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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Office of the Secretary Of Defense **Date:** February 2019

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605100D8Z I <i>Joint Mission Environment Test Capability (JMETC)</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	190.108	90.326	88.184	83.091	-	83.091	79.125	80.181	84.532	85.762	Continuing	Continuing
087: <i>JMETC Distributed Test</i>	120.306	58.154	16.558	15.157	-	15.157	14.819	15.279	15.950	16.402	Continuing	Continuing
088: <i>JMETC National Cyber Range (NCR) Complex</i>	69.802	10.000	71.626	67.934	-	67.934	64.306	64.902	68.582	69.360	Continuing	Continuing
100: <i>JMETC</i>	-	22.172	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Joint Mission Environment Test Capability (JMETC) program provides a Department of Defense (DoD) enterprise-wide test capability to support system-to-system interoperability testing, mission-level environment testing, and cyber event operations, including cyber testing, cyber training, cyber experimentation, and cyber mission rehearsal. The JMETC program implements the infrastructure capabilities defined in the DoD "Testing in a Joint Environment Roadmap" to provide acquisition program managers a robust nation-wide capability to "test like we fight." The JMETC program provides a persistent, distributed test and evaluation (T&E) capability that supports system development to measure and improve interoperability performance and cyber resiliency, which otherwise would not be readily available to Service/Component acquisition programs. The JMETC program is funded within the Research, Development, Test and Evaluation (RDT&E) Management Support Budget Activity because it provides test capability in support of RDT&E programs. By linking distributed facilities, as well as providing the necessary tools, services and subject matter expertise, the JMETC program allows acquisition programs to efficiently evaluate their warfighting capability in a realistic joint mission environment. The JMETC Program has been aligned to advance the National Defense Strategy (NDS), to test the development of resilient, survivable, federated networks and information ecosystems from the tactical level up to strategic planning, as well as test and assess cyber defenses, building a more lethal force.

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	91.057	84.184	83.091	-	83.091
Current President's Budget	90.326	88.184	83.091	-	83.091
Total Adjustments	-0.731	4.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	4.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.731	-			

UNCLASSIFIED

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Change Summary Explanation FY2019: Congressional add of +\$4M provided in Department of Defense Appropriation Bill (P.L. 115-245) accommodates a program increase, to include funding for cyber range capability and development. All additional funds included in Project 088 Joint Mission Environment Test Capability National Cyber Range (NCR) Complex.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Office of the Secretary Of Defense **Date:** February 2019

Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605100D8Z / <i>Joint Mission Environment Test Capability (JMETC)</i>	Project (Number/Name) 087 / <i>JMETC Distributed Test</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
<i>087: JMETC Distributed Test</i>	120.306	58.154	16.558	15.157	-	15.157	14.819	15.279	15.950	16.402	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The JMETC distributed test mission is to provide the persistent and reusable enterprise T&E infrastructure necessary for effectively conducting Joint, interoperability, and system integration RDT&E on DoD warfighting capabilities. Building the required agile, multi-organizational test infrastructure to assess system-to-system interoperability, effectiveness, and resiliency is cost prohibitive for any single acquisition program. The JMETC Distributed Test capability reduces the cost to plan, setup, and execute these complex tests by delivering an enterprise-wide capability that incorporates persistent connectivity, common integration software for linking sites and live-virtual-constructive (LVC) test resources, accredited test tools, cybersecurity support, and distributed T&E expertise into a robust, operationally representative T&E mission environment. The JMETC Distributed Test project also provides its customers a support team to assist with JMETC capabilities and the execution of distributed test events. The JMETC Distributed Test project has also begun the task of modernizing DoD T&E knowledge management by introducing big data analytics tools and techniques as part of its enterprise capabilities. The JMETC Distributed Test project builds, maintains, and operates the JMETC infrastructure and pays for persistent availability of national connectivity for testing; data communications middleware; development of interface standards; common software tools and components; and a reuse repository. The JMETC Distributed Test project also provides program management, facilities, equipment, operating costs, and special studies and analysis related to distributed test capabilities and infrastructure. Ultimately, the JMETC Distributed Test project supports and advances experimentation, system engineering, acquisition, testing, training, and mission planning, aligned to the National Defense Strategy to build a more lethal force.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: JMETC Distributed Test	58.154	16.558	15.157	-	15.157
Description: - The JMETC Distributed Test project expanded the JMETC Secret Network (JSN) infrastructure to 82 functional sites.					
- The JMETC Distributed Test project supported DoD distributed test and training events to include: system interoperability certification; system interoperability assessments; command and control systems; air and missile defense; 5th Generation Aircraft; unmanned aircraft; precision-guided bombs; munitions; missile tracking and guidance; infrared countermeasures; Joint Fires; Joint Close Air Support; and coalition exercises.					
- The JMETC Distributed Test project provided test planning support to users and organizations to conduct interoperability testing on numerous DoD systems including: command and control systems; information warfare; air and missile defense; intelligence, surveillance, and sensor systems; surface ships; anti-surface warfare; anti-					

