Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Office of the Secretary Of Defense	Date: May 2021
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	52.000	199.965	439.769	374.665	-	374.665	-	-	-	-	-	-
724: *Dual Use 5G Use Cases*	32.000	118.292	226.769	72.000	-	72.000	-	-	-	-	-	-
725: *Congested/Congested Spectrum*	14.000	75.581	198.000	283.665	-	283.665	-	-	-	-	-	-
726: *External Engagement*	6.000	6.092	15.000	19.000	-	19.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) Next Generation (NextG) Information Communications Technologies (ICT) program will conduct large-scale experimentation and prototyping of dual-use (military and commercial) fifth-generation (5G) cellular network technology for military uses. The program will develop and deploy 5G networks at DoD sites to evaluate and enhance 5G systems and technologies for CONUS and OCONUS DoD missions. This will include both the direct use of commercially available capabilities and DoD-specific technology enhancements and applications that highly leverage commercial capabilities. The program will also develop, test, and evaluate technology solutions to identify and mitigate the security challenges that 5G and NextG technologies will present in order to enable the military to operate through untrusted networks. The program will:

• Deploy flexible 5G infrastructure at twelve or more U.S. military facilities to enable varied applications and networking prototypes,
• Evaluate at least twenty different DoD 5G applications at DoD facilities across the Services based on parallel commercial applications and technologies,
• Demonstrate the capacity to “operate through” existing commercial 5G infrastructure throughout the globe, leveraging existing infrastructure to meet DoD mission needs and learning how to utilize untrusted 5G networks through automated security techniques.

The program will deliver fieldable prototype capabilities that will remain in place at designated DoD locations as well as lessons learned to promulgate 5G knowledge and tradecraft. This will ensure that both near-term and future generations of information and communications technologies will be capable of supporting US military and national security objectives.

The program will be executed through established support agreements with DoD Service laboratories and through existing DoD and Government-Wide Acquisition Contracts (GWACs) (including General Services Administration (GSA) contracts) that are suitable and cost-effective for 5G technology prototyping and telecommunications network equipment procurement and integration.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Office of the Secretary Of Defense	Date: May 2021
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604011D8Z *I Next Generation ICT (5G)*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	200.000	449.000	376.000	-	376.000
Current President's Budget	199.965	439.769	374.665	-	374.665
Total Adjustments	-0.035	-9.231	-1.335	-	-1.335
• Congressional General Reductions	-	-19.231			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Cancelled Account	-0.035	-	-	-	-
• Program Adjustment	-	-	-1.335	-	-1.335

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 725: *Congested/Congested Spectrum*		
Congressional Add: *5G SPECTRUM Reallocation Mitigation*	-	10.000
Congressional Add Subtotals for Project: 725	-	10.000
Congressional Add Totals for all Projects	-	10.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense			Date: May 2021
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604011D8Z / *Next Generation ICT (5G)*	Project (Number/Name) 724 / *Dual Use 5G Use Cases*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
724: *Dual Use 5G Use Cases*	32.000	118.292	226.769	72.000	-	72.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Develop and experiment with "dual-use" applications that demonstrate direct use of commercial systems and applications that use a large fraction of commercial capabilities that are augmented with DoD enhancements. Dual-use applications will be evaluated within a deployed 5G infrastructure with operationally relevant numbers of users and geographic scale. These use cases include:

• Mission Planning/Training: Develop and experiment with ultra-high reliability, low latency, high bandwidth communications, as well as augmented and virtual reality (AV/VR) technologies that enable high fidelity mission planning and training in realistic environments over 5G networks.
• Depot Operations: Leverage 5G technologies to upgrade depots for "smart" operations including autonomous repair and maintenance activities as well as warehouse movement via driverless forklifts, pallets, and tactical trucks.
• Global Asset/Supply Chain Management: Leverage emerging 5G enterprise solutions to provide real time, optimum, continuous asset visibility and movement tracking, supply status, movement and resupply, and reduce inventory control costs.
• Smart Installations (e.g., logistics bases, ports): Develop and experiment with 5G enabled massive machine-to-machine communications, cloud and edge computing, and autonomy to enhance installation operations to maximize logistics traffic throughput.

