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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army										Date: February 2018		
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 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	-	16.430	44.150	41.972	-	41.972	29.954	26.754	28.449	26.813	0.000	214.522
EF5: Joint Tactical Network (JTN)	-	9.676	14.210	11.156	-	11.156	4.466	3.558	3.324	5.565	0.000	51.955
EX6: Waveforms	-	6.754	29.940	30.816	-	30.816	25.488	23.196	25.125	21.248	0.000	162.567

Note

In FY 2013, Joint Tactical Networks (JTN) was funded in the Navy Program Element (PE) 0604280N (Joint Tactical Radio System (JTRS)), Project No.3076 (formally known as JTRS Network Enterprise Domain (JNED)). JNED was renamed JTN and the Joint Executive Program Office (JPEO) JTRS transitioned to the JTNC in FY 2013, in accordance with the Acquisition Decision Memorandum (ADM) dated 11 July 2012. FY 2013 and FY 2014 JTNC funding was provided by the JTN Program via PE 0604280N and PE 0605030A, respectively.

As per the JTNC ADM dated 20 January 2014, JTN and JTNC became separate entities and PE 0605031A (Project Code EF5) was created for JTN. The 2014 ADM also directed that the waveform development and sustainment responsibilities transition to the Services in 4QFY15. PdM Waveforms transitioned to PM TR; PdM Joint Enterprise Network Manager (JENM) transitioned to PEO C3T PM Warfighter Information Network-Tactical (WIN-T) PdM Tactical Cyber and Network Operations (TCNO); and Mobile User Objective System (MUOS) and Link16 transitioned to the Navy. For FY 2015 and out, the Army PE 0605031 contains only the JTN (Waveforms & JENM) RDT&E funding.

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

A. Mission Description and Budget Item Justification

Joint Tactical Networks (JTN) efforts are executed by PdM Waveforms and JENM. They are responsible for the portable, interoperable, mobile ad hoc networking waveforms and network enterprise services to enhance tactical warfighting capabilities. PdM Waveforms and JENM applications are: (1) Interoperable - among all Services, capable of operating in a variety of hardware items, for both Program of Record and commercial Non-Developmental Item (NDI) radios; (2) Secure - meet all DoD and US Government information assurance requirements; (3) Operationally relevant - quickly and effectively meet evolving network mission requirements of Combatant Commanders and the Services; (4) Affordable - drive down procurement and support costs via a robust, competitive Non-Developmental Item (NDI) market which adheres to open government standards.

In accordance with the Joint Tactical Networking Center (JTNC) Acquisition Decision Memorandum (ADM) and Charter dated 20 January, 2014, the JTN active efforts include Waveforms and JENM. Due to PdM Waveforms extensive knowledge and expertise, PdM Waveforms will continue to enhance, update, and sustain the following Legacy Waveforms on a reimbursable basis: the High Frequency (HF) waveform, the merged HAVE QUICK II (HQII) and Very High Frequency (VHF)/Ultra High

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Frequency (UHF) Line of Sight (VULOS) waveforms, the Joint Tactical Radio System (JTRS) Bowman waveform (JBW), the Single Channel Ground and Airborne Radio System (SINCGARS) waveform and the UHF Satellite Communications (SATCOM) waveform.						
EF5 project: The Joint Enterprise Network Manager (JENM) software provides the ability to plan, monitor, configure and control the Army's Software Defined Radio (SDR) communication networks. JENM configures numerous SDR 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), Wideband Networking Waveform (WNW), 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.						
EX6 project: Beginning in FY 2018, based on the results of the FY 2017 Army Network Analysis, the EX6 project will refocus efforts to improve waveforms for lower and mid-tier networks. The effort will focus 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.						
FY 2019 Base RDTE dollars in the amount of \$41.972 million supports the continued development of the Waveforms and JENM, testing support and the program management office.						
B. Program Change Summary (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget		16.014	44.150	41.175	-	41.175
Current President's Budget		16.430	44.150	41.972	-	41.972
Total Adjustments		0.416	0.000	0.797	-	0.797
• Congressional General Reductions		-	-			
• Congressional Directed Reductions		-	-			
• Congressional Rescissions		-	-			
• Congressional Adds		-	-			
• Congressional Directed Transfers		-	-			
• Reprogrammings		1.008	-			
• SBIR/STTR Transfer		-0.592	-			
• Other Adjustments 1 - Waveforms		-	-	2.362	-	2.362
• Other Adjustments 2 - JENM		-	-	-1.565	-	-1.565
Change Summary Explanation						
\$.592 million of FY 2017 reduction for SBIR / STTR Transfer.						