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605100D8Z / <i>Joint Mission Environment Test Capability (JMETC)</i>	Project (Number/Name) 087 / <i>JMETC Distributed Test</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>submarine warfare; tactical radar systems; precision-guided bombs; unmanned aircraft; autonomous aircraft; manned fixed wing aircraft; helicopters; and business systems.</p> <ul style="list-style-type: none"> - The JMETC Distributed Test project provided strategic planning efforts to engage new acquisition programs that must demonstrate compliance with Net-Ready Key Performance Parameter. - The JMETC Distributed Test project assisted customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. In addition, the JMETC team provided on-site support for the execution of large-scale, complex distributed events. - The JMETC Distributed Test project created a Data Architecture Reference Document (ARD) and investment roadmap that codifies needs and resource requirements for adopting an enterprise approach to T&E Knowledge Management and Big Data Analytics. <p>FY 2019 Plans:</p> <ul style="list-style-type: none"> - The JMETC Distributed Test project will continue to optimize the JMETC Secret Network (JSN) infrastructure to meet requirements, adding an additional 8 sites. - The JMETC Distributed Test project will continue supporting DoD distributed test and training events to include: system interoperability certification; system interoperability assessments; command and control systems; air and missile defense; 5th Generation Aircraft; unmanned aircraft; precision-guided bombs; munitions; missile tracking and guidance; infrared countermeasures; Joint Fires; Joint Close Air Support; and coalition exercises. - The JMETC Distributed Test project will continue providing test planning support to users and organizations to conduct interoperability testing on numerous DoD systems including: command and control systems; information warfare; air and missile defense; intelligence, surveillance, and sensor systems; surface ships; anti-surface warfare; anti-submarine warfare; tactical radar systems; precision-guided bombs; unmanned aircraft; autonomous aircraft; manned fixed wing aircraft; helicopters; and business systems. - The JMETC Distributed Test project will continue to assist customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. In addition, the JMETC team will provide on-site support for the execution of large-scale, complex distributed events. 					

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605100D8Z / <i>Joint Mission Environment Test Capability (JMETC)</i>	Project (Number/Name) 087 / <i>JMETC Distributed Test</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>- The JMETC Distributed Test project will expand post-test enterprise service capabilities, to include as Knowledge Management and Big Data Analytics tools and technologies, in support of JMETC customer needs and requirements.</p> <p>FY 2020 Base Plans:</p> <p>- The JMETC Distributed Test project will continue to optimize the JMETC Secret Network (JSN) infrastructure to meet requirements, adding or removing sites as necessary.</p> <p>- The JMETC Distributed Test project will continue supporting DoD distributed test and training events to include: system interoperability certification; system interoperability assessments; command and control systems; air and missile defense; 5th Generation Aircraft; unmanned aircraft; precision-guided bombs; munitions; missile tracking and guidance; infrared countermeasures; Joint Fires; Joint Close Air Support; and coalition exercises.</p> <p>- The JMETC Distributed Test project will continue providing test planning support to users and organizations to conduct interoperability testing on numerous DoD systems including: command and control systems; information warfare; air and missile defense; intelligence, surveillance, and sensor systems; surface ships; anti-surface warfare; anti-submarine warfare; tactical radar systems; precision-guided bombs; unmanned aircraft; autonomous aircraft; manned fixed wing aircraft; helicopters; and business systems.</p> <p>- The JMETC Distributed Test project will continue to assist customers with the use of distributed test tools and troubleshooting of the end-to-end network infrastructures. In addition, the JMETC team will provide on-site support for the execution of large-scale, complex distributed events.</p> <p>- The JMETC Distributed Test project will expand post-test enterprise service capabilities, to include as Knowledge Management and Big Data Analytics tools and technologies, in support of JMETC customer needs and requirements.</p> <p>- The JMETC Distributed Test project will support to new and emerging acquisition programs.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program Adjustments</p>					
Accomplishments/Planned Programs Subtotals	58.154	16.558	15.157	-	15.157

UNCLASSIFIED

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C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
N/A

E. Performance Metrics

- Number of distributed test sites
- Number of events conducted
- Number of acquisition programs supported
- Number of downloads from JMETC Repository