Dual-use 5G research, development, and experimentation activities will deliver fieldable prototype capabilities that will remain in place at designated DoD locations. Those that do not perform sufficiently well will still provide lessons learned to promulgate 5G knowledge and tradecraft. These deliverables will inform base/camp/station modernization and recapitalization investments as prototypes transition to enduring infrastructure.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Dual Use 5G Use Cases	118.292	226.769	72.000
Description: Demonstrate use cases of both commercial and military value, while also assessing and developing mitigations to their security vulnerabilities.			
FY 2021 Plans: DoD will continue Smart Warehouse prototyping and experimentation activities at Marine Corps Logistics Base Albany (MCLBA), and Naval Base San Diego (NBSD); and will continue AR/VR Mission Training prototyping and experimentation activities at Joint Base Lewis-McChord (JBLM). Construction of localized full scale 5G mobile cellular networks will be expanded and interfaced with other networks as needed to conduct further development and experimentation of autonomous warehouse operations and AR/VR mission training activities.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 724 / *Dual Use 5G Use Cases*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
DoD will initiate approximately five additional dual-use prototyping and experimentation projects at DoD Service-designated sites. Localized full scale 5G mobile cellular networks will be designed and constructed in order to support the dual-use military application experimentation at the designated DoD sites. ***FY 2022 Plans:*** DoD will continue Smart Warehouse prototyping and experimentation activities at MCLBA, and NBSD; and will continue AR/VR Mission Training prototyping and experimentation activities at JBLM. Construction of localized full scale 5G mobile cellular networks will be completed and experimentation with autonomous warehouse operations and AR/VR mission training activities will be conducted. DoD will continue with the development of approximately five additional dual-use prototyping and experimentation projects at Joint Base Pearl Harbor - Hickam, Naval Station Norfolk, Camp Pendleton, the National Training Center, and Joint Base San Antonio. Localized full scale 5G mobile cellular networks will be designed and initially constructed in order to support the dual-use military application experimentation at these DoD Service sites. The additional sites will experiment with AR/VR for aircraft readiness, ship-wide and pier-side connectivity, rapidly deployable 5G for tactical command and control centers, and AR/VR for medical applications to include training. DoD will initiate additional experiments at existing DoD Service sites and initiate approximately three additional sites for dual use prototyping and experimentation projects. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Level of effort decreases between FY 2021 and FY 2022 due to the DoD experimentation sites having been constructed in FY 2020 and FY 2021, with experimentation continuing in FY 2022.			
Accomplishments/Planned Programs Subtotals	118.292	226.769	72.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense			Date: May 2021
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604011D8Z / *Next Generation ICT (5G)*	Project (Number/Name) 724 / *Dual Use 5G Use Cases*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Dual Use 5G Use Cases	MIPR	Army, Navy, Air Force, etc. : Various	32.000	118.292	Jun 2020	226.769	Mar 2021	72.000	Jun 2022	-		72.000	Continuing	Continuing	-
		Subtotal	32.000	118.292		226.769		72.000		-		72.000	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	32.000	118.292		226.769		72.000		-		72.000	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 724 / *Dual Use 5G Use Cases*