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<p>\$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.</p> <p>(-\$2.435) million of FY 2019 RDTE funds were reduced for JENM development IAW tactical radio requirement updates.</p> <p>In accordance with the signed JTNC ADM and Charter dated 20 January 2014, Program Element (PE) 0605031A was established to execute JTN requirements in PB2015. FY 2015 was the first year funds were aligned to that PE. The Army has aligned their Service share of JENM and Waveform funding fully within the JTN PE for PB 2016. The Navy and Air Force funding for the JENM joint requirements remains in Navy PE 0605030N (shared) and Air Force PE 0605030F (shared). As part of the joint program budget strategy, each Military Department (MILDEP) budgets for approximately one-third of the total program RDT&E funds for joint efforts. Prior to the year of execution, the funding is consolidated in the Army PE for execution.</p>		

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
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 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
EF5: Joint Tactical Network (JTN)	-	9.676	14.210	11.156	-	11.156	4.466	3.558	3.324	5.565	0.000	51.955
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note 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: FY18 - \$1.407M; FY19 - \$1.118M; FY20 - \$1.121M; FY21 - \$1.139M and FY22 - \$1.392M.												
A. Mission Description and Budget Item Justification The Joint Enterprise Network Manager (JENM) software provides the ability to plan, monitor, configure and control the Army's Software Defined Radio (SDR) communication networks. JENM configures numerous SDR 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), Wideband Networking Waveform (WNW), 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. In accordance with the JTNC ADM and Charter dated 20 January 2014, the JTN active efforts include the SRW, the WNW and the JENM. FY 2019 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 2017	FY 2018	FY 2019	
Title: JENM Program Office Support									1.551	1.534	1.596	
Description: Program Management Office support in the development of the JENM system.												
FY 2018 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 emerging Integrated Network Operations (INO) vision, JENM will lower and mid-tier Network Management with that of WIN-T to enable Soldiers the ability to manage the entire, consolidated, tactical network. JENM will also work to extend our Over-The-Air-Management (OTAM)												

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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)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
capabilities to the mounted environment through our participation with Dynamic Network Connectivity development. Program Office Support funding will also support US Navy Digital Modular Radio (DMR) enhancements, ARC 210/231 development, USMC and USAF 117G MUOS deployment, full-rate production HMS Radios, AMF airborne radio, and the integration of USMC terrestrial based waveform planning and management capability.JENM will also manage the completion of deferred program requirements. 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 2018 to FY 2019 Increase/Decrease Statement: Program Office Support costs slightly up in FY19 to support completion of deferred requirements.				
Title: JENM Development 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 2018 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 support US Navy Digital Modular Radio (DMR) enhancements, ARC 210/231 development, full-rate production HMS Radios, Aviation Small Tactical Terminal (STT), and Small Airborne Networking Radio (SANR) and the integration of USMC terrestrial based waveform planning and management capability. JENM will continue to support modifications to the SRW, WNW, SINCGARS, SATCOM, and Integrated Waveforms. JENM will also incorporate enhanced over the air management (OTAM)		8.125	9.946	8.984

