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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2023 Air Force **Date:** April 2022

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303140F / <i>Information Systems Security Program</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	9.592	8.032	70.582	0.000	70.582	62.897	64.072	65.422	66.878	Continuing	Continuing
675100: <i>Cryptographic Modernization</i>	-	9.592	8.032	70.582	0.000	70.582	62.897	64.072	65.422	66.878	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

Information Systems Security Program (ISSP) - Includes resources, manpower authorizations, necessary facilities and equipment required to perform INFOSEC research and development, to provide INFOSEC services, to procure INFOSEC products required to secure telecommunications and information systems when such products are separately procurable from host systems, and to provide INFOSEC maintenance and support. Also includes costs associated with the protection afforded to telecommunications and information systems which process sensitive data and efforts to ensure confidentiality, integrity, and availability of the information and the system.

The ISSP Element provides centrally-funded cradle-to-grave research, development, acquisitions, supply, sustainment, depot maintenance, and demilitarization of the Air Force (AF) cryptographic and key distribution/management systems. ISSP delivers on rising national, DoD, and AF priorities to address cyber security threats and increasing war-fighter dependence on cyberspace. The AF and the DoD require the capability to securely collect, process, store, and disseminate an uninterrupted flow of information, while denying an adversary the ability to intercept, collect, destroy, interpret, or manipulate our information flows. Secure communication allows the DoD to achieve and maintain decision superiority, the key to successful application of the military instrument of national power in modern, high-tempo, full-spectrum operations. AF Communications Security (COMSEC) equipment protects information such as war-fighter positions, mission planning, target strikes, commanders' orders, intelligence, force strength, and force readiness. When an adversary is capable of interpretation, manipulation, or destruction of the information used by the war-fighter, DoD military forces will suffer significant and/or devastating mission degradation that can result in loss of life and resources and/or exceptionally grave damage to national security.

The overall focus of the Research, Development, Test, and Evaluation (RDT&E) efforts within this program is to transform electronic key delivery and cryptographic devices to meet the next generation war-fighting requirements. These efforts are driven by the National Security Agency's (NSA) mandates to address decertifications, new requirements, and end of life issues. NSA requires an inventory of cryptographic devices that are more robust, modular, scalable, capable, net-centric, and durable. This enables more effective and efficient performance including reduced inventory, expanded data rates, simplified upgrades, lower life cycle costs, and ensured global information grid-compatibility.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver ISSP for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In CY 0.780M was expended for civilian pay expenses in this program element, and in BY 0.300M is forecasted for civilian pay expenses in this program element.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

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This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
Previous President's Budget	10.351	8.032	0.000	0.000	0.000
Current President's Budget	9.592	8.032	70.582	0.000	70.582
Total Adjustments	-0.759	0.000	70.582	0.000	70.582
• Congressional General Reductions	-0.019	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	-0.437	0.000			
• SBIR/STTR Transfer	-0.303	0.000			
• Other Adjustments	0.000	0.000	70.582	0.000	70.582

**Change Summary Explanation**

The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY2023 cannot be made in a relevant manner. FY2023 funding increased significantly to address expanding quantum resilient and cyber security requirements including Technology Development, IFF Mode 5, and Classified Data at Rest (CDAR).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Air Force										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303140F / <i>Information Systems Security Program</i>				<b>Project (Number/Name)</b> 675100 / <i>Cryptographic Modernization</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
675100: <i>Cryptographic Modernization</i>	-	9.592	8.032	70.582	0.000	70.582	62.897	64.072	65.422	66.878	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The AF Cryptographic Modernization (CM) effort modernizes cryptographic devices protecting critical national security information across multi-domain operations. This AF effort supports an integrated effort across the cyber domain to transform to next-generation cryptographic capabilities. It provides U.S. forces and multinational and interagency partners the multi-domain security needed to protect the flow and exchange of strategic, operational, and tactical information in accordance with national and international policy/standards, and the validated requirements of decision makers, warfighters, and the intelligence community. The AF Cryptographic Modernization 2 (CM2) effort is required by Chairman Joint Chiefs of Staff Notice (CJCSN) 6510 and NSA Decertification Messages (CED-31-15/037-21/032-16) for the need to add quantum resistance to the existing high assurance cryptographic products. This effort will allow protection against advanced & evolving quantum computing threats. All existing crypto devices will be vulnerable and must be modernized to be quantum resilient. The majority of the development effort includes hardware changes to the existing crypto devices.

