Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force											Date: May 2017	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	-	49.954	41.632	14.263	0.000	14.263	4.000	1.934	0.000	0.000	0.000	111.783
657102: *Command & Control Sys-Consolidated (CCS-C)*	-	8.249	12.248	4.263	0.000	4.263	4.000	1.934	0.000	0.000	0.000	30.694
657107: *WGS Space Systems Resiliency Upgrade*	-	41.705	29.384	10.000	0.000	10.000	0.000	0.000	0.000	0.000	0.000	81.089

Note

In FY2018, PE 0605433F, Wideband Global SATCOM efforts were transferred to PE 1206433F, Wideband Global SATCOM, due to the creation of a new Major Force Program for Space. FY2016 and FY2017 funding is now documented in the exhibits for PE 1206433F.

A. Mission Description and Budget Item Justification

The Wideband Global SATCOM (WGS) System provides DoD users with high data rate military satellite communications (MILSATCOM) services in accordance with the Joint Space Management-approved MILSATCOM architecture (Aug 96), the Joint Requirements Oversight Council (JROC)-approved MILSATCOM Capstone Requirements Document (Oct 97), and the JROC-approved WGS Operational Requirements Document (May 00). Dual-frequency WGS satellites augment, then replace the DoD's Defense Satellite Communications System (DSCS) X-band service and augment one-way Global Broadcast Service Ka-band capabilities. In addition, WGS provides a new high capacity two-way Ka-band service.

All WGS Block I (Satellites 1-3) and Block II (Satellites 4-6) have been launched and are operational. With the operation of WGS-5, the constellation has global coverage and Full Operational Capability (FOC) was declared on 12 May 2014. Project 657107, WGS Space Systems Resiliency Upgrade, is an Acquisition Category III (ACAT III) effort. The WGS resiliency upgrade will enable the WGS system to both locate and neutralize ground-based jamming threats to the X-band.

The Command and Control System-Consolidated (CCS-C) system provides integrated launch and on-orbit command and control (C2) functionality at Schriever AFB and Vandenberg AFB for MILSATCOM satellites. Schriever AFB is used for primary operations and Vandenberg AFB is used for backup operations. CCS-C uses modified commercial off the shelf hardware/software to control emerging and legacy MILSATCOM systems including Milstar, Defense Satellite Communications System (DSCS), Wideband Global SATCOM (WGS) and Advanced Extremely High Frequency (AEHF) satellites.

The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and AFSPC-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full-rate production.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force					Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*			**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*		
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	52.185	41.632	14.385	0.000	14.385
Current President's Budget	49.954	41.632	14.263	0.000	14.263
Total Adjustments	-2.231	0.000	-0.122	0.000	-0.122
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.231	0.000			
• Other Adjustments	0.000	0.000	-0.122	0.000	-0.122

Change Summary Explanation

FY18: -$4.217M to account for availability of prior year execution balances, -$5.934M for CCS-C Assurance and Capability Enhancement (CACE) program re-phase, +$10.000M for Commercial Satellite Communications (COMSATCOM) Pilot program, +$0.029M Inflation adjustment (total FY18 adjustments -$0.122M)

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	Project (Number/Name) 657102 / *Command & Control Sys-Consolidated (CCS-C)*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
657102: *Command & Control Sys-Consolidated (CCS-C)*	-	8.249	12.248	4.263	0.000	4.263	4.000	1.934	0.000	0.000	0.000	30.694
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Additional Prior Years funds for Wideband Global SATCOM (SPACE) are in PE 0603854F, Project 644870, Command and Control System - Consolidated (CCS-C), Budget Activity 4.

A. Mission Description and Budget Item Justification

The Military Satellite Communications (MILSATCOM) Command and Control System-Consolidated (CCS-C) system provides integrated launch and on-orbit command and control (C2) functionality at Schriever AFB and Vandenberg AFB for MILSATCOM satellites. Schriever AFB is used for primary operations and Vandenberg AFB is used for backup operations. CCS-C uses modified commercial off the shelf hardware/software to control emerging and legacy MILSATCOM systems including Milstar, Defense Satellite Communications System (DSCS), Wideband Global SATCOM (WGS) and Advanced Extremely High Frequency (AEHF) satellites.