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 6					R-1 Program Element (Number/Name) PE 0605100D8Z / <i>Joint Mission Environment Test Capability (JMETC)</i>				Project (Number/Name) 088 / <i>JMETC National Cyber Range (NCR) Complex</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
088: <i>JMETC National Cyber Range (NCR) Complex</i>	69.802	10.000	71.626	67.934	-	67.934	64.306	64.902	68.582	69.360	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The National Cyber Range Complex (NCRC) is comprised of cyber ranges and a secure distributed network infrastructure to service the cyber range user community. The NCRC currently consists of five functional cyber ranges, including the National Cyber Range in Florida as well as four Regional Service Delivery Points (RSDP) located in Hawaii, Alabama, Maryland, and Massachusetts. To enhance DoD cyber range test and training capability and capacity, the NCRC is being expanded with additional cyber ranges co-located with key Service organizations to support an increase of cyber testing of DoD systems as well as training of cyber warfighters. The JMETC Multiple Independent Level of Security (MILS) Network (JMN) currently links 58 sites across the DoD, industry, and academia, providing secure access between cyber ranges, laboratories, and facilities. Both the cyber ranges and the network infrastructure are accredited to support multiple levels of security classifications, specifically configured to meet particular cyber event requirements. The NCRC investments have been aligned to support the National Defense Strategy in improving cyber defense, cyber resilience, and the continued integration of cyber capabilities into the full spectrum of military operations.

The NCRC conducts cyberspace test and training events for the full spectrum of DoD customers including research, development, acquisition, testing, training and operational Cyber Mission Forces (CMF). The NCRC executes wide variety of event types including science and technology (S&T) demonstrations, developmental test and evaluation (DT&E), operational test and evaluation (OT&E), security controls assessments, cyberspace operations training, refinement of cyberspace tactics, techniques, and procedures (TTP) Development, forensics/malware analysis) and cyberspace operations mission rehearsal. The NCRC enables acquisition programs to conduct cybersecurity test and evaluation in an operationally representative cyberspace environment enabling identification, validation and mitigation of vulnerabilities. The NCRC also supports training, mission rehearsal and certification of the CMF in support of US Cyber Command by enabling operational forces to efficiently evaluate cyber warfighting capability in a realistic joint mission environment.

The NCRC provides secure facilities, technology, processes, and workforce to rapidly create hi-fidelity, mission-representative friendly, neutral, and adversarial cyberspace environments.

The NCRC also facilitates integration of distributed organizations with different missions and workforce relevant to cyber operations (e.g., cyber operators, penetrations testers, cyber assessors, cyber observers, cyber analysts, etc.). The NCRC supports cyber activities across of a full spectrum of DoD systems, including weapon platforms, C4I systems, business systems, network devices, and other systems vulnerable to a cyber-attack. The NCRC extensively utilizes automation to minimize human error, to reduce the time required to set-up for a cyber event, and to ensure repeatable results. In addition, the NCRC employs post-event sanitization techniques on all assets after exposure to malicious code to restore back to a known, clean state, which allows for reuse in future events.

The NCRC has a multidisciplinary workforce with software, systems, network, virtualization, automation, system administration, and cybersecurity subject matter expertise. In support of successful planning and execution of hosted events, the NCRC workforce helps users define and refine their event objectives, assists with identifying and prioritizing potential vulnerabilities, designs virtualized cyber environments, develops customized traffic generation and instrumentation solutions,

UNCLASSIFIED

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integrates 3rd party hardware and software, executes cyber events on behalf of the user, provides cooperative vulnerability and penetration assessments, performs detailed cyber analysis, and delivers detailed reports on the results. In addition, the NCRC workforce supports both the Executive Agent for Cyber Test Ranges and the Executive Agent for Cyber Training Ranges, to identify and address relevant needs, define and promulgate standards, and seek efficiencies through focused investments.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: JMETC National Cyber Range (NCR) Complex</p> <p>Description: - The NCRC supported hundreds to cyber events, providing cybersecurity T&E support to Major Defense Acquisition Programs (MDAP), Major Automated Information Systems (MAIS) Acquisition Programs, and smaller acquisition programs.</p> <ul style="list-style-type: none"> - The NCRC supported cyber testing of systems and subsystems relevant to manned and unmanned aircraft, surface ships, command and control systems, data management platforms, weapons platforms, satellites, radars, and missile defense systems. - The NCRC supported Service Cyber Mission Forces (CMF) with training, certification, mission rehearsal and TTP development focused events. - The NCRC supported numerous DoD organizations in cyber activities, including US Cyber Command; Joint Staff J-7; Director, Operational Test & Evaluation (DOT&E); Director, Developmental Test & Evaluation (DT&E); Army PEO Command Control Communications Tactical (PEO C3T); Naval Air Systems Command (NAVAIR); Space and Naval Warfare Systems Command (SPAWAR); Naval Sea Systems Command (NAVSEA); PEO Ships; Air Force Space and Missile Command; