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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</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	-	111.125	159.836	133.117	0.000	133.117	92.813	73.994	75.790	77.481	Continuing	Continuing
655050: <i>TDL System Integration</i>	-	99.584	109.252	133.117	0.000	133.117	92.813	73.994	75.790	77.479	Continuing	Continuing
655262: <i>Family of Gateways</i>	-	11.541	50.584	0.000	0.000	0.000	0.000	0.000	0.000	0.002	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Tactical Data Networks Enterprise (TDNE) develops, enhances and fields Tactical Data Links (TDL) including internet protocol (IP) networks, advanced waveforms, radios, network management tools, and associated hardware and software that comprise the Joint Aerial Layer Network (JALN). This will be accomplished by upgrading currently fielded communications and TDL systems and IP networks. The upgrades align with the development and fielding of more advanced systems in support of the Advanced Battle Management System (ABMS). ABMS is a family of systems which provides capabilities consisting of air, land, and maritime surveillance, tactical communications and networking, integrated with battle management command and control in support of Joint forces. ABMS is an integral component to transition to the Joint All Domain Command and Control (JADC2) concept at the tactical level of warfare. TDNE supports the development, fielding and training of aerial layer networking capabilities across multiple force projection missions including air superiority, ground precision attack, command and control, intelligence, surveillance and reconnaissance (ISR), and personal recovery while integrating capabilities with space operations. TDNE also addresses warfighter urgent demands through the establishment of Quick Reaction Capabilities (QRC) and enterprise activities. TDNE executes quick reaction response capability requests by the warfighter and support activities (including ramp-up) associated with the JALN enterprise. This program ensures the continued enhanced interoperability of Air Force and joint/coalition/NATO assets through efforts such as early systems engineering for program requirements analysis and architectural design development/coordination of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, interoperability certification testing, and flight testing. The aerial layer extends to interfacing with space communication assets (both military and commercial). An example of this interface work includes the use of the Protected Tactical Waveform (PTW) designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all services. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). PTW development activities may include technical and acquisition-related studies, analysis, early systems engineering and risk reduction activities, addressing all subsystems to support both current program planning/execution and future AF program planning. This effort also funds PTW modem development and aperture development on suitable platforms. Satellite communication efforts includes all necessary system components to leverage commercially available space assets such as antennas modems, and network management support systems.

TDL System Integration will provide for the study (acquisitions current and proposed), analysis, enhancement, development, integration, demonstration, test, and evaluation of TDLs as a subset of the broader aerial layer networks. TDLs are used in both peace time and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine-to-machine target and threat information, thereby, enabling time critical targeting and other mission assignment

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<p>tasking. TDLs are used by all service theater command and control (C2) elements, weapons platforms, and sensors. TDLs include, but are not limited to: Link 16, Link 22, and other Advanced TDL Link technologies, such as Tactical Targeting Network Technology (TTNT), Common Data Link (CDL), Intra-Flight Data Link (IFDL) and Multifunction Advanced Data Link (MADL). SATURN (Second-Generation Anti-Jam Tactical UHF Radio for NATO) is the next generation UHF line-of-sight link and is required to supporting a DoD CIO Mandate a resilient voice and data capability for operations in a contested environment. Agile Communications includes the capability to share tactically significant information within/to/from highly contested environments in support of the Air Superiority 2030 Flight Plan. Agile Communication efforts provide processes and coordination for enterprise communication development activities. High Capacity Backbone (HCB), a subset of the overall ABMS plan, will provide the warfighter with a robust communication infrastructure enhancing C2 capabilities. HCB connects users operating within disadvantaged conditions to space and terrestrial communications utilizing Deployed Ground Entry Points (DGEP) and aerial nodes. To address future Advanced Tactical Datalinks, development of a Software Programmable OMS compliant (SPOC) radio terminal prototype is being built and tested. SPOC will provide a next generation radio set capable of hosting a variety of advanced tactical datalinks which aligns with the ABMS plan, and allows for more than one waveform operating simultaneously resulting in improved connectivity and situational awareness for the warfighter.</p> <p>Communication gateways are necessary to support systems of systems integration and the delivery of information exchanges across disparate physical and logical network pathways. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancements, development, integration, costing, demonstration, test, and evaluation efforts related to future TDL communications development that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Additionally, Family of Gateways will support enhancements of existing TDL performance, through upgrades and engineering analysis of system designs. Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communication bridging across multiple platforms, sources and communication domains.</p> <p>This program element may include necessary civilian pay expenses required to support, manage, execute, and deliver weapon system capabilities across the BACN platforms, aerial network, and tactical data network enterprise. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2021 0.900M was expended for civilian pay expenses in this program element, and in FY2022 0.900M is forecasted for civilian pay expenses in this program element.</p> <p>Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancement, development, integration, costing demonstration, test and evaluation efforts that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime and space-based C4ISR networks producing operational effects not possible within individual networks. Activities also include studies, analysis, demonstrations and experiments to support both current program planning/execution and future program planning efforts for Family of Gateways or other applicable platforms to include but not limited to E-11 Battlefield Airborne Communications Node (BACN).</p>		

