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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)							
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	722.985	321.186	252.834	329.948	0.000	329.948	160.139	47.178	71.686	116.771	543.700	2,566.427
643833: MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP	722.985	321.186	252.834	329.948	0.000	329.948	160.139	47.178	71.686	116.771	543.700	2,566.427
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 447

Note

Prior Year Joint Service System Management Office (JSSMO) funding was removed from Prior Years Cost Exhibit and from R3.

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based radio Positioning, Navigation, and Timing (PNT) distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, and other related equipment, grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by the Department of Defense (DoD). Research, Development, Test and Evaluation (RDT&E) funds UE development, integration, test, and analysis for new PNT receiver capabilities in Navigation Warfare (NAVWAR) across all military platforms using GPS services.

The Military Global Positioning System User Equipment (MGUE) Increment (Inc) 1 program is responsible for the development of standard modernized receiver form factors for the Service-nominated lead platforms. The MGUE Inc 1 Capability Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) on 24 July 2014. MGUE Inc 1 is initiating a new family of modernized GPS receivers that will deliver significantly improved capability to counter current and emerging PNT threats and enable military operations in a NAVWAR environment where current legacy receiver performance would be compromised. MGUE Inc 1 received a Milestone A decision in April 2012. The program received direction in February 2014 from the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to execute a new acquisition strategy, accelerating the program to provide test units faster to facilitate military end users. The MGUE program received a Milestone B decision in January 2017.

The MGUE Inc 2 effort will continue to expand Military-Code (M-Code) receiver technology into additional applications (space receivers and precision guided munitions), and develop a modernized Handheld device to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while addressing the production of M-Code integrated circuits far into the future. The JROC approved the MGUE Inc 2 CDD on 6 April 2018. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two FY 2016 National Defense Authorization Act (NDAA) Section 804, Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface (MSI) Receiver Cards to include next generation Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.						
This Program Element (PE) may include necessary civilian pay expenses required to manage, execute, and deliver MGUE weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.						
Re-Phasing of GPS IIIF Buy Across FYDP saved \$34.800M in FY 2020. Re-Phasing of GPS IIIF Buy Across FYDP description: to align all GPS efforts across the enterprise in FY 2020, the Air Force realigned \$34.800M from Military Global Positioning System User Equipment Increment 1 to better synchronize the user segment with the current planned GPS launch schedule. All GPS program adjustments will fund higher priority space initiatives to improve lethality.						
As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.						
This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.						
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		253.939	286.629	240.748	0.000	240.748
Current President's Budget		321.186	252.834	329.948	0.000	329.948
Total Adjustments		67.247	-33.795	89.200	0.000	89.200
• Congressional General Reductions		0.000	-3.795			
• Congressional Directed Reductions		-10.000	-30.000			
• Congressional Rescissions		0.000	0.000			
• Congressional Adds		98.500	0.000			
• Congressional Directed Transfers		0.000	0.000			
• Reprogrammings		-9.346	0.000			
• SBIR/STTR Transfer		-11.907	0.000			
• Other Adjustments		0.000	0.000	89.200	0.000	89.200
Change Summary Explanation						
FY 2018: -\$10.000M Congressional decrease - funds early to Need MGUE Inc 1; +\$98.500M Congressional increase to Fund MGUE Inc 2; -\$9.346M for higher Air Force Space priorities.						