The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and AFSPC-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness. This continuing effort was previously funded in the FY14PB and prior as an Acquisition Category II (ACAT II) program. With the 10 October 2013 Final Operational Capability (FOC) declaration, the program has transitioned to an ACAT III program, the Command and Control System-Consolidated Assurance and Capability Enhancement (CACE), beginning FY2014. The WGS and AEHF procurement program elements fund the mission unique software and databases for the WGS Block II Follow-On satellites and the AEHF 4-6 satellites, respectively. FY18 funds have been re-phased due to an increased CACE test scope and fact-of-life Government delays driving the need for an increased contract Period of Performance.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: CCS-C development	8.249	12.248	4.263
Description: Develop system architecture to provide enhanced C2 of MILSATCOM satellites.			
FY 2016 Accomplishments: Executed CCS-C modifications to implement new Cross-Domain Solution and Host Based Security System to enhance Information Assurance posture; upgraded, integrated, and tested new cryptologic equipment; and implemented new architecture changes to increase WGS capacity, reduced system downtime, and decreased O&M costs. Conducted Critical Design Review (CDR).			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657102 / *Command & Control Sys-Consolidated (CCS-C)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Continue to execute implementation, integration, and begin test verification activities for all CCS-C modifications. Manage both the operational CCS-C baseline and the new CCS-C Assurance and Capacity Enhancement (CACE) upgraded baseline throughout testing activities. ***FY 2018 Plans:*** Continue to execute implementation, integration, and conduct test verification activities for all CCS-C modifications. Continue to manage the operational CCS-C & CACE baseline. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.			
Accomplishments/Planned Programs Subtotals	8.249	12.248	4.263

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SPAF: BA01: Line Item # MILSAT: *Milsatcom Space*	0.269	0.272	0.277	0.000	0.277	0.282	0.000	0.000	0.000	0.000	1.100
• SPAF: BA01: Line Item # ADV555: *Advanced EHF*	1.906	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.906
• SPAF: BA01: Line Item # GAP000: *Wideband Global System Procurement*	0.000	0.000	0.208	0.000	0.208	0.000	0.000	0.000	0.000	0.000	3.291

Remarks

D. Acquisition Strategy

Competitive contract was awarded in November 2012 and began performance in January 2013. The CCS-C Production and Sustainment Contract (CPASC) includes effort to increase the capability of the CCS-C system to provide ongoing C2, launch readiness support, and anomaly resolution for MILSATCOM satellite families. The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and AFSPC-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness. This continuing effort was previously funding in the FY14PB and prior as an ACAT II program. With the 10 October 2013 FOC declaration, the program has transitioned to an ACAT III program, the Command and Control System - Consolidated Assurance and Capability Enhancement (CACE), beginning in FY2014.

E. 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.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	Project (Number/Name) 657107 / *WGS Space Systems Resiliency Upgrade*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
657107: *WGS Space Systems Resiliency Upgrade*	-	41.705	29.384	10.000	0.000	10.000	0.000	0.000	0.000	0.000	0.000	81.089
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Wideband Global SATCOM (WGS) System provides the DoD with high data rate military satellite communications (MILSATCOM) services in accordance with the Joint Space Management Board-approved MILSATCOM architecture (August 1996), the Joint Requirements Oversight Council (JROC)-approved MILSATCOM Capstone Requirements Document (October 1997), and JROC-approved WGS Operational Requirements Document (May 2000). This program was originally conceived to augment the near-term "bandwidth gap" in warfighter communications needs. Dual-frequency WGS satellites augment, then replace the DoD's Defense Satellite Communications System X-band service and augment one-way Global Broadcast Service Ka-band capabilities. In addition, WGS provides a high capacity two-way Ka-band service.

All WGS Block I (Satellites 1-3), Block II (Satellites 4-6), and the first Block II Follow-on (Satellite 7) have been launched and are operational. Satellites 8-9 successfully launched on 7 December 2016 and 18 March 2017, respectively. With the operation of WGS-5, the constellation has global coverage and Full Operational Capability (FOC) was declared on 12 May 2014. Project 657107, WGS Space Systems Resiliency Upgrade, is an Acquisition Category III (ACAT III) effort. The WGS resiliency upgrade will enable the WGS system to both locate and neutralize ground-based jamming threats to the X-band.

