Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019	

Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* I BA 5: *System Development & Demonstration (SDD)*					**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*						

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	-	46.051	41.920	40.808	-	40.808	26.630	36.027	26.193	14.312	0.000	231.941
EF5: *Joint Tactical Network (JTN)*	-	17.295	11.142	15.324	-	15.324	5.438	4.306	4.160	4.078	0.000	61.743
EX6: *Waveforms*	-	28.756	30.778	25.484	-	25.484	21.192	31.721	22.033	10.234	0.000	170.198

Note

As part of the joint program budget strategy for Joint Enterprise Network Manager (JENM), each Military Department (MILDEP) budgets for approximately one-third of the total program RDT&E funds for joint efforts. Joint funding is programmed in the Navy PE 0605030N and Air Force PE 0605030F. Prior to submission of the President's Budget, the funding is consolidated in the Army PE (0605031A) for execution.

NOTE:
The Joint Tactical Networking Center (JTNC) Acquisition Decision Memorandum (ADM) of 20 Jan 2014 officially chartered the JTNC, assigned responsibility for the development and sustainment of JENM to the PM Joint Tactical Networks (JTN), and transitioned waveform development and sustainment to the Services. The Army Program Executive Office (PEO) Command Control Communications Tactical (C3T) Memos of 25 Jun 2015 transferred all program, development, and configuration control of JENM from Product Manager (PdM) JENM under PM JTN to the Army as Lead service under PdM Tactical Cyber Network Operations (TCNO) under PM Tactical Network (formally PM WIN-T). Waveform development transferred to PM Tactical Radios, who is responsible for program of record development.

JENM, funded in project EF5, is a software only program.

A. Mission Description and Budget Item Justification

EF5 project: In support of Line of Effort (LOE) 1B, Network Enabling Functions, JENM software provides a single network management tool for the Warfighter to plan, configure, load, and manage the Joint Services' Software Defined Radios (SDRs) and networks in the field, a capability not available in legacy planning systems. JENM configures numerous Tactical radios such as the ManPack and Rifleman, enabling them to utilize the Mobile Ad Hoc Networking (MANET) waveforms such as the Soldier Radio Waveform (SRW), Mobile User Objective System (MUOS), Satellite Communications (SATCOM) Demand Assigned Multiple Access (DAMA), Integrated Waveform (IW), and Single Channel Ground and Airborne Radio System (SINCGARS) waveforms. Furthermore, JENM provides the Commander the ability to quickly reconfigure critical networks using its Over the Air Management (OTAM) functionality. JENM enhances the S6's ability to conduct Course of Action (COA) Analysis and the Military Decision Making Process (MDMP) providing commanders critical information regarding their ability to effectively communicate. JENM is deployed on the Joint Tactical Networking Environment NetOps Toolkit (J-TNT) from Division to the Company level based upon the Basis of Issue Plan.

EX6 project: Beginning in FY 2018, based on the results of the FY 2017 Army Network Analysis, the EX6 project refocused efforts to improve waveforms for lower and mid-tier networks. The effort focuses on development to achieve improved performance, network simplification, improved spectrum efficiency and improved Electronic Warfare (EW)/Cyber resistance. The planned waveforms may include changes to a mid-tier waveform, SRW 2.0/Narrow Band, and SINCGARS upgrades. This new capability must be completed by FY20-21 to support future tactical radio procurements.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	R-1 Program Element (Number/Name) PE 0605031A *I Joint Tactical Network (JTN)*

FY 2020 Base RDTE dollars in the amount of $40.808 million supports the continued development of the Waveforms and JENM, testing support and the program management office.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	44.150	41.972	29.954	-	29.954
Current President's Budget	46.051	41.920	40.808	-	40.808
Total Adjustments	1.901	-0.052	10.854	-	10.854
• Congressional General Reductions	-0.035	-0.052			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	3.640	-			
• SBIR/STTR Transfer	-1.704	-			
• Adjustments to Budget Years	-	-	10.854	-	10.854

Change Summary Explanation

EX6: $2.362 million of FY 2019 RDTE funds were identified to support SRW Narrowband Transition and integration efforts. This funding will provide support for the Narrowband capability to be transitioned from CERDEC to PdM Waveforms and integrated into the current waveform portfolio.