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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)		
FY 2019: -\$30.000M Congressional reduction to improve funds management				
FY 2020: +\$89.200M to fund MGUE Inc 1 to the Independent Cost Estimate (ICE) and Inc 2 to the Single Best Estimate (SBE)				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Title: MGUE Inc 1		118.790	98.016	53.506
Description: The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 CDD.				
FY 2019 Plans: Continue development, qualification testing and technical requirements verification. Complete initial security certification efforts. Continue to assist each lead platform office to integrate and test M-Code receivers in their respective platforms. Continue M-Code ASIC producibility analysis, risk reduction and early engineering, and perform engineering for Regional Military Protection (RMP) capabilities. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue activities that address MGUE ASIC obsolescence issues. Activities may include, but are not limited to, program office support, studies, technical analysis, prototyping, etc.				
FY 2020 Plans: Complete the following: Verification Testing, Qualification Testing, Technical Requirements Verification, Lead Platform Integration, and Card level Program Executive Officer Certification for Operational Test and Evaluation (OT&E). Continue to assist each lead platform office in integrating and testing M-Code receivers in their respective platforms. Continue M-Code ASIC producibility analysis, risk reduction, and early engineering. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue activities that address MGUE ASIC obsolescence issues. Activities may include, but are not limited to, program office support, studies, technical analysis, prototyping, etc.				
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 decreased compared to FY 2019 by \$44.510M. Justification for this decrease is described in plans above.				
Title: MGUE Inc 2		111.630	59.153	187.355
Description: The MGUE Inc 2 effort began in FY 2017 and will continue to develop M-Code receiver technology for additional applications (space receivers, precision guided munitions, and handheld receivers) to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while ensuring producibility of M-Code integrated circuits far into the future to support DoD PNT requirements.				
FY 2019 Plans:				

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Continue evaluation of next generation ASIC and receiver design, engineering, architecture, requirements and functional reviews with vendors. Award contracts for next generation ASIC preliminary design and formal reviews. Core ASIC technology, including but not limited to, ASIC components, tools, design libraries and building blocks will be identified and/or purchased. Characterization for military purposes (e.g. temperatures and environments) will be performed. Next generation ASIC design and prototyping activities will occur at the new foundry. Continue security certification planning activities. Continue contract documentation preparation and solicitation for development of a new low size/power receiver to include integration with the next generation ASICs. Award contracts for M-Code Handheld risk reduction efforts. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, market research, studies, technical analysis, prototyping, etc.</p> <p>FY 2020 Plans:</p> <p>Continue development of next generation ASIC and receivers, complete Preliminary Design Review (PDR), and purchase any remaining core ASIC technology and ASIC design/manufacturing/test support. Commence security certification evaluations and refine plans. Award development contract(s) for new low size/power receiver to include next generation ASIC post-PDR and integration activities. Continue M-Code Handheld risk reduction activities, to include prototype evaluations. Secure any remaining core ASIC technology and begin early ASIC fabrication and manufacturing activities. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p> <p>FY 2020 increased compared to FY 2019 by \$128.202M. Justification for this increase is described in plans above.</p>				
<p>Title: Advanced Technology</p> <p>Description: Advanced Technology includes efforts to mature technology for future GPS receivers called out in the MGUE CDDs. These efforts aim to find innovative solutions to increase resiliency in GPS performance and improve on size, weight, power, and cost (SWAP/C) of military receivers.</p> <p>FY 2019 Plans:</p> <p>Continue developing new technologies to augment United States (U.S.) military GPS receiver development. Deliver initial M-Code Government owned Intellectual Property (IP) for integration into both software defined radio (SDR) and ASIC implementations. Continue developing receiver capability to increase trust and integrity that might permit military use of other Global Navigation Satellite System (GNSS) signals for delivering assured PNT. Complete technical requirements documents (TRD) that define advanced antennas and antenna electronics, as well as integrated antenna electronics (AE) and receivers for size, weight, and power (SWAP) constrained platforms, which protects multi-GNSS solutions in a future NAVWAR environment. Continue</p>		13.041	8.500	5.097

