0.000		4.500		9.528		-		9.528	0.000	14.028	N/A

Remarks
Increase in Services from FY18 to FY19 funds engineering and research efforts in support of UHF Narrowband SATCOM Analysis of Alternatives.

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2472				
Information Assurance Engineering	1	2018	4	2023
Terminal Integration, Certification, and Test	1	2018	4	2023
Waveform Sustainment	1	2018	4	2023
Ground System Updates	1	2018	4	2023
Developmental Test Assist Event 1	2	2018	2	2018
Developmental Test Assist Event 2	3	2018	3	2018
Developmental Test Assist Event 3	4	2018	4	2018
Developmental Test Assist Event 4	4	2018	4	2018
Developmental Test Assist Event 5	4	2018	4	2018
Gate 6/CSB FY18	4	2018	4	2018
Developmental Test Readiness Review	1	2019	1	2019
Tech Eval	1	2019	1	2019
DT Test Report	3	2019	3	2019
Operational Test Readiness Review	3	2019	3	2019
MOT&E2B	3	2019	3	2019
Adversarial Assessment	3	2019	3	2019
OT Test Report	4	2019	4	2019
Gate 6/CSB FY19	4	2019	4	2019
Full Operational Capability (FOC) Objective	1	2020	1	2020
Full Operational Capability (FOC) Threshold	3	2020	3	2020
Gate 6/CSB FY20	4	2020	4	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 2472 / Mobile User Objective Sys (MUOS)

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Gate 6/CSB FY21	4	2021	4	2021
Gate 6/CSB FY22	4	2022	4	2022
Gate 6/CSB FY23	4	2023	4	2023
Cooperative Vulnerability Penetration Assessment	1	2019	1	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)				Project (Number/Name) 3398 / Enterprise SATCOM Gateway Modems (ESGMs)			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
3398: Enterprise SATCOM Gateway Modems (ESGMs)	0.000	0.000	1.510	0.915	-	0.915	0.002	0.000	0.000	0.000	0.000	2.427
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Navy Global Broadcast Service (GBS) Program is the Navy component of the Joint Military Satellite Communications (MILSATCOM) program that delivers the continuous flow of high-speed, high-volume communication and information flow for deploying, deployed, on the move, and garrisoned forces. The GBS system supports the Navy Strategic Plan and equips warfighters with a proven Assured Command and Control (C2) capability. GBS provides Satellite Communications (SATCOM) capability for forces afloat, ashore, and Naval Special Warfare Command.

The Enterprise SATCOM Gateway Modem (ESGM) is the DoD Chief Information Officer directed solution to satisfy the Transmission Security (TRANSEC) requirement. This modem will replace the existing modem in the GBS System. Testing and fielding of the ESGM is a joint venture, operationally directed by the Defense Information Systems Agency (DISA) and the Air Force as the lead service. Additionally, the ESGM will continue to enable GBS reception of the Digital Video Broadcast - Satellite 2nd Generation (DVB-S2).

FY19 GBS activities will complete Joint GBS integration and support the Joint GBS DT/OT event.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Enterprise SATCOM Gateway Modems (ESGMs)	0.000	1.510	0.915	0.000	0.915
Articles:	-	-	-	-	-
FY 2018 Plans: DISA is responsible for the selection of the DoD Wide Modem. After selection is made, DISA will complete an initial DT/OT. Complete integration and testing necessary to support a DISA led Enterprise Satellite Communications Gateway Modems (ESGM) technical baseline. Complete Navy-specific application integration testing and report on compliance with Navy C4I systems.					
FY 2019 Base Plans: Air Force will follow up with a Joint Services DT/OT. Complete integration and testing necessary to support and finalize the Joint led GBS-ESGM technical baseline. Complete test execution, qualification and reporting for Joint-specific GBS and Navy-specific requirements during GBS Joint ESGM DT and OT activities.					
FY 2019 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 3398 / Enterprise SATCOM Gateway Modems (ESGMs)

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Decrease of \$.595M from FY18 to FY19 is due to DISA qualification reporting and Navy-specific application integration testing not required for FY19 activities.					
Accomplishments/Planned Programs Subtotals	0.000	1.510	0.915	0.000	0.915

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

N/A

Remarks

D. Acquisition Strategy

The GBS program reached a Full Rate Production Decision on 24 Oct 2008 and is in sustainment. The Enterprise Satellite Communications (SATCOM) Gateway Modem (ESGM), the Commercial Off-The-Shelf (COTS) Internet Protocol (IP) modem, provides Transmission Security functionality in support of DoD CIO direction to implement Information Assurance for all transmission media.

E. Performance Metrics

The RDT&E goal for the GBS program is to create a military satellite communications system that supports current and future requirements for Assured Command and Control (AC2) and Information Assurance.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy												Date: February 2018			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
1319 / 7				PE 1203109N / (U)Satellite Communications (SPACE)					3398 / Enterprise SATCOM Gateway Modems (ESGMs)						
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.313	Nov 2017	0.188	Nov 2018	-		0.188	0.000	0.501	-
Systems Engineering	WR	NUWC : Newport, RI	0.000	0.000		0.274	Nov 2017	0.165	Nov 2018	-		0.165	0.000	0.439	-
Systems Engineering	WR	SSC LANT : Charleston, SC	0.000	0.000		0.322	Nov 2017	0.200	Nov 2018	-		0.200	0.000	0.522	-
Subtotal			0.000	0.000		0.909		0.553		-		0.553	0.000	1.462	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	SYSTECH : San Diego, CA	0.000	0.000		0.000	Nov 2017	0.163	Nov 2018	-		0.163	0.000	0.163	-
Operational Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.271	Nov 2017	0.133	Nov 2018	-		0.133	0.000	0.404	-
Developmental Test & Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.221	Nov 2017	0.000		-		0.000	0.000	0.221	-
Subtotal			0.000	0.000		0.492		0.296		-		0.296	0.000	0.788	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	BAH : San Diego	0.000	0.000		0.100	Nov 2017	0.061	Nov 2018	-		0.061	0.000	0.161	-
Travel	Reqn	SPAWAR : Various	0.000	0.000		0.009	Nov 2017	0.005	Nov 2018	-		0.005	0.000	0.014	-
Subtotal			0.000	0.000		0.109		0.066		-		0.066	0.000	0.175	N/A
Project Cost Totals			0.000	0.000		1.510		0.915		-		0.915	0.000	2.425	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy							Date: February 2018			
Appropriation/Budget Activity 1319 / 7			R-1 Program Element (Number/Name) PE 1203109N / (U) <i>Satellite Communications (SPACE)</i>			Project (Number/Name) 3398 / <i>Enterprise SATCOM Gateway Modems (ESGMs)</i>				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 3398 / Enterprise SATCOM Gateway Modems (ESGMs)

	2017	2018	2019	2020	2021	2022	2023
DEVELOPMENT and INTEGRATION		ESGM Development & Integration					
TESTING			GBS ESGM DT/OT				
PROCUREMENT		◊					

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / (U)Satellite Communications (SPACE)	Project (Number/Name) 3398 / Enterprise SATCOM Gateway Modems (ESGMs)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3398				
ESGM Development and Integration	1	2018	3	2019
GBS ESGM DT/OT	3	2018	1	2020
ESGM Test Equipment Buy	2	2018	2	2018