EF5: (-$1.565) million of FY 2019 RDTE funds were reduced for JENM development IAW tactical radio requirement updates.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019	
Appropriation/Budget Activity 2040 / 5				**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*				**Project (Number/Name)** EF5 / *Joint Tactical Network (JTN)*			

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
EF5: *Joint Tactical Network (JTN)*	-	17.295	11.142	15.324	-	15.324	5.438	4.306	4.160	4.078	0.000	61.743
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
LOE 1B, Network Enabling Functions Joint Enterprise Network Manager (JENM))

For FY 2018 and out, the continuing JTN efforts are funded in Army PE 0605031A (JTN), Navy PE 0605031N (shared), Air Force PE 0605031F (shared) and USMC (Marine Corps Communications Systems - MCPC: 112107). As part of the JENM joint program budget strategy, the Air Force and Army budget for approximately one-third each of the total program funds for JENM efforts. The Navy and USMC funding combined equal the other third of the JENM program funding. Prior to the year of execution, Navy and Air Force funding is consolidated in the Army PE (0605031A) and software sustainment funds are realigned from RDT&E to O&M,A PE (4326750A) to support the joint program acquisition strategy. USMC funding will be provided on an annual basis via Military Interdepartmental Purchase Request (MIPR). USMC funding projections are as follows: FY20 - $1.121M; FY21 - $1.139M and FY22 - $0.927M.

JENM is a software only program.

A. Mission Description and Budget Item Justification
EF5 project: The Joint Enterprise Network Manager (JENM) software provides a single network management tool for the Warfighter to plan, configure, load, and manage the Joint Services' Software Defined Radios (SDRs) and networks in the field, a capability not available in legacy planning systems. JENM configures numerous Tactical radios such as the ManPack and Rifleman, enabling them to utilize the Mobile Ad Hoc Networking (MANET) waveforms such as the Soldier Radio Waveform (SRW), Mobile User Objective System (MUOS), Satellite Communications (SATCOM) Demand Assigned Multiple Access (DAMA), Integrated Waveform (IW), and Single Channel Ground and Airborne Radio System (SINCGARS) waveforms. Furthermore, JENM provides the Commander the ability to quickly reconfigure critical networks using its' Over the Air Management (OTAM) functionality. JENM enhances the S6's ability to conduct Course of Action (COA) Analysis and the Military Decision Making Process (MDMP) providing commanders critical information regarding their ability to effectively communicate. JENM is deployed on the Joint Tactical Networking Environment NetOps Toolkit (J-TNT) from Division to the Company level based upon the Basis of Issue Plan.

The Army will pivot away from JENM to new prototyping activities for emerging Tactical Radio and planning requirements for a simplified workflow based planning solution that leverages COTS capabilities to rapidly meet emerging needs from the Network CFT & ITN.

FY 2020 Base RDTE dollars supports the continued development of the JENM software, testing support, and the program management office.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: JENM Program Office Support	1.553	1.596	0.318

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 *I* 5	**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*		**Project (Number/Name)** EF5 *I Joint Tactical Network (JTN)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020**
Description: Program Management Office support in the development of the JENM system. *FY 2019 Plans:* Program Office funding will support JENM design, engineering, integration and test of mid and lower tier planning and management application for the Software Defined Radio (SDR) network. To align with the Unified Network Operations (UNO) vision, JENM will lower and mid-tier Network Management with that of PM TN to enable Soldiers the ability to manage the entire, consolidated, tactical network. JENM will also work to extend our Over-The-Air-Management (OTAM) capabilities to the mounted/ tablet based environment through our participation with Dynamic Network Connectivity development. Program Office Support funding will also support completion of MUOS support for US Navy Digital Modular Radio (DMR) enhancements, ARC 210/231, USMC and USAF 117G MUOS, as well as full threshold requirement support for HMS Manpack and Leader Radios. Begin development in support of the AMF airborne radio, and the integration of USMC terrestrial based waveform planning and management capability. JENM will also manage the completion of deferred Army program requirements. *FY 2020 Plans:* Program Office funding will continue support JENM design, engineering, integration and test of mid and lower tier planning and management application for the Software Defined Radio (SDR) network. Support to align with the Unified Network Operations (UNO) vision to provide further integration of the lower and mid-tier Network Management with that of PM TN to enable Soldiers the ability to manage the entire, consolidated, tactical network. JENM will also work to extend our Over-The-Air-Management (OTAM) capabilities to the mounted/ tablet based environment through our participation with Dynamic Network Connectivity development. Program Office Support funding will also support completion of MUOS support for US Navy Digital Modular Radio (DMR) enhancements, Airborne Radio Communications (ARC) 210/231, USMC and USAF 117G MUOS, as well as full threshold requirement support for HMS Manpack and Leader Radios. Continued development in support of the AMF airborne radio, and the integration of USMC terrestrial based waveform planning and management capability. JENM will also manage the completion of deferred Army program requirements. JENM Program Office Support will support the completion of JENM v3.4 Transitioning to Sustainment in addition to JENM v3.5 development, which include complete MUOS simplification, Upgrades to JENM Public Key Infrastructure (PKI) Certificate Management, and Cyber Enhancements. *FY 2019 to FY 2020 Increase/Decrease Statement:* JENM Program Office Support funding experiencing a decrease from FY19 to FY20 due to JENM v3.4 Transitioning to Sustainment. In FY20, JENM v3.5 development, which include complete MUOS Simplification, Upgrades to JENM Public Key Infrastructure (PKI) Certificate Management, and Cyber Enhancements, continuing at reduced funding and manpower levels.			
Title: JENM Development	13.012	8.562	13.394