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
assessment and development of advanced techniques and systems for jammer and spoofer identification and location across the GNSS bands to enhance situational awareness in a NAVWAR environment. FY 2020 Plans: Continue developing new technologies to augment U.S. Military GPS receiver development. Deliver first formal release of the M-Code Government owned IP for incorporation into vendor solutions, opening the M-Code market to additional participants, including simulator developers and small businesses. Develop test plans and procedures, perform testing and deliver reports on the incorporation of advanced trust / integrity algorithms that might permit military use of other GNSS signals for delivering assured PNT. Start the prototype development of an integrated antenna, AE and MGUE receiver suitable for protecting SWAP constrained platforms in a future NAVWAR environment. Identify and assess algorithms and hardware implementations for integration of enhanced anti-jam capability for SWAP constrained MGUE handheld receiver. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 decreased compared to FY 2019 by \$3.403M. Justification for this decrease is described in plans above.				
Title: System/Platform Integration and Performance Certification Description: Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration. FY 2019 Plans: Complete system level integration on ground-based Lead Platform efforts in support of developmental test. Continue Host Application Assembly (HAE) and system level integration for the air/maritime based Lead Platform efforts in support of developmental test. Continue lead platform integration efforts in support of operational test events. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms. FY 2020 Plans: Complete developmental test of the Ground-based lead platform efforts. Complete HAE and system level integration for the air/maritime based Lead Platform efforts in support of developmental test. Continue lead platform integration efforts in support of operational test events. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 decreased compared to FY 2019 by \$7.319M. Justification for this decrease is described in plans above.		67.486	78.115	70.796
Title: Information Assurance, Security/Compatibility Certification, and Test/Evaluation Description: Develop, implement, and maintain GPS security certification programs. Development of DoD Policy, Strategy & Resource Requirements for MGUE security certification and compatibility certification. Security certification, compatibility		10.239	9.050	13.194

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C. Accomplishments/Planned Programs (\$ in Millions)							FY 2018	FY 2019	FY 2020		
certification, and security approval ensures future military GPS receivers protect critical program information and continue working in all environments and concepts of operations called for by U.S. Strategic Command.											
FY 2019 Plans: Complete initial security certification efforts for MGUE receivers. Support lead platform integration and test activities. Continue Modernized Security Evaluations/Tests for Selective Availability Anti-Spoofing Module (SAASM) and other legacy GPS receiver equipment. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD.											
For the Ground Based-GPS Receiver Application Module-Military Code (GB-GRAM-M), complete the Technical Requirements Verification (TRV) for vendor A. Continue Phase 2 (Requirements Verification) and Phase 3 (Reliability) test activities for all vendors to include approved engineering changes. Continue Phase 4 (Lead Platform Integration) test activities for two of the GB-GRAM-M MGUE vendors. Accomplish Developmental Field LiveSky testing at White Sands Missile Range in an Electronic Warfare Environment.											
FY 2020 Plans: Continue to conduct security certification activities for all M-Code receivers, as required. Continue Modernized Security Evaluations/Tests for SAASM and other legacy GPS receiver equipment. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue to conduct delta certifications, as required. For the GB-GRAM-M complete the Technical Requirements Verification. Continue Requirements Verification and Reliability test activities as required to include approved engineering changes. Continue Lead Platform Integration test activities for the GB-GRAM-M MGUE vendors.											
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increased compared to FY 2019 by \$4.144M. Justification for this increase is described in plans above.											
Accomplishments/Planned Programs Subtotals							321.186	252.834	329.948		
D. 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
• SPAF 01 GPSSPC: Navstar GPS Space	2.159	2.181	0.000	-	0.000	2.259	2.305	2.349	2.408	0.000	13.661
Remarks Space Procurement, Air Force (SPAF) funding in this PE supports legacy SAASM efforts. Similar work for the MGUE is in the planning phase.											