The CM effort is a holistic AF-wide "modern" cryptographic strategy to provide long-term, evolving protection of NC3, ISR, PKI, KME, and nearly all AF platforms and ground networks. CM will provide the required enhanced security for all AF voice, data, and video capabilities on the battlefield and throughout the DoD enterprise, and will enable the integration of new capabilities to AF users through development of a new DoD Cryptographic Modernization 2 (CM2) Initial Capabilities Document (ICD) dated 15 July 2021.

To accomplish this effort, it is executed in three phases: replacement, modernization, and transformation. The replacement phase of the program focused on updating and/or replacing out-of-date algorithms along with unsustainable cryptographic products. The modernization phase provides crypto devices with common solutions that are more robust, modular, scalable, and provide durability to existing cryptographic end items, as well as updating midterm aging/unsupportable crypto equipment. The third phase, transformation, provides common joint solutions which enable secure, transparent, multi-domain, network-centric capabilities. Activities also include studies and analysis to support both current program planning/execution and future program planning.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver ISSP emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In CY 0.780M was expended for civilian pay expenses in this program element, and in BY 0.300M is forecasted for civilian pay expenses in this program element.

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

	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<b>Title:</b> Technology Development (TD)	0.291	0.414	41.292

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> Technology Development (TD) provides the initial development efforts needed to tackle the current and upcoming quantum computing threat for Crypto Modernization 2. TD will stand up all acquisition efforts for over 13 devices to become quantum resilient, reprogrammable architecture to ensure long service life. Capabilities slated for modernization include classified data at rest if data storage is comprised or captured; NC2 and NC3 requirements, secure voice and data, and remote rekey.</p> <p><b>FY 2022 Plans:</b></p> <ul style="list-style-type: none"> <li>- Work with stakeholders and ACC HQ on 1067 modifications to establish and conduct pre-contract award activities for standing up approximately three acquisition programs for contract award</li> <li>- Work with NSA on new algorithms standards to share with defense contractors on CM2 efforts</li> <li>- Enable artificial intelligence and machine learning capabilities for the Joint All Domain Command and Control (JADC2) by developing and delivering NSA Approved cryptologic solutions to secure communications and data storage for tactical and strategic level data</li> </ul> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will finalize contract actions and posture for quick contract awards for development / modification of crypto devices incorporating quantum resilience. Efforts include KG-3XA, KY-280/280A, Small Diameter Bomb II and a Crypto Enterprise Management tool.</li> <li>- Will conduct architectural modeling and simulation efforts that drive rapid algorithm and capability evolution to defend against advanced and evolving threats. These digital engineering efforts will provide the standardization across the AF. These efforts include Remote ReKey-Next Gen, Multifunction and Hi-Speed Crypto.</li> </ul> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding increased to accelerate development efforts to defend against evolving quantum threats.</p>				
<p><b>Title:</b> IFF Mode 5</p> <p><b>Description:</b> Modernization of the Identification Friend or Foe (IFF) Mode 5 devices enables the warfighter to engage and accurately identify friendly or enemy forces as friend or foe. It prevents fratricide during target engagements and provides authentication and encryption/decryption services. The modernized devices will be quantum resilient and prevent enemy disruption of IFF functions. They will enhance the needed security for interrogations and response. These encryption devices operate within military aircraft, fixed, and transportable ground stations when connected to an interrogator and/or transponder. The Identification Friend or Foe (IFF) Mode 5 crypto models KIV-77 and KIV-78 require permanent modification. The modification of these devices are required to address quantum threats, produce-ability and algorithm re-programmability mandated by the National Security Agency (NSA) and the 2019 Chairman of the Joint Chiefs of Staff Notice (CJCSN) 6510.</p> <p><b>FY 2022 Plans:</b></p>		4.822	3.852	13.820

**UNCLASSIFIED**

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<ul style="list-style-type: none"> <li>- Complete development of the KIV-78A IFF Mode 5 device to address quantum threats, produce-ability and algorithm re-programmability and obtain NSA certification</li> <li>- Pre-award development activities to execute for the permanent modification of the KIV-77A IFF Mode 5 device</li> </ul> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will award development contract for the KIV-77 IFF Mode 5 device to address quantum threats, produce-ability and algorithm re-programmability and obtain NSA certification in support of the CM2 ICD (dated Jul 2021)</li> </ul> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p> <ul style="list-style-type: none"> <li>- Funding increased due to awarding development contract for the KIV-77 IFF Mode 5 device</li> </ul>				
<p><b>Title:</b> Space Modular Common Crypto (SMCC)</p> <p><b>Description:</b> Space Modular Common Crypto (SMCC) provides Information Assurance (IA) services for new satellite architectures via a family of common crypto solutions that integrate Tracking, Telemetry, &amp; Commanding (TT&amp;C), Mission Data (MD), and/or Transmission Security (TRANSEC) key stream functions for the Air Force and Intelligence Community space systems.</p> <p><b>FY 2022 Plans:</b></p> <ul style="list-style-type: none"> <li>- Assess performance</li> </ul> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue performance assessments</li> </ul> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p> <p>N/A</p>		0.100	0.100	0.100
<p><b>Title:</b> Algorithm Transition Compliance and Support</p> <p><b>Description:</b> Supports Air Combat Command (AF lead for Cyber Superiority) in Algorithm Transition Compliance and provides Information Assurance (IA) support by investigating and analyzing all utilized cryptographic algorithms and hundreds of cryptographic equipment types to support the transformation effort in becoming quantum resilient. This includes the development of prototyping efforts to include the development of a software program of a centralized near real-time accountability of AF COMSEC equipment that reports compliance to AF/DoD Leadership. In addition, it will provide automated software updates to crypto devices (networked &amp; non-networked), and field modernized cryptography, replacing outdated inventory, algorithms, and quantum computing.</p> <p><b>FY 2022 Plans:</b></p>		4.279	3.566	2.989

**UNCLASSIFIED**

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<ul style="list-style-type: none"> <li>- Continue to work with all the AF platforms to analyze the AF crypto enterprise and provide situational awareness of significant risks related to aging inventory and cryptographic vulnerabilities</li> <li>- Continue to provide analysis of adequacy of COMSEC products in support of NSA requirements, sustainment issues, and the state of technology to all AF platforms</li> <li>- Execute a pathfinder effort for the AF community to assist in annual assessments and long-term efforts to develop enterprise</li> </ul> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue prototyping efforts to reduce risk on the new algorithm integrations across all crypto devices</li> <li>- Will work across all MAJCOMs to ensure the Department of the Air Force is implementing enterprise crypto solutions to reduce logistical footprints and sustainment costs</li> </ul> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p> <ul style="list-style-type: none"> <li>- Funding decreased due to higher AF priorities</li> </ul>				
<p><b>Title:</b> Classified Data At Rest (CDAR)</p> <p><b>Description:</b> CDAR will provide the capability to render classified data at rest unusable to adversaries if data storage is captured or compromised. The development of CDAR is a NSA approved modernized cryptographic solution(s) for use in ISR, C2, and EW platforms exposed to hostile/uncontrolled environments. The enterprise cryptographic solution will encrypt/decrypt Top Secret and Below (TSAB) data at rest residing in a variety of data storage environments.</p> <p><b>FY 2022 Plans:</b></p> <ul style="list-style-type: none"> <li>- Begin development of increment 1 of the CDAR enterprise cryptographic solution</li> <li>- Continue market research and preparation for Milestone B and entry into EMD</li> <li>- Continue development of system security documentation</li> </ul> <p><b>FY 2023 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will accelerate pre-contract award activities to posture for a late FY23 contract award</li> </ul> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p> <p>Funding increased due to higher priority to protect data on airborne platforms</p>		0.100	0.100	12.381
<b>Accomplishments/Planned Programs Subtotals</b>		9.592	8.032	70.582

