Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603662D8Z / *Networked Communications Capability*

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	-	5.692	2.975	3.168	0.000	3.168	3.253	3.334	3.415	3.485	Continuing	Continuing
663: *Network Communications Analysis*	-	5.692	2.975	3.168	0.000	3.168	3.253	3.334	3.415	3.485	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Departments initiatives to Build a Sustainable and Long-Term Advantage, and Build a Resilient Joint Force and Defense Ecosystem.

Fielded communications infrastructure for the Department of Defense (DoD) faces a variety of challenges including threats from electromagnetic, cyber, and kinetic sources among others. As more of this infrastructure becomes virtualized in cloud and embedded systems, the ability to rapidly protect and reconstitute this infrastructure is increasingly important, particularly in situations where both commercial and DoD infrastructures are used. The Network Communications Capability Program (NCCP) strives to enable such resilience with a strategy that leverages and develops rapidly reconfigurable and deployable solutions from the physical, to network, to applications layers of a communications stack. Such solutions will leverage software and hardware that are agile in their ability to be reconfigured and managed in contested environments both at the tactical edge and in the enterprise strategic contexts.

Most Department of Defense (DoD) missions are critically reliant on communications infrastructure, particularly in the context of command and control systems. The NCCP program strives to protect such critical missions at all layers of communications system functionality using a cost effective and automated approach for terrestrial, maritime, air, and space missions. Since most components of a communications system are increasingly being deployed using software, automated strategies of enabling physical layer, network layer, application layer interoperability, and rapid re-configurability are critical. Methods that dynamically allow multiple types of waveforms to be used in concert with multiple networking protocols, on hardware platforms that can handle a diverse set of protocols and capabilities are important. Because most of these capabilities will be delivered as communications services, the ability to analyze and rapidly reconstitute these services to manage the mission and inherent system complexities are critical, particularly when such missions are developed in large scale. Such complex system integration requires modern software and hardware practices and automated system repair capabilities to enable affordable, resilient operation in contested spectrum challenged DoD environments.

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B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	5.882	2.984	0.000	0.000	0.000
Current President's Budget	5.692	2.975	3.168	0.000	3.168
Total Adjustments	-0.190	-0.009	3.168	0.000	3.168
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.189	-			
• Other Reprogramming	-0.001	-	-	-	-
• FFRDC	-	-0.009	-	-	-
• Adjustments to Budget Year	-	-	3.058	-	3.058
• Economic Assumption	-	-	0.110	-	0.110

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President’s Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense			Date: April 2022
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603662D8Z / *Networked Communications Capability*	Project (Number/Name) 663 / *Network Communications Analysis*	

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
663: *Network Communications Analysis*	-	5.692	2.975	3.168	0.000	3.168	3.253	3.334	3.415	3.485	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Threats to communications systems come from a combination of sources today from electromagnetic, cyber, and kinetic to name a few. Because DoD communication systems are highly distributed, the ability to rapidly model, measure, and manage these threats in the context of missions being conducted is critical. In order to accomplish this approach, a combination of new methods must be developed, including automated and flexible methods in continuous integration and delivery of communications software, virtualized and interoperable communications layers, which can rapidly shift between the DoD and commercial systems, detailed ability to model the interactions between these components, and flexible hardware solutions that can absorb a wide variety of communications protocols and techniques. Additionally, machine learning methods that enable rapid assessment and reconfiguration of communications infrastructure are of interest.

The Network Communications Capability Program (NCCP) will endeavor to accomplish the objectives for networking and communication through three areas of research. The first area is methods for interoperable composition of communications software stacks. Such methods will enable standard components from physical, networking, and applications layers to be dynamically composed, tested, and deployed to a wide variety of communications platforms across terrestrial, maritime, airborne, and space communications and networking applications. These components will be able to be modelled and composed using standard techniques that enable verification and validation of performance as well as resilience and affordable production through automation and machine learning.

The second area is development, augmentation, and leveraging of hardware communications platforms that allow a wide variety of networking and communications protocols. These platforms should be able to accommodate many types of missions and applications, information services for software defined networking and control plane management, and physical layer implementations with broadband high speed flexible physical layers that support wireless and optical solutions, both the DoD and commercial. Additionally, these hardware platforms should be able to accommodate measurement and assessment of the status of communication functions and mission performance.

The third area of the program enables modeling of communications systems and platforms that incorporate the ability to assess real time data from the communications system and compare it with regions of system performance with respect to latency and security of pre-determined system configurations. This area will make use of methods in model based systems engineering, as well as methods in verification and validation, and employ such techniques used in complex systems management including online models of systems performance.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Networked Communications Capability Program (NCCP)	5.692	2.975	3.168

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: NCCP is developing its research thrusts in three areas of interoperable automated software, flexible resilient, and virtualizable hardware, and modeling that allows real time system assessment and management. The program is collaborating with programs in the DoD services that employ these methods across a wide variety of systems, from tactical to strategic. Methods that enable technology developments to be deployed as information services which are resilient to threats from the electromagnetic spectrum as well as cyber, and kinetic sources among others will be investigated. ***FY 2022 Plans:*** Software Development: - Demonstrate instrumented performance of existing software elements as information services. - Show interaction between hardware and software elements in the cloud environment. Hardware Development: - Demonstrate how hardware is flexible enough for virtualization across a variety of different communications protocols. Modeling: - Demonstrate prototype that allows real time modeling and comparison of system performance from measured data with resilient performance. ***FY 2023 Plans:*** Software Development: - Incorporate/demonstrate remaining planned and/or additional software elements as information services. - Show interaction between hardware and new software elements in the cloud environment. Hardware Development: - Pursue improved performance/resilience using commercial radio hardware implementations in preparation for FY 2023 Army field test. Modeling: - Utilize modeling results to support/target FY 2023 software and hardware improvements. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** There were no significant changes between FY 2022 and FY 2023.			
Accomplishments/Planned Programs Subtotals	5.692	2.975	3.168

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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

NCCP is working with the Navy, Army, and Air Force to integrate its components into existing communications infrastructure from tactical to strategic contexts. Flexible, reconfigurable, resilient communications infrastructure is critical to addressing existing threats to DoD communications systems while reducing cost and modernizing DoD's capability.