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Army		**Date:** March 2019
Appropriation/Budget Activity 2040 *I* 5	**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*	**Project (Number/Name)** EF5 *I Joint Tactical Network (JTN)*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020**
Description: JENM provides consolidated communications planning, network configuration, network activation, position reporting, fault management, security management, and network health and status reporting needed to establish and maintain a mobile wireless network comprised of JTN network waveforms. JENM can interface with other external network managers, mission planning systems, network planning systems, key management systems, and spectrum planning systems. JENM is considered a mission essential system. JENM is also considered a critical element within the J-TNT configuration management tool kit. *FY 2019 Plans:* JENM will support systems design, engineering, and integration of mid and lower tier radio planning and management application for the SDR network. JENM will provide support to the Unit Task Reorganization (UTR) systems integration effort to enable the S-6 to quickly transform the tactical network based upon the Commander?s intent and associated mission analysis. JENM will also work to extend our Over-The-Air-Management (OTAM) capabilities to the mounted/ tablet based environment through our participation with Dynamic Network Connectivity development. JENM will support completion of MUOS support for US Navy Digital Modular Radio (DMR) enhancements, ARC 210/231, USMC and USAF 117G MUOS, as well as full threshold requirement support for HMS Manpack and Leader Radios. Begin development in support of the AMF airborne radio, and the integration of USMC terrestrial based waveform planning and management capability. JENM will continue to support modifications to the SRW, Tactical Scalable Mobile Ad-Hoc Networking Waveform (TSM), MUOS, SINCGARS, SATCOM, and Integrated Waveforms. JENM will also manage the completion of deferred program requirements as well as radio planning and management enhancements. *FY 2020 Plans:* JENM will support systems design, engineering, and integration of mid and lower tier radio planning and management application for the SDR network. JENM will provide support to the Unit Task Reorganization (UTR) systems integration effort to enable the S-6 to quickly transform the tactical network based upon the Commander?s intent and associated mission analysis. JENM will also work to extend our Over-The-Air-Management (OTAM) capabilities to the mounted/ tablet based environment through our participation with Dynamic Network Connectivity development. JENM will support completion of MUOS support for US Navy Digital Modular Radio (DMR) enhancements, Airborne Radio Communications (ARC) 210/231, USMC and USAF 117G MUOS, as well as full threshold requirement support for HMS Manpack and Leader Radios. Begin development in support of the AMF airborne radio, and the integration of USMC terrestrial based waveform planning and management capability. JENM will continue to support modifications to the SRW, MUOS, SINCGARS, SATCOM, and Integrated Waveforms. JENM will also manage the completion of deferred program requirements. JENM Program Office Support will support the completion of JENM v3.4 Transitioning to Sustainment in addition to JENM v3.5 development, which include complete MUOS simplification, Upgrades to JENM Public Key Infrastructure (PKI) Certificate Management, and Cyber Enhancements. *FY 2019 to FY 2020 Increase/Decrease Statement:*			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity 2040 I 5	**R-1 Program Element (Number/Name)** PE 0605031A I *Joint Tactical Network (JTN)*	**Project (Number/Name)** EF5 I *Joint Tactical Network (JTN)*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
JENM funding experiences a decrease from FY19 to FY20 due to JENM v3.4 Transitioning to Sustainment. In FY20, JENM v3.5 development, which include complete MUOS Simplification, Upgrades to JENM Public Key Infrastructure (PKI) Certificate Management, and Cyber Enhancements, continues at reduced funding and manpower levels.			
Title: Test and Evaluation	2.730	0.576	1.612
Description: Test and Evaluation of JENM *FY 2019 Plans:* JENM will provide direct support to the FY19 Developmental and Operational Test (DT/OT) of the PdM HMS Leader radio. JENM will undergo an Operational Test (OT) assessment to ensure it continues to meet the needs of today?s Soldiers. JENM will also support the planned MUOS OT in FY19. *FY 2020 Plans:* JENM will provide direct support to the FY20 Developmental and Operational Test (DT/OT) of the PdM HMS Leader radio. JENM will undergo an Operational Test (OT) assessment to ensure it continues to meet the needs of today?s Soldiers. JENM will undergo a formal qualification test. *FY 2019 to FY 2020 Increase/Decrease Statement:* JENM will experience an increase in funding from FY19 to FY20 due to supporting the FY20 Developmental and Operational Test (DT/OT) of the PdM HMS Leader radio, undergoing an Operational Test (OT) assessment to ensure it continues to meet the needs of today's Soldiers, and a formal qualification test (FQT).			
Title: FY19 SBIR/STTR Transfer	-	0.408	-
FY 2019 Plans: FY19 SBIR/STTR Transfer *FY 2019 to FY 2020 Increase/Decrease Statement:* FY19 accounts for SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	17.295	11.142	15.324