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	121.188	169.836	0.000	0.000	0.000
Current President's Budget	111.125	159.836	133.117	0.000	133.117
Total Adjustments	-10.063	-10.000	133.117	0.000	133.117
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-10.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-9.900	0.000			
• SBIR/STTR Transfer	-0.163	0.000			
• Other Adjustments	0.000	0.000	133.117	0.000	133.117

Change Summary Explanation

FY21: 9.9M realigned for higher AF priorities & 0.163M decrease for Small Business Innovation Research.

FY22: Decrease of 10M based on Congressional mark.

FY23: 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.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>				Project (Number/Name) 655050 / <i>TDL System Integration</i>			
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
655050: <i>TDL System Integration</i>	-	99.584	109.252	133.117	0.000	133.117	92.813	73.994	75.790	77.479	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Tactical Data Links (TDL) System Integration provides for the study, analysis, enhancement, development, integration, demonstration, joint/coalition/NATO interoperability exercises, costing, test, trials, and evaluation of TDL as a subset of the broader aerial layer network. TDLs are used in both peacetime and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine to machine target and threat information and, thereby, enabling time critical targeting and other mission assignment tasking. TDLs are used by all service, NATO, and coalition theater C2 elements, weapons platforms, and sensors.

The number of Air Force platforms hosting TDLs has expanded from C2 aircraft (E-3, E-8, E-11A, EQ-4B, etc.) to the fighter, bomber, intelligence, surveillance and reconnaissance (ISR), tanker, airlift and other tactical fleets (F-15, F-16, F-22A, Rivet Joint, B-1, B-2, B-52, KC-46, etc.), as well as precision guided munitions. Utilization of TDLs in joint and international environments requires the integration of terminals into host platforms and interoperability of TDL networks across all deployed joint/Coalition/NATO platforms. USAF mandates require additional studies and analysis in order to meet frequency reprogramming and cryptographic requirements.

High Capacity Backbone (HCB) effort implements an incremental approach for deploying resilient reach back connectivity to DISN services and in-theater rear echelon organizations through dedicated aerial gateways and opportunistic airborne nodes. The HCB Transport supports a robust deployable ground infrastructure required, through reach back, range extension and payload control. It will use an open system approach composed of non-proprietary government and commercial interface standards. Link 16 Enhancement will develop and field advanced signal processing capabilities on 4th and 5th generation platforms to address threats in the contested and highly contested environments.

Efforts in this project include waveform and integration activities.

Waveform:

Waveform activities include, but are not limited to, enabling and supporting Joint Interoperability of Tactical Command and Control Systems (JINTACCS), joint/Coalition/NATO Interoperability, Link 16 enhancements, and development of a next generation waveform and/or advanced tactical data link. Funding will provide training, logistics development, testing and certification of individual TDL implementations to joint/allied standards, establishment of service-wide network management procedures/operations, and system-wide enhancements/testing, demonstration and experimentation.