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Air Force		<b>Date:</b> April 2022
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 831010: <i>COMSEC Equipment</i>	50.634	61.761	52.727	-	52.727	53.619	54.618	55.763	56.895	Continuing	Continuing

**Remarks**

Remarks: Other Program Funding reflects Crypto Modernization (CM) portion of Information Systems Security Program (ISSP) OPAF total.

**D. Acquisition Strategy**

Implement AF portion of the DoD's Cryptographic Modernization (CM) Initiative through modernization/modification efforts, in varying stages of the acquisition cycle, with focus on minimizing life cycle costs. The CM portfolio of component acquisition projects is executing using a variety of approaches that vary from an evolutionary acquisition strategy using spiral development (for new component development) to incremental improvement leveraging leading-edge, certified non-developmental items (for modernization). Contract type is selected for each of the individual projects based upon its acquisition approach and its unique technology risks. A mixture of fixed-price and cost-reimbursement contracts have been selected which maximize the best value for the Government.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 7				PE 0303140F / Information Systems Security Program				675100 / Cryptographic Modernization							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Tech Development	Various	MULTIPLE : MULTIPLE	-	0.291	Jan 2021	0.414	Jan 2022	37.771	Jan 2023	-		37.771	Continuing	Continuing	-
IFF Mode 5	Various	MULTIPLE : MULTIPLE	-	1.805	Feb 2021	1.955	Feb 2022	13.820	Feb 2023	-		13.820	Continuing	Continuing	-
Space Modular Common Crypto (SMCC)	C/CPIF	MULTIPLE : MULTIPLE	-	0.100	Feb 2021	0.100	Feb 2022	0.100	Feb 2023	-		0.100	0.000	0.300	-
Algorithm Transition Compliance and Support	Various	MULTIPLE : MULTIPLE	-	3.507	Apr 2021	3.466	Apr 2022	2.989	Apr 2023	-		2.989	Continuing	Continuing	-
CDAR	Various	MULTIPLE : MULTIPLE	-	0.100	Feb 2021	0.100	Feb 2022	12.381	Feb 2023	-		12.381	Continuing	Continuing	-
<b>Subtotal</b>			-	5.803		6.035		67.061		-		67.061	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
IFF Mode 5	C/CPAF	Not specified. : TBD	-	0.320	Jan 2021	0.422	Jan 2022	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.320		0.422		-		-		-	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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 Administration (PMA)	Various	Various : Various	-	3.469	Dec 2020	1.575	Dec 2021	3.521	Dec 2022	-		3.521	Continuing	Continuing	-
<b>Subtotal</b>			-	3.469		1.575		3.521		-		3.521	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	9.592		8.032		70.582		-		70.582	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2023 Air Force		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140F / Information Systems Security Program	<b>Project (Number/Name)</b> 675100 / Cryptographic Modernization

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<b>Cryptographic Modernization APPN 3600, BA07, PE 0303140F, BPAC 675100</b>	
Technology Development	
IFF Mode 5	
Space Modular Common Crypto (SMCC)	
Algorithm Transition Compliance and Support	
CDAR	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2023 Air Force		<b>Date:</b> April 2022
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Cryptographic Modernization APPN 3600, BA07, PE 0303140F, BPAC 675100</i></b>				
Technology Development	1	2021	4	2027
IFF Mode 5	3	2021	4	2027
Space Modular Common Crypto (SMCC)	1	2021	4	2023
Algorithm Transition Compliance and Support	1	2021	4	2027
CDAR	1	2021	4	2027