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2017	FY 2018	FY 2019
capabilities for U.S. Army mid and lower tier waveforms along with continued integration of JENM capability within the WIN-T Network Management System (NMS) including automating critical interface for planning and configuring crypto solutions.					
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, WNW, MUOS, SINCGARS, SATCOM, and Integrated Waveforms. JENM will also manage the completion of deferred program requirements.					
FY 2018 to FY 2019 Increase/Decrease Statement: FY19 development costs decreased due to development level of effort tasks consistent with tactical radio requirements.					
Title: Test and Evaluation			-	2.730	0.576
Description: Test and Evaluation of JENM					
FY 2018 Plans: JENM will provide direct support to the FY18 Developmental and Operational Test (DT/OT) of the PdM HMS Full and Open Competition (FOC) for the next generation HMS Manpack radio. JENM will execute a Functional Qualification Test (FQT) / Developmental Test (DT) and applicable cyber security testing leading into the planned Network Integration Exercise (NIE) 18.2 event, of which JENM will also undergo an Operational Test (OT) assessment to ensure it continues to meet the needs of today's Soldiers.					
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 2018 to FY 2019 Increase/Decrease Statement: Schedule updates for the Rifleman/Leader radio test requirements have resulted in decreased JENM test requirements for FY19					
Accomplishments/Planned Programs Subtotals			9.676	14.210	11.156

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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
• 0605031N: 0605031N; JTN, RDTE,N	-	2.800	2.617	-	2.617	2.677	2.705	1.747	-	Continuing	Continuing
• 0605031F: 0605031F; JTNC, RDTE,F	6.427	4.691	3.735	-	3.735	3.798	3.844	3.910	3.979	Continuing	Continuing
Remarks											
PE 0605031A contains only the JTN (PdM Waveforms and PdM TCNO (JENM)) RDTE funding.											
In accordance with the Acquisition Decision Memorandum (ADM) dated 11 July 2012, the Joint Tactical Radio System (JTRS) Program of Records (PORs) transitioned to Military Department (MILDEP) managed programs. As per the ADM dated 20 January 2014, JTN and JTNC became separate entities. FY 2015 and out, Army PE 0605031 contains only the JTN RDT&E funding. For FY2018 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,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: FY18 - \$1.407M; FY19 - \$1.118M; FY20 - \$1.121M; FY21 - \$1.139M and FY22 - \$1.392M.											
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).											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
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 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
JENM Program Management Support	C/CPFF	G2 Software Systems : San Diego, CA	-	0.809	Nov 2016	0.636	Nov 2017	0.650	Nov 2018	-		0.650	0.000	2.095	-
JENM Program Management Support	C/CPIF	Pending Contract Award : Aberdeen, MD	-	0.348	Nov 2016	-		-		-		-	0.000	0.348	-
JENM Program Management Support	Allot	USAASC : Aberdeen, MD	-	0.116	Oct 2016	-		-		-		-	Continuing	Continuing	Continuing
JENM Program Management Support	MIPR	SSC PACIFIC : San Diego, CA	-	0.238	Oct 2016	0.898	Oct 2017	0.946	Oct 2018	-		0.946	0.000	2.082	-
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			2.356	1.511		1.534		1.596		-		1.596	Continuing	Continuing	N/A
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
JENM NMRIL Development	C/CPFF	G2 Software Systems : San Diego, CA	-	0.992	Nov 2016	-		-		-		-	0.000	0.992	-
JENM NMRIL Development	C/CPFF	Pending Contract Award : Aberdeen, MD	-	0.875	Nov 2016	-		-		-		-	0.000	0.875	-
JENM NMRIL Development	MIPR	SSC PACIFIC : San Diego, CA	-	1.741	Oct 2016	9.946	Oct 2017	8.984	Oct 2018	-		8.984	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

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
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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
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
Subtotal			26.713	3.608		9.946		8.984		-		8.984	Continuing	Continuing	N/A
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
JENM v3 Software Support	C/CPFF	G2 Software Systems : San Diego, CA	-	0.350	Nov 2016	-		-		-		-	0.000	0.350	-
JENM v3 Software Support	C/CPFF	Pending Contract Award : Aberdeen, MD	-	0.537	Nov 2016	-		-		-		-	Continuing	Continuing	Continuing
JENM v3 Software Support	MIPR	SSC PACIFIC : San Diego, CA	-	0.582	Oct 2016	-		-		-		-	Continuing	Continuing	Continuing
Development/Engineering/ Technical Support	C/CPFF	Various : various	1.855	0.343		-		-		-		-	0.000	2.198	1.985
Subtotal			1.855	1.812		-		-		-		-	Continuing	Continuing	N/A