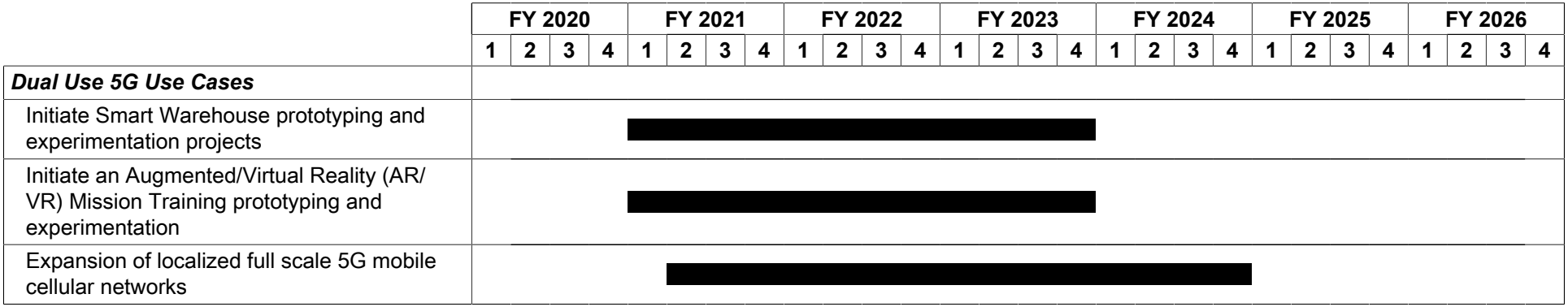

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 724 / *Dual Use 5G Use Cases*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Dual Use 5G Use Cases				
Initiate Smart Warehouse prototyping and experimentation projects	1	2021	4	2023
Initiate an Augmented/Virtual Reality (AR/VR) Mission Training prototyping and experimentation	1	2021	4	2023
Expansion of localized full scale 5G mobile cellular networks	2	2021	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense											Date: May 2021	
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604011D8Z / *Next Generation ICT (5G)*				Project (Number/Name) 725 / *Congested/Congested Spectrum*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
725: *Congested/Congested Spectrum*	14.000	75.581	198.000	283.665	-	283.665	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Demonstrate the capacity to “operate through” existing commercial 5G infrastructure throughout the globe, leveraging existing infrastructure to meet DoD mission needs using dynamic spectrum utilization and controlled manipulation of 5G network security architectures. These capabilities will be based on technologies such as dynamic spectrum utilization to maximize availability and resilience for wireless connectivity, multi-networking across wired and wireless systems for finding and exploiting alternate paths and redundant paths to ensure secure and reliable communication, network monitoring including new artificial intelligence (AI) techniques that use both passive and active measurements to assess security threats and identify potential mitigations. Develop tactical, operational, and strategic networking prototypes to demonstrate capabilities to dynamically balance use of congested spectrum between military systems and commercial wireless networks.

Capabilities will be prototyped and evaluated at-scale within highly dynamic and contested radio frequency (RF) environments. The Congested/Contested Spectrum research, development, and experimentation activities will deliver fieldable prototype capabilities that will remain in place at designated DoD locations. Those that do not perform sufficiently well will still provide lessons learned to promulgate 5G knowledge and tradecraft. These deliverables will inform base/camp/station modernization and recapitalization investments as prototypes transition to enduring infrastructure.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Congested/Contested Spectrum	75.581	188.000	283.665
Description: Demonstrate the capacity to “operate through” in congested/contested environments using dynamic spectrum utilization and by prototyping technologies to both defend and exploit 5G networks. ***FY 2021 Plans:*** Continue congested/contested spectrum prototyping and experimentation activities at Hill AFB. Construction of a localized full scale 5G mobile cellular network will be expanded in order to evaluate the impact of the 5G network on the airborne radar systems and the radar’s impact on the 5G network, employing both active and passive techniques to enable co-use or coexistence. Continue development of a network to disaggregate and mobilize command and control architectures at Nellis AFB, to include the development of 5G infrastructure with dispersed command and control nodes. Initiate approximately two additional congested/contested spectrum prototyping and experimentation projects at Tinker AFB, and a 5G Core security project centered at Joint Base San Antonio. Localized full scale 5G mobile cellular networks will be designed and initially constructed in order to evaluate the specific technologies.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 725 / *Congested/Congested Spectrum*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Continue investments in key technologies for use in contested environments, such as: resilient networking protocols, trusted edge devices, cognitive gateways, homomorphic encryption, and secure 5G ASICs. ***FY 2022 Plans:*** Continue congested/contested spectrum prototyping and experimentation activities at Hill AFB. Continue the evaluation of the impact of the 5G network on the airborne radar systems and the radar's impact on the 5G network to enable co-use or coexistence. Continue development of a network to disaggregate and mobilize command and control architectures at Nellis AFB, to include experimentation with 5G-enabled disaggregated command and control capabilities. DoD will continue congested/contested spectrum prototyping and experimentation at Tinker AFB, and experimentation with 5G Core security and interoperability in the project centered at Joint Base San Antonio. DoD will continue investments in key technologies for use in contested environments, to enable "operating through" adversary impediments on 5G networks. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Level of effort increases between FY 2021 and FY 2022 due to the addition of new DoD experimentation sites.			
Accomplishments/Planned Programs Subtotals	75.581	188.000	283.665

	FY 2020	FY 2021
Congressional Add: 5G SPECTRUM Reallocation Mitigation	-	10.000
FY 2021 Plans: DoD will expand investments in the evaluation of midband spectrum reallocation and associated impact mitigation requirements.		
Congressional Adds Subtotals	-	10.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense			Date: May 2021
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604011D8Z / *Next Generation ICT (5G)*	Project (Number/Name) 725 / *Congested/Congested Spectrum*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Congested/Contested Spectrum	MIPR	Army, Navy, Air Force, Marine Corps, etc. : Various	14.000	75.581	Mar 2020	198.000	Mar 2021	283.665	Mar 2022	-		283.665	Continuing	Continuing	-
		Subtotal	14.000	75.581		198.000		283.665		-		283.665	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	14.000	75.581		198.000		283.665		-		283.665	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 725 / *Congested/Congested Spectrum*