Commercial SATCOM (COMSATCOM) Pilot program started in FY2017 and will demonstrate the feasibility and utility of the DoD using order-of-magnitude SATCOM capability improvements advertised by commercial companies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: WGS Upgrade	30.190	21.544	-
Description: Upgrade WGS system to both locate and neutralize ground-based jamming threats.			
FY 2016 Accomplishments: X-band: Initiated Ground Based Receiver Equipment Development, Global SATCOM Command and Control Element (GSCCE)Software (SW) Development (GBAN). In Service Calibration/Geolocation/Beam Mitigation SW Development, and initiated Rack Integration and Test (I&T).			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657107 / *WGS Space Systems Resiliency Upgrade*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
X-band: Complete Ground Based Receiver Equipment Development, Global SATCOM Command and Control Element (GSCCE)Software (SW) Development (GBAN). In Service Calibration/Geolocation/Beam Mitigation SW Development. Continue Rack Integration and Test (I&T). Initiate System I&T and Information Assurance Certification.			
Title: Wideband AoA ***Description:*** Analysis of alternatives for a follow-on wideband communications system to the WGS system. ***FY 2016 Accomplishments:*** Defined core team and working group leads and established working group structure as well began studies bounding the expected solution space regarding requirements definition and technology maturity. ***FY 2017 Plans:*** Support the Principal DoD Space Advisor (PDSA) and USD AT&L in the conduct of a wideband Analysis of Alternatives to determine the appropriate mix of military and commercial wideband satellite communications.	6.302	7.840	-
Title: COMSATCOM Pilot Program ***Description:*** Analysis for Wideband Transport Architectures, End user equipment, Mission Management and Operations, Future Technologies, Cyber-security, and Resiliency. ***FY 2016 Accomplishments:*** Developed initial concepts for studies to define commercial SATCOM architectures and potential avenues to incorporate them into a future DoD SATCOM solution. ***FY 2018 Plans:*** Implement flexible modem/terminal interface and centralized management process enabling demonstration of order of magnitude improvements in commercial satellite communications.	5.213	-	10.000
Accomplishments/Planned Programs Subtotals	41.705	29.384	10.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SPAF:BA01:Line Item # GAP000: *Wideband Global System Procurement*	74.476	86.272	80.849	0.000	80.849	62.112	0.000	0.000	0.000	0.000	303.709

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657107 / *WGS Space Systems Resiliency Upgrade*

D. Acquisition Strategy

The Wideband Global SATCOM (WGS) Space Systems Resiliency Upgrade will be accomplished by modifying the WGS Block II Follow-On (B2FO) Firm Fixed Price (FFP) contract definitized in August 2010. The B2FO contract currently provides development, production, and deployment of WGS satellites 7-10.

E. 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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657107 / *WGS Space Systems Resiliency Upgrade*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
WGS Upgrade: X-band Anti-jam enhancement	SS/FFP	The Boeing Company : El Segundo, CA	-	23.020	Mar 2016	20.260	Jan 2017	0.000		0.000		0.000	0.000	43.280	55.560
WGS Upgrade: Ka-band Anti-jam enhancement	C/TBD	TBD : TBD	-	5.400		0.000		0.000		0.000		0.000	0.000	5.400	-
Technical Mission Analysis	Various	Aerospace : El Segundo, CA	-	0.622	Nov 2015	0.707	Feb 2017	2.000	Nov 2017	0.000		2.000	0.000	3.329	-
Enterprise SE&I (COMSATCOM Pilot Program)	C/CPIF	LinQuest : Los Angeles, CA	-	2.213	Aug 2016	0.000		0.000		0.000		0.000	0.000	2.213	-
Lincoln Labs (COMSATCOM Pilot Program)	Various	Lincoln Labs : Lexington, MA	-	3.000	Mar 2017	0.000		7.800	Apr 2018	0.000		7.800	0.000	10.800	-
Wideband Analysis of Alternatives (AoA)	Various	Multiple : Multiple	-	6.302	Apr 2017	7.760	Jun 2017	0.000		0.000		0.000	0.000	14.062	-
Boeing Pension Protection Act Harmonization	SS/FFP	The Boeing Company : El Segundo, CA	-	0.081	Sep 2016	0.000		0.000		0.000		0.000	0.000	0.081	-
		Subtotal	-	40.638		28.727		9.800		0.000		9.800	0.000	79.165	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	Project (Number/Name) 657107 / *WGS Space Systems Resiliency Upgrade*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	Various	Aerospace : El Segundo, CA	-	0.067	Jan 2016	0.069	May 2017	0.000		0.000		0.000	0.000	0.136	6.180
Other Support	Various	Various : TBD	-	1.000	Aug 2016	0.588	Dec 2016	0.200	Oct 2017	0.000		0.200	0.000	1.788	1.200
		Subtotal	-	1.067		0.657		0.200		0.000		0.200	0.000	1.924	7.380

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	41.705		29.384		10.000		0.000		10.000	0.000	81.089	-

Remarks

FY16 Lincoln Labs (COMSATCOM Pilot Program) Subcontractors: Boeing, Northrop Grumman, Space Systems-Loral, Hughes, KRATOS, and ViaSat

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657107 / *WGS Space Systems Resiliency Upgrade*