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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)					
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
JENM v3 System Engineering and Test	MIPR	SSC PACIFIC : San Diego, CA	-	1.104	Oct 2016	1.193	Oct 2017	0.013	Oct 2018	-		0.013	Continuing	Continuing	Continuing
JENM v3 System Engineering and Test	MIPR	NM RIL : San Diego, CA	-	1.641	Nov 2016	1.537	Nov 2017	0.563	Oct 2018	-		0.563	0.000	3.741	-
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			7.171	2.745		2.730		0.576		-		0.576	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			38.095	9.676		14.210		11.156		-		11.156	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>	Project (Number/Name) EF5 / <i>Joint Tactical Network (JTN)</i>
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Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
FY2018 JENM Software Development and Release					FY2018 JENM Software Development and Release																							
JENM FQT FY18																												
					JENM FQT FY18																							
FY2020 JENM Software Development and Release									FY2020 JENM Software Development and Release																			
JENM FQT FY20																												
													JENM FQT FY20															
FY2022 JENM Software Development and Release																												
JENM FQT FY22																												
																									JENM FQT FY22			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>	Project (Number/Name) EF5 / <i>Joint Tactical Network (JTN)</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FY2018 JENM Software Development and Release	2	2017	2	2018
JENM FQT FY18	2	2018	2	2018
FY2020 JENM Software Development and Release	2	2018	1	2020
JENM FQT FY20	2	2020	2	2020
FY2022 JENM Software Development and Release	1	2020	1	2022
JENM FQT FY22	1	2023	1	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
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 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
EX6: Waveforms	-	6.754	29.940	30.816	-	30.816	25.488	23.196	25.125	21.248	0.000	162.567
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

PdM Waveforms delivers, maintains, and upgrades portable, interoperable, mobile ad hoc 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:

- Engage industry to assess options for Low Probability of Interception/Low Probability of Detection (LPI/LPD) waveforms to reduce the signature of the tactical network
- Pursue alternative waveforms to reduce the complexity of MANET waveforms
- 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 2019 Base RDTE dollars in the amount of \$30.816 million supports the continued development of the waveforms, testing support, and the program management office.

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

	FY 2017	FY 2018	FY 2019
Title: Program Management Office Support	0.793	3.772	3.383
Description: Provides Program Management Office (PMO) support for Waveforms enhancements.			
As a result of the Waveforms strategy moving forward, Waveforms will not be participating in the RMD process and will not utilize O&M funding aside from Core labor costs.			
For FY18, PMO costs include Core, Matrix, and SETA Contract labor. For FY19, PMO costs include Matrix and SETA Contract Labor only, as Core labor will be paid out of O&M funds.			
FY 2018 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
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 2017	FY 2018	FY 2019
Continue program management support for PdM Waveforms. FY 2019 Plans: Continue program management support for PdM Waveforms. FY 2018 to FY 2019 Increase/Decrease Statement: Funding Decrease - staff reduction due to reorganization				
Title: Wideband Networking Waveform (WNW) Development Description: WNW is a high data rate Mobile Adhoc Networking (MANET) waveform application that provides the Army?s mid-tier tactical Internet backbone (transit network) and connects tactical forces during Unified Land Operations, particularly in Denied, Degraded, Disrupted, Space Operational Environment (D3SOE). WNW provides high throughput, dynamically adaptable connectivity for the secure exchange of IP based voice, data, and video traffic. WNW has two signals-in-space (SiS), whichare the Orthogonal Frequency Division Multiplexing (OFDM) and Anti-Jam (AJ), each with multiple bandwidths. WNW supports network nodes on mobile, airborne, and maritime platforms. WNW includes Type 1 Encryption, networking services, High Assurance IP Equipment (HAPE) capabilities, red/black switching, and internal routing of other WNW signals. WNW is currently ported on 7 radio platforms with 5 different vendors.		2.422	-	-
Title: Soldier Radio Waveform (SRW) Description: Soldier Radio Waveform (SRW) will operate on tactical radio sets to provide a networked battlefield communications capability for users engaged in land combat operations and will support voice, data, and video communications on the immediate battlefield. These forces include vehicles, rotary wing aircraft, dismounted Soldiers, and unmanned aerial vehicles (UAV). Functional software applications will use SRW radio enabled sets over Internet Protocol (IP) capable networks and sub-networks. SRW will be interoperable with higher throughput, IP based network waveforms, such as Wideband Networking Waveform (WNW). As applicable, these IP-based networking waveforms will enable information exchanges through the Global Information Grid (GIG) to the Soldier and provide entirely new capabilities for battlefield communications and information sharing. SRW is currently ported on 21 different radio platforms with 9 different vendors.		2.531	-	-
Title: Waveforms Software Development 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:		1.008	20.986	22.266