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
• 0605031N: *0605031N; JTN, RDTE,N*	2.800	2.617	2.677	-	2.677	2.705	1.747	-	-	Continuing	Continuing
• 0605031F: *0605031F; JTNC, RDTE,F*	4.691	3.735	3.798	-	3.798	3.844	3.910	3.979	-	Continuing	Continuing

PE 0605031A: *Joint Tactical Network (JTN)*
Army

R-1 Line #147

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Army		**Date:** March 2019
Appropriation/Budget Activity 2040 *I* 5	**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*	**Project (Number/Name)** EF5 *I Joint Tactical Network (JTN)*

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

PE 0605031A contains only the JTN (PdM Waveforms and PdM TCNO (JENM)) RDTE funding.

For FY2019 and out, the continuing JTN efforts are funded in Army PE 0605031A (JTN), Navy PE 0605031N (shared), Air Force PE 0605031F (shared) and USMC (Marine Corps Communications Systems - MCPC: 112107). As part of the joint program budget strategy, the Air Force and Army budget for approximately one-third each of the total program funds for JENM efforts. The Navy and USMC funding combined equal the other third of the JENM program funding. Prior to the year of execution, Navy and Air Force funding is consolidated in the Army PE (0605031A) and software sustainment funds are realigned from RDT&E to O&M, APE (4326750A) to support the joint program acquisition strategy. USMC funding will be provided on an annual basis via Military Interdepartmental Purchase Request (MIPR). USMC funding projections are as follows: FY20 - $1.121M; FY21 - $1.139M and FY22 - $0.927M.
In FY 2017 and out Waveform funding is on the Army PE 0605031A, Project Code EX6. JENM funding is under Army PE 0605031A Project Code EF5.

D. Acquisition Strategy

Joint Tactical Network Center (JTNC) Acquisition Decision Memorandum (ADM) (July 2012) (JENM Supporting Role). Per the December 2014 Joint Tactical Network (JTN) Select Acquisition Report (SAR), JTN was 90% expended and changed to inactive. Defense Acquisition Management Information Retrieval (DAMIR) reflected the inactive status on 3 June 2015 JTN APB (13 October 2015) (JENM Supporting Role).

Product Manager Tactical Cyber & Network Operations (TCNO) manages a Government Owned, Government Operated (GOGO) Software Development & Integration Facility which employs competitive contracting strategies for software development & sustainment of the network manager components to ensure warfighter access to the best technology and innovative capabilities while addressing emerging threats and future requirements via an affordable, operationally effective, and timely framework.

JENM will support the completion of JENM v3.4 Transitioning to Sustainment in addition to JENM v3.5 development, which include complete MUOS Simplification, Upgrades to JENM Public Key Infrastructure (PKI) Certificate Management, and Cyber Enhancements.

E. Performance Metrics

N/A

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2020 Army														**Date:** March 2019
Appropriation/Budget Activity 2040 / 5						**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*						**Project (Number/Name)** EF5 / *Joint Tactical Network (JTN)*		

Management Services ($ in Millions)

				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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**
JENM Program Management Support	C/CPFF	G2 Software Systems : San Diego, CA	0.809	0.381	Nov 2017	0.228	Nov 2018	0.151	Nov 2019	-		0.151	0.000	1.569	-
JENM Program Management Support	C/CPIF	Pending Contract Award : Aberdeen, MD	0.348	-		-		-		-		-	0.000	0.348	-
JENM Program Management Support	Allot	USAASC : Aberdeen, MD	0.116	-		-		-		-		-	Continuing	Continuing	Continuing
JENM Program Management Support	MIPR	SSC PACIFIC : San Diego, CA	0.238	0.598	Oct 2017	0.946	Oct 2018	0.106	Nov 2019	-		0.106	0.000	1.888	-
Program Management Support	C/CPFF	Booz Allen Hamilton : San Diego, CA	0.673	-		-		-		-		-	0.000	0.673	0.673
Program Management	C/CPFF	G2 Software Systems : San Diego, CA	1.683	-		-		-		-		-	0.000	1.683	1.683
		Subtotal	3.867	0.979		1.174		0.257		-		0.257	Continuing	Continuing	N/A

Product Development ($ in Millions)

				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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**
JENM NMRIL Development	C/CPFF	G2 Software Systems : San Diego, CA	0.992	-		-		-		-		-	0.000	0.992	-
JENM NMRIL Development	C/CPFF	Pending Contract Award : Aberdeen, MD	0.875	-		-		-		-		-	0.000	0.875	-
JENM NMRIL Development	MIPR	SSC PACIFIC : San Diego, CA	1.741	9.946	Oct 2017	8.984	Oct 2018	2.744	Nov 2019	-		2.744	Continuing	Continuing	Continuing
Post Formal Qualification Testing-JENM	C/CPIF	Boeing : Huntington Beach, CA	6.139	-		-		-		-		-	0.000	6.139	4.991
Post Formal Qualification Testing-WNW	C/CPIF	General Dynamics : Scottsdale, AZ	2.757	-		-		-		-		-	0.000	2.757	2.976