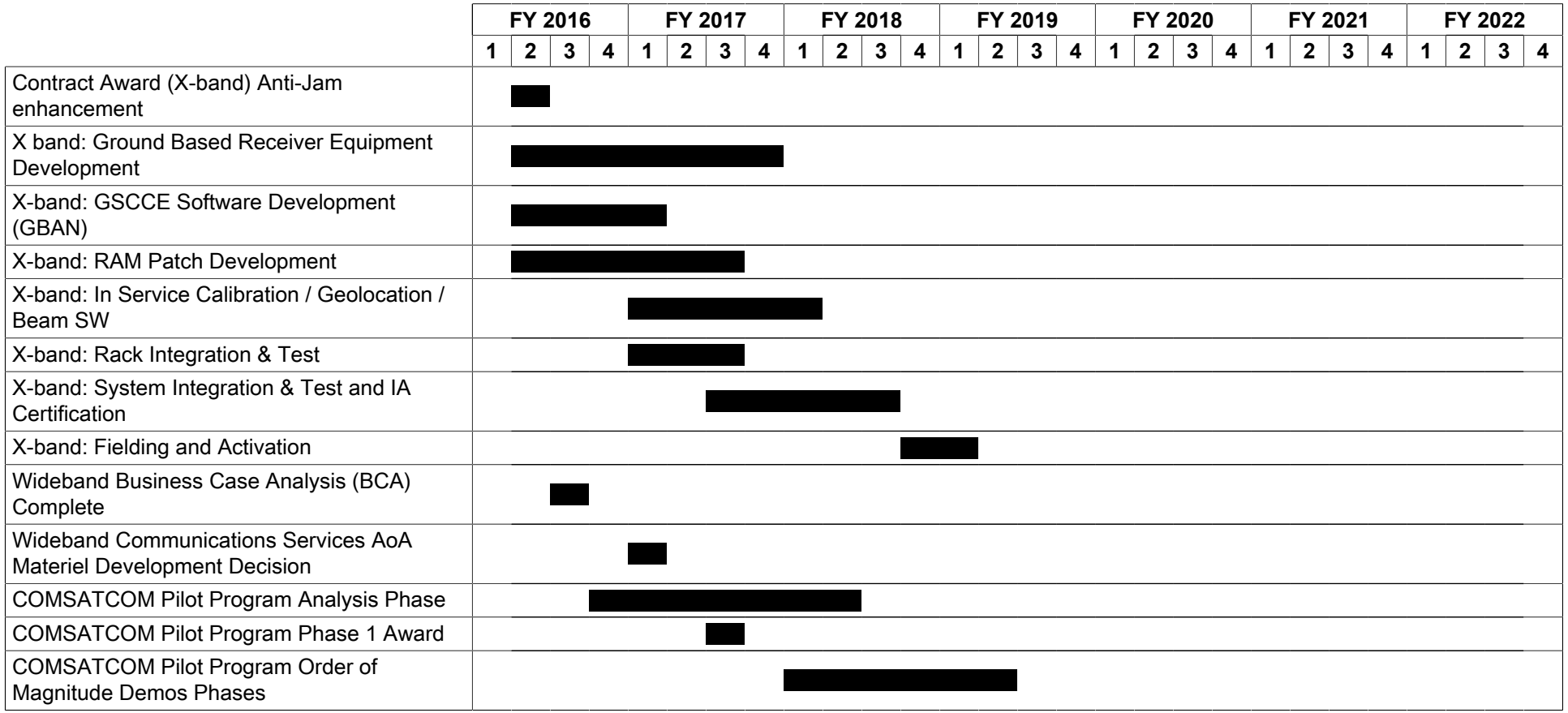

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1206433F / *WIDEBAND GLOBAL SATCOM (SPACE)*	**Project (Number/Name)** 657107 / *WGS Space Systems Resiliency Upgrade*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Contract Award (X-band) Anti-Jam enhancement	2	2016	2	2016
X band: Ground Based Receiver Equipment Development	2	2016	4	2017
X-band: GSCCE Software Development (GBAN)	2	2016	1	2017
X-band: RAM Patch Development	2	2016	3	2017
X-band: In Service Calibration / Geolocation / Beam SW	1	2017	1	2018
X-band: Rack Integration & Test	1	2017	3	2017
X-band: System Integration & Test and IA Certification	3	2017	3	2018
X-band: Fielding and Activation	4	2018	1	2019
Wideband Business Case Analysis (BCA) Complete	3	2016	3	2016
Wideband Communications Services AoA Materiel Development Decision	1	2017	1	2017
COMSATCOM Pilot Program Analysis Phase	4	2016	2	2018
COMSATCOM Pilot Program Phase 1 Award	3	2017	3	2017
COMSATCOM Pilot Program Order of Magnitude Demos Phases	1	2018	2	2019