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>		Project (Number/Name) EX6 / <i>Waveforms</i>	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2017	FY 2018	FY 2019
<ul style="list-style-type: none"> - Cyberspace and Cybersecurity Operations * Focused on IP traffic (data) * Intrusion Detection and Intrusion Prevention of Army networks within Tactical Radio platforms (HMS, AMF, MNVR) - Electronic Warfare (EW) * Focused on Radio Frequency (RF/voice) * Electronic Attack (EA) * Electronic Protection (EP) * Includes Anti-jam protection and deployment - Spectrum Management Operations (SMO). * Development of capabilities for the warfighter to maintain communication in spectrum denied environments. <p>2. SINCGARS Development of a Frequency Hopping (FH3) mode, which will address the adversary's EA capabilities. Development of transmission security protocols.</p> <p>3. SRW & SRW Narrowband Integration Development of SRW Narrowband and the integration of Narrowband Code into the SRW baseline support the following warfighter capability gaps:</p> <ul style="list-style-type: none"> - Availability of adequate spectrum to deploy a full Brigade Combat Team of subnets is increasingly becoming a problem in combat environments. - Maintaining longer distances between communication nodes - Maintaining communication capabilities in foliage-heavy environments. - Operation in VHF and UHF bands with narrower bandwidths. <p>FY 2018 Plans:</p> <ul style="list-style-type: none"> - Transition SINCGARS Reference Implementation Laboratory (RIL) to CERDEC Ultra Lab - Complete trade studies addressing CEMA threats - Mitigate CEMA threats - Mitigate interference affects & coordinated EW and communications threats - Develop EW Enabled cyber capabilities <p>FY 2019 Plans:</p> <ul style="list-style-type: none"> - Mitigate CEMA threats 					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>		Project (Number/Name) EX6 / <i>Waveforms</i>	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2017	FY 2018	FY 2019
<ul style="list-style-type: none"> - Mitigate interference affects & coordinated EW and communications threats - Develop EW Enabled cyber capabilities 					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to SRW Narrowband requirements					
Title: Waveforms Software Support & Syatems Engineering Description: Beginning in FY18, due to a refocused product strategy, Waveforms will eliminate annual engineering releases and efforts will no longer be categorized and organized by product. Future work will be separated into Systems Engineering, Software Development, and Test and Evaluation categories. PdM Waveforms software support and systems engineering for waveforms and network manager applications provide the following: <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> * Risk identification and assessment * Risk mitigation planning and execution * Risk documentation - Configuration Management of waveform product baselines and changes via the Engineering Review Board (ERB) and two Configuration Control Board (CCBs). - Technical interface to pertinent stakeholders across PM TR and PEO C3T. - Provide necessary assistance and oversight to Waveforms product specific engineering. 			-	2.691	2.524
FY 2018 Plans: Continue software support and systems engineering efforts as described above in support of PdM Waveforms.					
FY 2019 Plans: Continue software support and systems engineering efforts as described above in support of PdM Waveforms.					
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease due to reduction in Software support.					
Title: Waveforms Testing & Evalution Description: Waveforms Testing and Evaluation insures the following:			-	2.491	2.643

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>			Project (Number/Name) EX6 / <i>Waveforms</i>				
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019		
<ul style="list-style-type: none"> - compatibility with current components - integrations with appropriate subsystems - validation of waveform performance - compliance with current security verification requirements * NSA and JTeL IA certifications - compliance with current military standard documentation - interoperability with joint systems <p><i>FY 2018 Plans:</i> Continue testing and evaluation procedures for waveforms code development and defect fixes to insure tactical waveforms meet warfighter requirements.</p> <p><i>FY 2019 Plans:</i> Continue testing and evaluation procedures for waveforms code development and defect fixes to insure tactical waveforms meet warfighter requirements.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Increase due to additional waveform testing requirements.</p>											
Accomplishments/Planned Programs Subtotals							6.754	29.940	30.816		
C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 4326750A: 4326750A: JTN, O&M, A	10.278	-	0.000	-	0.000	-	-	-	-	0.000	10.278
Remarks											
For FY 2017 and prior, PdM Waveforms utilized OMA funding to support annual maintenance releases. Beginning in FY 2018, PdM Waveforms' refocused strategy assumes major upgrades to accommodate emerging warfighter needs. This strategy will eliminate the need for OMA funding. Therefore, RDTE funding increases.											
D. Acquisition Strategy											
PdM Waveforms is responsible for common core activities including developing and updating legacy and networking 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 FY 2018, based on the results of the FY 2017 Army Network Analysis, PdM Waveforms will refocus efforts to improve waveforms for lower and mid-tier networks. The effort will focus on development to achieve improved performance, network simplification, improved spectrum efficiency and improved EW/Cyber											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>	Project (Number/Name) EX6 / <i>Waveforms</i>
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 FY 2020-2021 to support future tactical radio procurements.		
<u>E. Performance Metrics</u> N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity						R-1 Program Element (Number/Name)				Project (Number/Name)					
2040 / 5						PE 0605031A / Joint Tactical Network (JTN)				EX6 / Waveforms					
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 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	-		0.539	Continuing	Continuing	Continuing
Program Management Support - MITRE	MIPR	MITRE : Aberdeen, MD	-	0.561		-		-		-		-	0.000	0.561	-
Program Management Support - SETA	MIPR	Booz Allen Hamilton : Riverside, MD	-	-		2.788		2.513	Jun 2019	-		2.513	Continuing	Continuing	Continuing
Subtotal			-	0.793		3.772		3.052		-		3.052	Continuing	Continuing	N/A
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-SRW	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		-		6.489	Continuing	Continuing	Continuing
Software Development - Technical/Coding (MA-IDIQ)	C/CPAF	MA - IDIQ : Various Locations	-	-		13.618		14.449		-		14.449	Continuing	Continuing	Continuing
Software Development - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	-		1.253		1.329		-		1.329	Continuing	Continuing	Continuing
Subtotal			-	3.492		20.987		22.267		-		22.267	Continuing	Continuing	N/A