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2020 Army												**Date:** March 2019		
Appropriation/Budget Activity 2040 *I* 5						**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*						**Project (Number/Name)** EF5 *I Joint Tactical Network (JTN)*		

Product Development ($ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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**
Post Formal Qualification Testing-SRW	C/CPIF	Harris : Rochester, NY	2.554	-		-		-		-		-	0.000	2.554	2.554
Software Communications Architecture (SCA) Compliance	MIPR	NSA : Fort Meade, MD	0.953	-		-		-		-		-	0.000	0.953	0.953
Post FQT/Software Support	MIPR	SSC PAC : San Diego, CA	7.478	-		-		-		-		-	0.000	7.478	7.604
Post FQT/Software Support	MIPR	CERDEC : APG, MD	0.611	-		-		-		-		-	0.000	0.611	0.611
Post FQT/Software Support	MIPR	SSC LANT : Charleston, SC	5.229	-		-		-		-		-	0.000	5.229	5.229
Post Formal Qualification Testing-MUOS	C/CPIF	Lockheed Martin Corp. : Sunnyvale, CA	0.660	-		-		-		-		-	0.000	0.660	0.660
Post Formal Qualification Testing-Link 16	C/CPIF	BAE : Wayne, NJ	0.332	-		-		-		-		-	0.000	0.332	0.332
JENM Radio Planning and Management Enhancement	TBD	Harris, CodeMettle : Aberdeen, MD	-	3.640		-		10.880		-		10.880	0.000	14.520	-
FY19 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.408		-		-		-	0.000	0.408	-
		Subtotal	30.321	13.586		9.392		13.624		-		13.624	Continuing	Continuing	N/A

Support ($ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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**
JENM v3 Software Support	C/CPFF	G2 Software Systems : San Diego, CA	0.350	-		-		-		-		-	0.000	0.350	-
JENM v3 Software Support	C/CPFF	Pending Contract Award : Aberdeen, MD	0.537	-		-		-		-		-	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army | | **Date:** March 2019

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / *Joint Tactical Network (JTN)*	Project (Number/Name) EF5 / *Joint Tactical Network (JTN)*

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
JENM v3 Software Support	MIPR	SSC PACIFIC : San Diego, CA	0.582	-		-		-		-		-	Continuing	Continuing	Continuing
Development/Engineering/ Technical Support	C/CPFF	Various : various	2.198	-		-		-		-		-	0.000	2.198	1.985
Subtotal			3.667	-		-		-		-		-	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
JENM v3.4 System Engineering and Test	MIPR	SSC PACIFIC : San Diego, CA	1.104	1.193	Oct 2017	0.013	Oct 2018	-		-		-	Continuing	Continuing	Continuing
JENM v3.5 System Engineering and Test	MIPR	NM RIL : San Diego, CA	1.641	1.537	Nov 2017	0.563	Oct 2018	0.250	Nov 2019	-		0.250	0.000	3.991	-
JENM v3.5x System Engineering and Test	TBD	NM RIL : San Diego, CA	-	-		-		1.193	Nov 2019	-		1.193	0.000	1.193	-
JTN Test and Evaluation Support	C/CPFF	Booz Allen Hamilton : San Diego, CA	1.862	-		-		-		-		-	0.000	1.862	1.406
JTN Test and Evaluation	FFRDC	MITRE : San Diego, CA	3.661	-		-		-		-		-	0.000	3.661	3.205
JTN Test and Evaluation Support	C/CPFF	G2 Software Systems : San Diego, CA	1.648	-		-		-		-		-	0.000	1.648	1.192
Subtotal			9.916	2.730		0.576		1.443		-		1.443	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	47.771	17.295	11.142	15.324	-	15.324	Continuing	Continuing	N/A

Remarks

Exhibit R-4, **RDT&E Schedule Profile:** PB 2020 Army		**Date:** March 2019	
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*	**Project (Number/Name)** EF5 / *Joint Tactical Network (JTN)*	

Exhibit R-4A, **RDT&E Schedule Details:** PB 2020 Army				**Date:** March 2019	
Appropriation/Budget Activity 2040 *I* 5			**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*	**Project (Number/Name)** EF5 *I Joint Tactical Network (JTN)*	

Schedule Details

Events	Start		End	
	Quarter	**Year**	**Quarter**	**Year**
JENM v3.5 Software Development and Release	4	2018	1	2020
Operational Evaluation 1	4	2018	1	2019
MUOS MOT&E 1	4	2019	4	2019
JENM FQT 2	1	2020	1	2020
JENM v3.5x Software Development and Release	1	2020	4	2026
JENM v3.4 Transition to Sustainment	3	2020	3	2020
Manpack OT	3	2020	3	2020
JENM v3.5 Transition to Sustainment	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019	
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0605031A / *Joint Tactical Network (JTN)*						Project (Number/Name) EX6 / *Waveforms*	

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
EX6: *Waveforms*	-	28.756	30.778	25.484	-	25.484	21.192	31.721	22.033	10.234	0.000	170.198
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Waveforms program supports the Army Network Modernization Strategy Line of Effort 1, Unified Network

In order to support the overall connectivity for the Unified Network, PdM Waveforms mission execution provides the transport technologies allowing soldiers to better communicate between echelons. PdM Waveforms' technology assessments, integration, and configuration management enable more fluid and swift updates to the Unified Network capabilities by focusing on the Soldier's mission and safety.

PdM Waveforms delivers, maintains, and upgrades portable, interoperable, mobile ad hoc networking waveforms (MANET), advance networking waveforms, and network enterprise services to enhance tactical warfighting capabilities. PdM Waveforms provides the Lower Tactical Internet with a suite of waveforms and network services that are: (1) Interoperable - used by all Services; (2) Capable of operating on a variety of hardware platforms, both Program of Record and non-developmental commercial radios; (3) Secure - meet all Department of Defense and US Government information assurance requirements; (4) Operationally relevant - quickly and effectively meet evolving network mission requirements of Combatant Commanders and the Services; and (5) Affordable - drive down procurement and support costs via a robust, competitive market which adheres to open government standards.

PdM Waveforms will remain agile to accommodate emerging warfighter needs by refocusing effort strategies to address the following:

- Work with Industry Partners to assess, analyze, and vet Commercial Off-The-Shelf (COTS)/Non-Developmental Item (NDI) waveforms in support of the Integrated Tactical Network (ITN)
- Pursue alternative waveforms to reduce the complexity of MANET
- Improve spectral efficiency
- Seek Electronic Counter-Counter Measure (ECCM) improvements for operations in contested environment
- Implement improvements that allow the tactical radios to be operated in a radio silence mode.

FY 2020 Base RDTE dollars in the amount of $25.484 million supports the continued development of the waveforms, testing support, and the program management office.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2018	FY 2019	FY 2020
Title: Program Management Office Support	3.772	3.383	3.138
Description: Provides Program Management Office (PMO) support for Waveforms enhancements.			

UNCLASSIFIED

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Army		**Date:** March 2019
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*	**Project (Number/Name)** EX6 / *Waveforms*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020**
FY 2019 Plans: Continue program management support for PdM Waveforms.			
FY 2020 Plans: Program Management support for PdM Waveforms.			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to efficiencies.			
Title: Waveforms Software Development	19.802	21.100	12.340
Description: Software Development efforts within PdM Waveforms are focused on the following: 1. Cyber Electro-magnetic Activities (CEMA) CEMA activities focus on impact the adversary?s ability to communicate through voice and data communications. This also includes protecting and hardening Army capabilities and systems to prevent the adversary from doing the same. CEMA is not limited to voice and data communications, but also includes tactics such as deception and adversary communication extraction. CEMA consist of: - Cyberspace and Cybersecurity Operations * Focused on IP traffic (data) * Intrusion Detection and Intrusion Prevention of Army networks within Tactical Radio platforms - Electronic Warfare (EW) * Focused on Radio Frequency (RF/voice) * Electronic Attack (EA) * Electronic Protection (EP) * Electronic Survivability (ES) * Includes Anti-jam protection and deployment - Spectrum Management Operations (SMO). * Development of capabilities for the warfighter to maintain communication in spectrum denied environments. 2. SINCGARS Development of a Frequency Hopping (FH3) mode, which will address the adversary's EA capabilities. Development of transmission security protocols. 3. Warrior Robust Enhanced Network (WREN) (formerly know as Soldier Radio Waveforms (SRW) Narrowband) Integration Development of WREN and the integration of Narrowband Code into the SRW baseline support the following warfighter capability gaps:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / *Joint Tactical Network (JTN)*	Project (Number/Name) EX6 / *Waveforms*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
- Availability of adequate spectrum to deploy a full Brigade Combat Team of subnets is increasingly becoming a problem in combat environments. - Enhance Scalability and longer distances between communication nodes. - Maintaining communication capabilities in foliage-heavy environments. - Operation in VHF and UHF bands with narrower bandwidths. *FY 2019 Plans:* - Mitigate CEMA threats - Mitigate interference affects & coordinated EW and communications threats for SINCGARS/WREN. - Develop EW Enabled cyber capabilities *FY 2020 Plans:* Continue to mitigate CEMA threats for SINCGARS/WREN, mitigate interference affects & coordinated EW and communications threats, and develop EW Enabled cyber capabilities *FY 2019 to FY 2020 Increase/Decrease Statement:* Decrease due cancellation of SRW Integration / Enhancements			
Title: Waveforms Software Support & Systems Engineering *Description:* PdM Waveforms software support and systems engineering for waveforms and network manager applications provide the following: - Identification and documentation of development requirements to meet warfighter capability gaps. - Documentation of code development. - Provides current status of open defects and necessary code baseline fixes by severity. - Maintain an integrated master schedule (IMS), including significant reviews, events, and required product delivery dates. - Risk Management execution through the Risk Review Board (RRB). - Configuration Management of waveform product baselines and changes via the Configuration Control Board (CCB). - Technical interface to pertinent stakeholders across PM TR and PEO C3T. - Provide necessary assistance and oversight to Waveforms product specific engineering. *FY 2019 Plans:* Continue software support and systems engineering efforts as described above in support of PdM Waveforms. *FY 2020 Plans:* Continue software support and systems engineering efforts as described above in support of PdM Waveforms *FY 2019 to FY 2020 Increase/Decrease Statement:*	2.691	2.524	2.912