Integration:

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Integration activities include but are not limited to, Data Link Test Facility (DTF), MIDS JTRS, Air Force Participating Test Unit (AFPTU), Interoperable System Management and Requirements Transformation (iSMART), Network Centric Capability Assessment (NCCA), NATO interoperability, Coalition interoperability, , integration analysis of C2 of JALN, Combat Cloud, Protected Tactical Waveform (PTW), second generation Anti Jam(AJ) Tactical Ultra High Frequency(UHF) Radio for North Atlantic Treaty Organization(NATO) (SATURN) and analysis of integration on platforms of existing TDN systems, system-of-systems analysis. Funding will ensure continued enhanced interoperability of Air Force/joint/Coalition/NATO assets through efforts such as early systems engineering for program requirements analysis and architectural design development/coordination of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, integration of cyber technologies, interoperability certification testing, and flight testing, demonstration and experimentation.

Activities also include studies, prototypes, analysis (engineering and cost), demonstrations and experiments to support both current program planning and execution and future program planning efforts for Tactical Data Networks (TDN), to include but not limited to development of joint concepts for C2, Analysis of Alternatives (AoA) follow-on analysis, advanced gateway planning, development/integration of Advanced Battle Management systems (ABMS) capabilities, across all aerial network and tactical data networks enterprise platforms including (but not limited to) E-11 Battlefield Airborne Communications Node (BACN).

Activities will also include joint/Coalition/NATO Interoperability that provides program office system engineering to support Foreign Military Sales (FMS). Agile Communications include the capability to share tactically significant information within/to/from highly contested environments in support of the Air Superiority 2030 Flight Plan. Agile Communication efforts provide for pre-Analysis of Alternatives (AoA) and development activities. Agile Communications supports the application of open standards & advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from & within the Highly Contested Environment (HCE).

This program element may include necessary civilian pay expenses required to support, manage, execute, and deliver weapon system capabilities across the BACN platforms, aerial network, and tactical data network enterprise. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In PY 0.9M was expended for civilian pay expenses in this program element, and in CY 0.9M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Title: Tactical Data Networks (TDN) Integration</p> <p>Description: TDN Integration activities include but are not limited to, Data Link Test Facility (DTF), Air Force Participating Test Unit (AFPTU), Network Centric Capability Assessment (NCCA), Joint/Coalition/NATO Interoperability, Analysis of Alternatives (AoA) follow-on, gateway planning as well as Joint Interoperability of Tactical Command and Control Systems (JINTACCS) ensures interoperability of TDL systems with associated joint, allied, and Coalition systems. It includes configuration management of TDL Military Standards (MIL-STDs), TDL message development, interoperability test/certification, and TDL message standard implementation using interoperable System Management and Requirements Transformation (iSMART) for Link 16, Link 22, Intra-flight Data Link (IFDL), Multifunction Advanced Data Link (MADL), and others. Full Motion Video (FMV) Extended Unified Relay (FEURY) system development.</p>	25.594	25.946	24.420

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans:</p> <ul style="list-style-type: none"> -Will continue to manage the development, certification, training and logistics plans for individual TDL implementations to Joint/allied standards. -Will continue to provide the necessary engineering, technical, and administrative support required to add and/or update Air Force platform and system information exchange requirements -Will continue to ensure compatibility and interoperability of TDLs by funding required Air Force/joint MIL-STD compliance and interoperability tests -Will continue to ensure compatibility and interoperability of TDLs by developing TDL messaging capability to address new or updated operational requirements -Will further develop FEURY systems <p>FY 2023 Plans:</p> <ul style="list-style-type: none"> -Will continue to manage the development, certification, training and logistics plans for individual TDL implementations to Joint/allied standards. -Will continue to provide the necessary engineering, technical, and administrative support required to add and/or update Air Force platform and system information exchange requirements -Will continue to ensure compatibility and interoperability of TDLs by funding required Air Force/joint MIL-STD compliance and interoperability tests -Will continue to ensure compatibility and interoperability of TDLs by developing TDL messaging capability to address new or updated operational requirements -Will further develop FEURY systems <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p> <p>TDN integration requirements fluctuate based on scope of analysis development, certification efforts for AFPTU (AF Participating Unit), JINTACC (Joint Interoperability of Tac Command & Control Sys), NATO interoperability, and Coalition implementation. Reduction in requirements for MAVRK/FEURY reduced funding between FY 22 & FY 23.</p>			
<p>Title: High Capacity Backbone (HCB)</p> <p>Description: High Capacity Backbone (HCB) is an expeditionary dynamic network made up of aerial and ground nodes that augment existing communication networks to greatly increase connectivity, network capacity, and information sharing at all security levels in order to effectively employ military capability across the range of military operations. HCB reduces joint forces reliance on limited, relatively fixed/static satellite and surface line-of-sight communication components. HCB rapid prototyping is a demonstration of HCB network transport installed in existing USAF aircraft and deployable ground entry points that meets this Rapid Prototyping Requirements Document's threshold technical and functional requirements while operating as an integral part of an aerial layer network in a realistic operational environment</p>	13.190	35.531	33.464