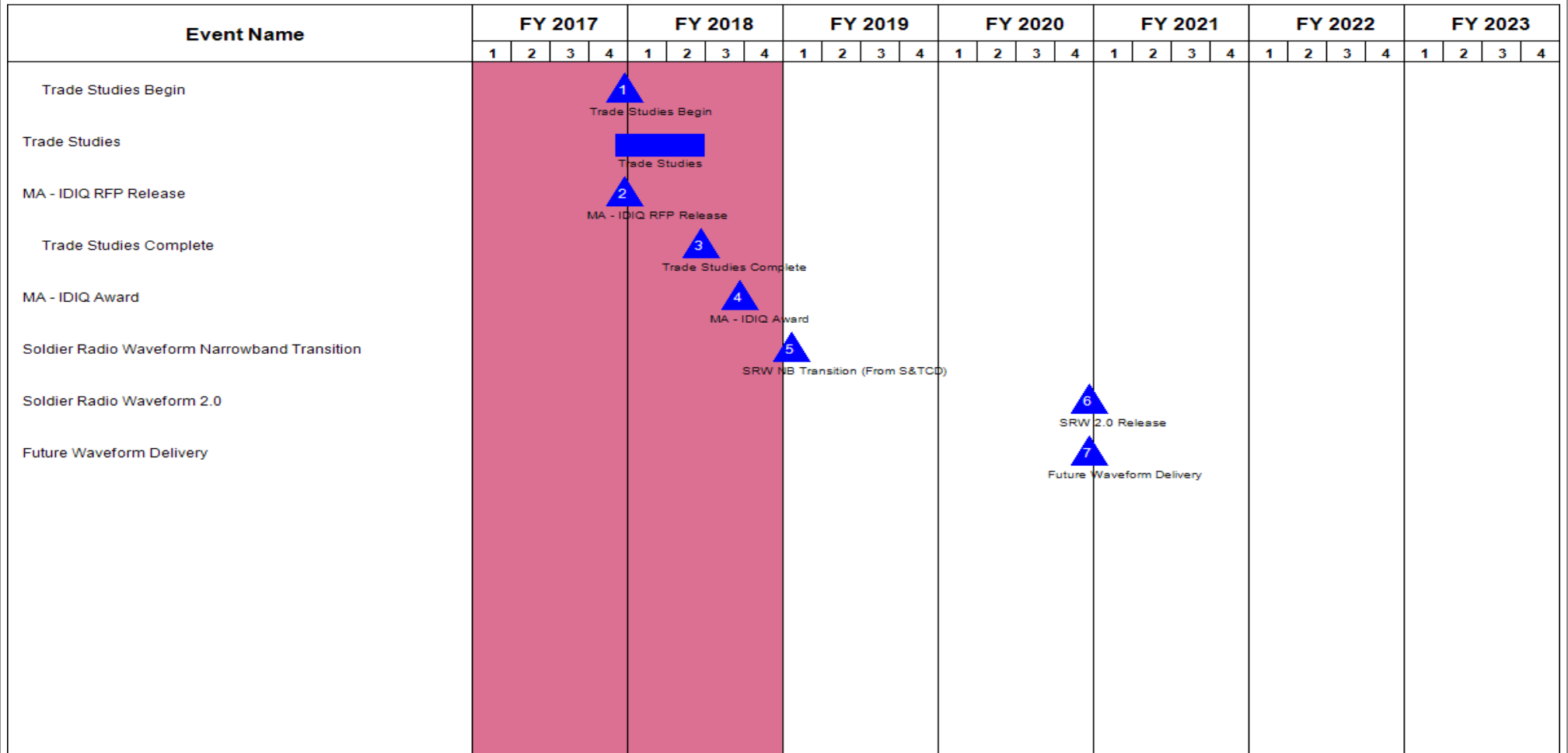
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0605031A / Joint Tactical Network (JTN)				Project (Number/Name) EX6 / Waveforms					
Support (\$ in Millions)				FY 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 Support - SRW	MIPR	CERDEC : APG, MD	-	0.194		-		-		-		-	0.000	0.194	-
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	-	-		1.212		1.286		-		1.286	Continuing	Continuing	Continuing
Systems Engineering - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	-		1.479		1.569		-		1.569	Continuing	Continuing	Continuing
Subtotal			-	1.976		2.691		2.855		-		2.855	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
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		-		2.177	Continuing	Continuing	Continuing
Test and Evaluation - SSC LANT	MIPR	SSC LANT : Charleston, SC	-	-		0.438		0.465		-		0.465	Continuing	Continuing	Continuing
Subtotal			-	0.493		2.490		2.642		-		2.642	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	6.754		29.940		30.816		-		30.816	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605031A / <i>Joint Tactical Network (JTN)</i>	Project (Number/Name) EX6 / <i>Waveforms</i>
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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Trade Studies Begin	4	2017	4	2017
Trade Studies	4	2017	2	2018
MA - IDIQ RFP Release	4	2017	4	2017
Trade Studies Complete	2	2018	2	2018
MA - IDIQ Award	3	2018	3	2018
Soldier Radio Waveform Narrowband Transition	1	2019	1	2019
Soldier Radio Waveform 2.0	4	2020	4	2020
Future Waveform Delivery	4	2020	4	2020

Note

Due to MNVR AoA and changing requirements regarding the Army Tactical Network, PdM Waveforms has eliminated annual engineering software releases into the IR.