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*	**Project (Number/Name)** EX6 / *Waveforms*	

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Increase due to software engineering support.			
Title: Waveforms Testing & Evalution	2.491	2.643	7.094
Description: Waveforms Testing and Evaluation insures the following: - compatibility with current components - integrations with appropriate subsystems - validation of waveform performance including Anti-jam capability, spectral efficiency, and Network optimization - compliance with current security verification requirements NSA and JTeL IA certifications - compliance with current military standard documentation - interoperability with joint systems *FY 2019 Plans:* Continue testing and evaluation procedures for waveforms code development and defect fixes to insure tactical waveforms meet warfighter requirements. *FY 2020 Plans:* Conduct testing and evaluation procedures for continued code development and defect fixes of Government-owned waveforms and perform evaluation and characteristics analysis of commercial waveforms for potential Government utilization to meet warfighter requirements. *FY 2019 to FY 2020 Increase/Decrease Statement:* Increase due to performing evaluation and characteristics analysis of commercial waveforms.			
Title: FY 2019 SBIR/STTR Transfer	-	1.128	-
Description: Accounting for SBIR/STTR Transfer *FY 2019 Plans:* Accounting for SBIR/STTR Transfer *FY 2019 to FY 2020 Increase/Decrease Statement:* Accounting for SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	28.756	30.778	25.484

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Army		**Date:** March 2019
Appropriation/Budget Activity 2040 *I* 5	**R-1 Program Element (Number/Name)** PE 0605031A *I Joint Tactical Network (JTN)*	**Project (Number/Name)** EX6 *I Waveforms*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

PdM Waveforms is responsible for common core activities including developing and updating legacy and analyzing advance network waveforms that operate on multiple radios sets and in all operational environments that support network-centric operational warfare. Waveform developments (upgrading, developing, and maintaining) will generally be procured through full and open contract competitions.

Beginning in FY19, while maintaining legacy networking waveforms, PdM Waveforms implemented a pivoting strategy which focuses on vetting and analyzing commercial/ NDI waveforms. The Product Office has established great working relationships with Industry Partners within the waveform market. The strategy consist of conducting upfront analysis on commercial waveforms to inform Senior Leaders before a porting decision is made.

E. Performance Metrics

N/A

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2020 Army				**Date:** March 2019
Appropriation/Budget Activity 2040 / 5		**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*		**Project (Number/Name)** EX6 / *Waveforms*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support - CORE	MIPR	CORE : APG, MD	-	0.455		-		-		-		-	0.000	0.455	-
Program Management Support - Matrix	MIPR	CERDEC : APG, MD	0.232	0.529		0.539	Jan 2019	0.550	Jan 2020	-		0.550	Continuing	Continuing	Continuing
Program Management Support - MITRE	MIPR	MITRE : Aberdeen, MD	0.561	-		-		-		-		-	0.000	0.561	Continuing
Program Management Support - SETA	MIPR	Booz Allen Hamilton & Engeering Solutions & Products LLC : Riverside MD/ Chantilly, VA	-	2.788		2.513	Nov 2018	2.588	Nov 2019	-		2.588	Continuing	Continuing	Continuing
		Subtotal	0.793	3.772		3.052		3.138		-		3.138	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development- SRW/WREN	C/CPFF	Harris : Rochester, NY	0.997	-		-		-		-		-	0.000	0.997	-
Software Development- SRW	C/CPFF	Various/TBD : APG, MD	0.920	-		-		-		-		-	0.000	0.920	-
Software Development - WNW	MIPR	SSC Atlantic : Charleston, SC	0.567	-		-		-		-		-	0.000	0.567	-
Software Development - CERDEC	MIPR	CERDEC : APG, MD	1.008	6.116		6.489		6.619		-		6.619	Continuing	Continuing	Continuing
Software Development - Technical/Coding (MA-IDIQ)	C/CPAF	MA - IDIQ : Various Locations	-	12.434		13.283		5.721		-		5.721	Continuing	Continuing	Continuing
Software Development - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	1.253		1.329		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR & STTR Transfer	TBD	TBD : TBD	-	-		1.128		-		-		-	Continuing	Continuing	Continuing
		Subtotal	3.492	19.803		22.229		12.340		-		12.340	Continuing	Continuing	N/A

Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2020 Army													**Date:** March 2019	
Appropriation/Budget Activity 2040 / 5							**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*						**Project (Number/Name)** EX6 / *Waveforms*	

Support ($ in Millions)				**FY 2018**		**FY 2019**		**FY 2020 Base**		**FY 2020 OCO**		**FY 2020 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 Support - SRW/ WREN	MIPR	CERDEC : APG, MD	0.194	0.753		-		1.125		-		1.125	0.000	2.072	-
Software Support - SRW	C/CPFF	Harris : Rochester, NY	0.306	-		-		-		-		-	0.000	0.306	-
Software Support - WNW	MIPR	SSC LANT : Charleston, SC	0.614	-		-		-		-		-	0.000	0.614	-
Software Support - WNW	C/CPFF	Various/TBD : APG, MD	0.862	-		-		-		-		-	0.000	0.862	-
Systems Engineering - MITRE	MIPR	MITRE : APG, MD	-	0.459		1.286		0.621		-		0.621	Continuing	Continuing	Continuing
Systems Engineering - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	1.479		1.569		1.166		-		1.166	Continuing	Continuing	Continuing
		Subtotal	1.976	2.691		2.855		2.912		-		2.912	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)				**FY 2018**		**FY 2019**		**FY 2020 Base**		**FY 2020 OCO**		**FY 2020 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**
Test and Evaluation Support (SRW RIL)	MIPR	CERDEC : APG, MD	0.146	-		-		-		-		-	0.000	0.146	-
Test and Evaluation Support (WNW RIL)	MIPR	SSC Atlantic : Charleston, SC	0.347	-		-		-		-		-	0.000	0.347	-
Test and Evaluation - CERDEC	MIPR	CERDEC : APG, MD	-	2.052		2.177		2.220		-		2.220	Continuing	Continuing	Continuing
Test and Evaluation - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	0.438		0.465		-		-		-	Continuing	Continuing	Continuing
Test and Evaluation - Commercial Waveforms	MIPR	SSC LANT : Charleston, SC	-	-		-		4.874		-		4.874	Continuing	Continuing	Continuing
		Subtotal	0.493	2.490		2.642		7.094		-		7.094	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army									**Date:** March 2019

| Appropriation/Budget Activity
2040 / 5 | | R-1 Program Element (Number/Name)
PE 0605031A / Joint Tactical Network (JTN) | | | Project (Number/Name)
EX6 / Waveforms | | | | |

	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	6.754	28.756	30.778	25.484	-	25.484	Continuing	Continuing	N/A

Remarks

Exhibit R-4, **RDT&E Schedule Profile:** PB 2020 Army | **Date:** March 2019
| |
Appropriation/Budget Activity
2040 / 5 | **R-1 Program Element (Number/Name)**
PE 0605031A / *Joint Tactical Network (JTN)* | **Project (Number/Name)**
EX6 / *Waveforms*

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Trade Studies		1 Trade Studies																										
Trade Studies Complete		2 Trade Studies Complete																										
MA - IDIQ Award			3 MA - IDIQ Award																									
Warrior Robust Enhanced Network (WREN) Transition								4 WREN Transition (From S&TCD)																				
SINCGARS Waveforms 3.0											6 SINC 3.0 Release																	
Enterprise Over The Air Management (eOTAM) 2.0											5 eOTAM 2.0 Release																	
Warrior Robust Enhanced Network (WREN) Waveform 2.0													7 WREN 2.0 Release														
Enterprise Over The Air Management (eOTAM) 2.1																		8 eOTAM 2.1 Release									
SINCGARS Waveforms 4.0																						9 SINC 4.0 Release					
Warrior Robust Enhanced Network (WREN) Waveform 2.1																									10 WREN 2.1 Release		

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605031A / *Joint Tactical Network (JTN)*	**Project (Number/Name)** EX6 / *Waveforms*		

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Trade Studies	2	2018	2	2018
Trade Studies Complete	2	2018	2	2018
MA - IDIQ Award	3	2018	3	2018
Warrior Robust Enhanced Network (WREN) Transition	4	2019	4	2019
SINCGARS Waveforms 3.0	4	2020	4	2020
Enterprise Over The Air Management (eOTAM) 2.0	3	2020	3	2020
Warrior Robust Enhanced Network (WREN) Waveform 2.0	1	2021	1	2021
Enterprise Over The Air Management (eOTAM) 2.1	3	2022	3	2022
SINCGARS Waveforms 4.0	1	2023	1	2023
Warrior Robust Enhanced Network (WREN) Waveform 2.1	1	2024	1	2024

Note
 Warrior Robust Enhanced Network (WREN)