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>HCB capabilities are required to close four specific capability gaps: network connectivity, network capacity, share information and data, and network management.</p> <p>FY 2022 Plans: -Will continue the development of the airborne and ground prototypes -Will conduct test of the prototypes -Will develop a follow-on contract for fielding of the HCB that will be fielded on various airborne platforms</p> <p>FY 2023 Plans: will develop a follow on contract for fielding of the HCB that will be fielded on various airborne platforms</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding ramped up in FY22 to refine prototypes into production ready hardware/software and increased testing (both ground/flight) and then in FY23 ramped down as efforts shift toward readying HCB for production/fielding.</p>				
<p>Title: Protected Tactical Waveform (PTW)</p> <p>Description: Protected Tactical Waveform (PTW) is a waveform designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all Services. This effort funds PTW modem development and aperture development on suitable platforms to include but not limited to; F-35, RQ-4 Global Hawk and EQ-4B/E-11A Battlefield Airborne Communications Node (BACN). PTW provides communications path diversity by increasing SATCOM resilience through satellite, spectral, and waveform diversity. This effort continues work started in Protected Tactical Service Field Demonstration (PTSFD) to complete PTW maturity and modem development, leveraging TALON Tacet Avis aperture work to develop PTW antenna and radome. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). This effort funds continued development of PTW components, protected tactical terminal modems that will be capable of being fully integrated into existing wideband terminals and will ensure delivery of protected tactical SATCOM to the joint and coalition warfighters in contested, degraded environments. PTW development activities may also include technical and acquisition related studies, analysis, and early systems engineering and risk reduction activities addressing all subsystems to support both current program planning/execution and future AF program planning.</p> <p>FY 2022 Plans: No funding requested in FY22.</p> <p>FY 2023 Plans: -Continue the development, integration and testing of an airborne modem that will be utilized by fighter and wide-body aircraft.</p>		3.146	0.000	23.526

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>-Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms.</p> <p>-Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Unintended delays in project development and testing altered the scope pushing requirements to later FY re-aligned funds in FY22 to higher priority efforts within the TDNE program.</p>				
<p>Title: Agile Comms</p> <p>Description: Agile Comms supports the application of open standards, multi-function processors, and advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from and within the Highly Contested Environment (HCE) regardless of the data link and messages format that they are operating on. It supports the application of open standards, multi-function processors, and advanced apertures over the Enterprise-wide Aerial Network, enables all platforms to share combat relevant data/info to, from and within the Highly Contested Environment. This includes Supporting the development of airborne gateways. Agile Comms further includes initial integration of advanced communications and networking capabilities onto tactically-relevant aircraft. Finally, funding supports planning, data collection, development and analysis for initial technology maturation experimentation campaign.</p> <p>FY 2022 Plans: - Continue to develop and demonstrate the Common Tactical Edge Network (CTEN) Minimum Viable Product (MVP) and mature the Enterprise Approach to the Joint Aerial Network</p> <p>FY 2023 Plans: -Continue to develop and demonstrate the Common Tactical Edge Network (CTEN) Minimum Viable Product (MVP) and mature the Enterprise Approach to the Joint Aerial Network</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Increased scope of demonstration efforts to support maturing Enterprise approach.</p>		41.585	40.867	43.874
<p>Title: Link 16 Enhancements</p> <p>Description: Link 16 Enhancement will develop and field Link 16 Anti Jam (AJ) capabilities on 4th and 5th generation platforms to address Link 16 jamming threats in the contested and highly contested environments. This effort will implement Link 16 technologies into TDL terminals and investigate the integration of additional emerging technologies to improve communications reliability. This effort will maintain a government-controlled technical baseline(s) to efficiently execute development and</p>		11.564	0.000	0.000

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
enhancements. Emerging technologies will be developed and evaluated for efficacy; recommendations will be identified for appropriate terminal fielding/upgrades to platforms and will be considered when evaluating enterprise TDL capabilities/gaps.			
FY 2022 Plans: No funding in FY22			
FY 2023 Plans: No funding in FY23			
FY 2022 to FY 2023 Increase/Decrease Statement: Development funding reduced to 0 as Link 16 specific enhancements such as enhanced throughput and concurrent multi-netting are completed and prepared for integration into payloads/platforms/terminals.			
Title: SFF/DACAS Modernization and System-of-Systems (SoS) Enterprise Integration	4.505	6.908	7.833
Description: This effort will support the development and demonstration of Small Form Factor (SFF) technologies that can support Digitally Assisted Close Air Support (DACAS) and other missions across the full spectrum of operating environments. This effort will consider System-of-Systems (SoS) engineering, technical analysis/performance, platform integration, and Tactics, Techniques, and Procedures (TTPs) to best utilize technologies and acquisition approaches for enterprise modernization. SFF Phase II (TURTLE) will be a rapid prototyping and demonstration effort.			
FY 2022 Plans: -Will conduct testing of solutions with JTACS and TACP fielders			
FY 2023 Plans: Will conduct testing of solutions with JTACS and TACP fielders.			
FY 2022 to FY 2023 Increase/Decrease Statement: Slight increase of funds due to new phase of development.			
Accomplishments/Planned Programs Subtotals	99.584	109.252	133.117

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• RDTE 07 PE 0207448F: <i>C2/ISR TDL</i>	1.559	1.587	1.616	-	1.616	-	-	-	-	-	Continuing
• APAF 05 Line Item F01500: <i>F-15</i>	40.167	20.933	21.310	-	21.310	-	-	-	-	-	Continuing

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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>FY 2023</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item F01600: <i>F-16</i>	8.525	8.695	8.851	-	8.851	-	-	-	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	0.206	0.210	0.213	-	0.213	-	-	-	-	Continuing	Continuing
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	1.698	1.701	1.731	-	1.731	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Airborne Networking Directorate provides for common development, integration, and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force **Date:** April 2022

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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration	Various	Various : Various	-	21.474	Jan 2021	20.946	Jan 2022	9.670	May 2023	-		9.670	Continuing	Continuing	-
High Capacity Backbone (HCB)	C/TBD	Various : Various	-	13.190	Mar 2021	30.531	Mar 2022	19.043	Feb 2023	-		19.043	Continuing	Continuing	-
Agile Comms	Various	Various : Various	-	36.381	Apr 2021	38.367	Jan 2022	47.874	May 2023	-		47.874	Continuing	Continuing	-
SFF/DACAS Modernization and SoS Enterprise	Various	Various : Various	-	4.505	Apr 2021	4.752	Jan 2022	9.833	Feb 2023	-		9.833	Continuing	Continuing	-
Link 16 Enhancements	Various	Various : Various	-	11.564	Apr 2021	-		0.000		-		0.000	Continuing	Continuing	-
Protected Tactical Waveform (PTW)	C/TBD	Not specified. : TBD	-	3.146		-		34.947	Mar 2023	-		34.947	Continuing	Continuing	-
Subtotal			-	90.260		94.596		121.367		-		121.367	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration - DTF	PO	46th Test Squadron : Eglin AFB, FL	-	0.000	Jan 2021	1.500	Dec 2021	1.500	Nov 2022	-		1.500	Continuing	Continuing	-
JINTACCS	C/FFP	Spectrum Comm Inc : Newport News, VA	-	3.048	Feb 2021	3.815	Mar 2022	3.900	Mar 2023	-		3.900	Continuing	Continuing	-
TDN Integration - AFPTU	Various	Various : Various	-	2.156	Aug 2021	2.336	Jan 2022	2.500	Sep 2023	-		2.500	Continuing	Continuing	-
Subtotal			-	5.204		7.651		7.900		-		7.900	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration PMA - A&AS support - NCCA,	C/CPAF	Various : Various	-	3.000	Dec 2020	6.000	Apr 2022	3.000	Apr 2023	-		3.000	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

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

<i>Tactical Data Network Enterprise</i>	
TDN Integration	
JINTACCS	
High Capacity Backbone (HCB)	
Protected Tactical Waveform (PTW)	
TDL Planning, Analysis, and Monitoring (TDL PAM)	
Agile Comms	
Link 16 Enhancement	
SFF/DACAS Modernization and SoS Enterprise Integration	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Tactical Data Network Enterprise</i>				
TDN Integration	1	2021	4	2027
JINTACCS	1	2021	4	2027
High Capacity Backbone (HCB)	1	2021	4	2024
Protected Tactical Waveform (PTW)	2	2021	4	2023
TDL Planning, Analysis, and Monitoring (TDL PAM)	2	2021	4	2027
Agile Comms	1	2021	4	2027
Link 16 Enhancement	1	2021	4	2022
SFF/DACAS Modernization and SoS Enterprise Integration	2	2021	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>				Project (Number/Name) 655262 / <i>Family of Gateways</i>			
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
655262: <i>Family of Gateways</i>	-	11.541	50.584	0.000	0.000	0.000	0.000	0.000	0.000	0.002	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancement, development, integration, costing, demonstration, test, and evaluation efforts that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Family of Gateways will support to enhance existing TDL performance, through upgrades and engineering analysis of system designs.

Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communications bridging across multiple platforms, sources and communication domains.

Funds in this BPAC, 655262, Family of Gateways will be used in BPAC 655050, TDL System Integration under the same PE 0604281, Tactical Data Networks Enterprise.

Activities also include studies, analysis, demonstrations and experiments to support both current program planning/execution and future program planning efforts for Family of Gateways or other applicable platforms to include but not limited to E-11 Battlefield Airborne Communications Node (BACN).

This program element may include necessary civilian pay expenses required to support, manage, execute, and deliver weapon system capabilities across the BACN platforms, aerial network, and tactical data network enterprise. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In PY 0.9M was expended for civilian pay expenses in this program element, and in CY 0.9M is forecasted for civilian pay expenses in this program element.

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

	FY 2021	FY 2022	FY 2023
Title: Protected Tactical Waveform (PTW)	11.541	50.584	0.000
Description: In FY 2022, PE 0604281F, TDNE, BPAC 655262, Family of Gateways efforts were transferred to PE 0604281F, TDNE, BPAC 655050, TDL System Integration, Project Protected Tactical Waveform (PTW) in order to further aerial terminals development and integration in Wide body, UAV and Fighter configurations.			
FY 2022 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
- See plans in BPAC 655050, TDL System Integration.			
-Continue the development, integration and testing of an airborne modem that will be utilized by fighter and wide-body aircraft. -Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms. -Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.			
<i>FY 2023 Plans:</i> Funding moved to BPAC 655050			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funding moved to BPAC 655050			
Accomplishments/Planned Programs Subtotals	11.541	50.584	0.000

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>	
• RDTE 07 PE	1.559	1.587	1.616	-	1.616	-	-	-	-	-	Continuing	Continuing
0207448F: <i>C2ISR TDL</i>												
• APAF 05 Line Item F01500: <i>F-15</i>	40.167	20.933	21.310	-	21.310	-	-	-	-	-	Continuing	Continuing
• APAF 05 Line Item F01600: <i>F-16</i>	8.525	8.695	8.851	-	8.851	-	-	-	-	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	0.206	0.210	0.213	-	0.213	-	-	-	-	-	Continuing	Continuing
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	Continuing	Continuing
• OPAF 03 Line Item 834010:	1.698	1.701	1.731	-	1.731	-	-	-	-	-	Continuing	Continuing
<i>General Information Technology</i>												

Remarks

D. Acquisition Strategy
The Airborne Networking Directorate provides for common development, integration and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end, command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor. Contract approaches vary by program.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

	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

5th-to-4th Generation Gateway	
5th-to-4th Generation Gateway Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>5th-to-4th Generation Gateway</i>				
5th-to-4th Generation Gateway Development	1	2021	3	2021