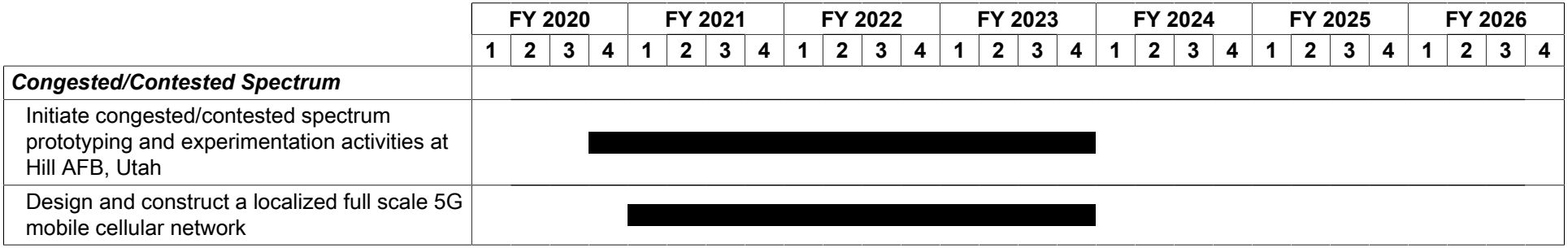

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 725 / *Congested/Congested Spectrum*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Congested/Contested Spectrum				
Initiate congested/contested spectrum prototyping and experimentation activities at Hill AFB, Utah	4	2020	4	2023
Design and construct a localized full scale 5G mobile cellular network	1	2021	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense			Date: May 2021
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604011D8Z / *Next Generation ICT (5G)*	Project (Number/Name) 726 / *External Engagement*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
726: *External Engagement*	6.000	6.092	15.000	19.000	-	19.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding from this project will be used to conduct external engagements across Government and beyond to influence statutes, policies, regulations, and standards within DoD, the U.S. Government, and international bodies for the global deployment and use of 5G to Next G technologies. DoD will conduct active and passive security vulnerability assessments of 5G prototypes in order to support zero-trust security designs for military 5G applications.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: External Engagement	6.092	15.000	19.000
Description: Develop policies, regulations, and standards for streamlined deployment of protected, resilient Government and commercial networks. Conduct active and passive security vulnerability assessments to support 5G security capabilities. ***FY 2021 Plans:*** Continue to engage across government and beyond to inform and influence statutes, policies, regulations, and standards within DoD, the U.S. Government, and international bodies. DoD will continue to conduct security vulnerability assessments of an increased number of Dual-Use and Congested/Contested Spectrum experimentation efforts during FY 2021. In collaboration at least one international partner, DoD will develop an initial roadmap for operating on 5G networks in coalition countries. ***FY 2022 Plans:*** Continue to engage across government and beyond to inform and influence statutes, policies, regulations, and standards within DoD, the U.S. Government, and international bodies. DoD will continue to conduct security vulnerability assessments and coalition partnership efforts during FY 2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Level of effort increases between FY 2021 and FY 2022 due to the addition of new DoD experimentation sites.			
Accomplishments/Planned Programs Subtotals	6.092	15.000	19.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 726 / *External Engagement*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
External Engagement	MIPR	Army, Navy, Air Force, Marine Corps, etc. : Various	6.000	6.092	Mar 2020	15.000	Mar 2021	19.000	Mar 2022	-		19.000	Continuing	Continuing	-
		Subtotal	6.000	6.092		15.000		19.000		-		19.000	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.000	6.092		15.000		19.000		-		19.000	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 726 / *External Engagement*

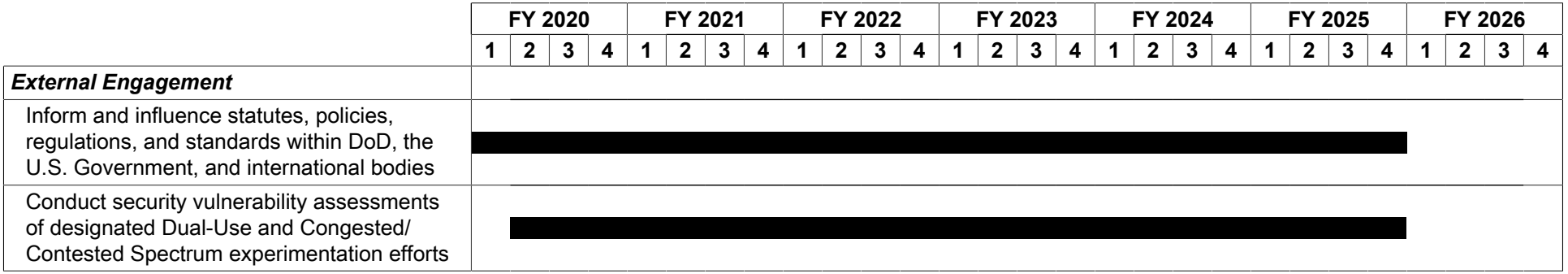

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604011D8Z / *Next Generation ICT (5G)*	**Project (Number/Name)** 726 / *External Engagement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
External Engagement				
Inform and influence statutes, policies, regulations, and standards within DoD, the U.S. Government, and international bodies	1	2020	4	2025
Conduct security vulnerability assessments of designated Dual-Use and Congested/ Contested Spectrum experimentation efforts	2	2020	4	2025