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E. Acquisition Strategy The MGUE program has developed a comprehensive acquisition strategy to provide modernized GPS capabilities to U.S. and Allied Forces by developing a competitive market driven approach. This strategy establishes the signal compatibility and security criteria along with a process for evaluating components to enable rapid movement from development to fielding. The pillars of this effort are: (a) establishing time certain and low risk development; (b) bounding requirements to leverage mature technology to the maximum extent possible; (c) focusing on the development of form factors based on well-defined standards to support lead platform integration; and (d) implementing a proactive, collaborative MGUE platform integration activity to mitigate risk and reduce cost for DoD force structure modernization. The MGUE program awarded three sole source contracts for the Inc 1 Technology Development Phase effort in September 2012, as follow-on efforts to the competitively awarded Modernized User Equipment (MUE) contracts awarded in June 2006. The effort spans the Technology Maturation and Risk Reduction Phase through design and includes integration and test of M-Code receivers into Service-nominated lead platforms. This effort also includes the security and compatibility certification of GPS receiver cards as a part of the integration effort. The Service lead platforms will select from the available vendors to integrate and perform operational testing with funding from the MGUE program. This supports compliance with Public Law 111-383, section 913. The MGUE Inc 2 program developed an Acquisition Strategy to continue MGUE development by: addressing long term producibility of MGUE ASICs, identifying a U.S. owned trusted foundry for ASIC development, delivering GPS receiver cards to meet stringent Inc 2 requirements, and developing a modernized GPS handheld receiver to meet the needs of the Services. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two FY 2016 NDAA Section 804, Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes next generation ASIC) and 2) Joint, Modernized Handheld Receiver.		
F. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)				Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP					
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
MGUE Increment 1 Technology Development (Collins Aerospace)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	125.920	10.199	Nov 2017	15.404	Nov 2018	12.584	Nov 2019	-		12.584	5.270	169.377	169.377
MGUE Increment 1 Technology Development (Raytheon)	C/CPIF	Raytheon : El Segundo, CA	132.110	47.002	Nov 2017	18.000	Nov 2018	8.685	Nov 2019	-		8.685	5.232	211.029	211.029
MGUE Increment 1 Technology Development (L3)	C/CPIF	L3 : Anaheim, CA	74.915	21.720	Nov 2017	15.800	Nov 2018	5.364	Nov 2019	-		5.364	4.145	121.944	121.944
MGUE Increment 1 Pre- Tech Development	C/CPAF	Various : Various	33.888	13.041	Jan 2018	8.500	Jan 2019	5.097	Jan 2020	-		5.097	5.500	66.026	-
MGUE Increment 1 MGUE Demonstrations	C/CPFF	Various : Various	19.783	-		-		-		-		-	0.000	19.783	-
MGUE Increment 1 Platform Integration	C/CPAF	Various : Various	134.314	40.252	Nov 2017	62.554	Nov 2018	54.726	Nov 2019	-		54.726	8.445	300.291	-
MGUE Increment 1 Compatibility Certification	C/CPAF	Various : Various	11.158	-		-		-		-		-	0.000	11.158	-
MGUE Increment 1 Information Assurance	C/CPAF	Various : Various	17.954	2.715	Jan 2018	3.390	Jan 2019	2.706	Jan 2020	-		2.706	5.610	32.375	-
MGUE Increment 1 Security Certification	C/CPAF	Various : Various	28.374	3.000	Jan 2018	1.740	Jan 2019	1.756	Jan 2020	-		1.756	3.700	38.570	-
MGUE Increment 1 Technical Mission Analysis	MIPR	Various : El Segundo, CA	22.409	19.347	Oct 2017	18.017	Oct 2018	16.352	Oct 2019	-		16.352	17.457	93.582	-
MGUE Increment 1 Enterprise SE&I	C/CPAF	Engility : El Segundo, CA	33.323	27.234	Nov 2017	15.561	Nov 2018	16.070	Nov 2019	-		16.070	18.890	111.078	111.078
MGUE RMP	C/CPIF	Various : Various	0.000	-		15.400	Jan 2019	-		-		-	0.000	15.400	-
MGUE Increment 2 ASIC Development	Various	Various : Various	5.200	103.200	Mar 2018	50.753	Jan 2019	139.155	Jan 2020	-		139.155	698.319	996.627	-
MGUE Increment 2 Miniature Serial Interface (MSI) Development	C/CPIF	TBD : TBD	0.000	-		-		15.400	Nov 2019	-		15.400	48.972	64.372	64.372

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)				Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP					
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
MGUE Increment 2 Handheld Development	C/TBD	TBD : TBD	0.000	-		-		9.600	Nov 2019	-		9.600	30.528	40.128	40.128
MGUE Increment 2 Technical Mission Analysis	MIPR	Various : El Segundo, CA	0.000	2.510	Oct 2017	2.500	Oct 2018	4.100	Oct 2019	-		4.100	13.038	22.148	-
MGUE Increment 2 Enterprise SE&I	C/CPAF	Engility : El Segundo, CA	0.000	2.020	Nov 2017	2.000	Nov 2018	11.200	Nov 2019	-		11.200	35.616	50.836	50.836
Subtotal			639.348	292.240		229.619		302.795		-		302.795	900.722	2,364.724	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
MGUE Increment 1 Test and Evaluation	Various	Various : San Diego, CA	13.327	4.524	Jan 2018	3.920	Jan 2019	8.732	Jan 2020	-		8.732	1.220	31.723	-
Subtotal			13.327	4.524		3.920		8.732		-		8.732	1.220	31.723	N/A
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
MGUE Increment 1 FFRDC	Various	Various : Various	45.041	6.750	Dec 2017	5.073	Dec 2018	5.929	Dec 2019	-		5.929	5.642	68.435	-
MGUE Increment 2 FFRDC	Various	Various : Various	0.000	2.500	Dec 2017	2.500	Dec 2018	2.600	Dec 2019	-		2.600	8.268	15.868	-
MGUE Increment 1 A&AS	Various	Various : Various	24.070	13.360	Dec 2017	9.961	Dec 2018	4.163	Dec 2019	-		4.163	6.554	58.108	-
MGUE Increment 2 A&AS	Various	Various : Various	0.000	1.400	Dec 2017	1.400	Dec 2018	5.300	Dec 2019	-		5.300	16.854	24.954	-
MGUE Increment 1 and Increment 2 Other Support	Various	Various : Various	1.199	0.412	Dec 2017	0.361	Dec 2018	0.429	Dec 2019	-		0.429	0.240	2.641	-
Subtotal			70.310	24.422		19.295		18.421		-		18.421	37.558	170.006	N/A

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			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			722.985	321.186		252.834		329.948		-		329.948	939.500	2,566.453	N/A
Remarks Rockwell Collins was acquired by United Technologies Corp. and is now called Collins Aerospace Systems															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
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	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
MGUE Increment 1																												
MGUE Increment 1 Security Certification																												
MGUE Increment 1 Developmental Test																												
MGUE Increment 1 All Lead Platforms Operational Test																												
MGUE Increment 2																												
MGUE Increment 2 Next Gen ASIC Studies up to PDR																												
MGUE Increment 2 Handheld Risk Reduction Activities/Prototypes																												
MGUE Increment 2 Post PDR Development, Fabrication, Manufacturing, and Test																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MGUE Increment 1				
MGUE Increment 1 Security Certification	1	2018	2	2019
MGUE Increment 1 Developmental Test	1	2018	2	2020
MGUE Increment 1 All Lead Platforms Operational Test	2	2019	1	2022
MGUE Increment 2				
MGUE Increment 2 Next Gen ASIC Studies up to PDR	1	2018	4	2020
MGUE Increment 2 Handheld Risk Reduction Activities/Prototypes	3	2019	2	2023
MGUE Increment 2 Post PDR Development, Fabrication, Manufacturing, and Test	4	2020	4	2024

Note

Note: MGUE Increment 1 Security Certification refers to initial security certifications. Security Certifications activities such as delta certifications for all M-Code receivers will continue after FY19 as required.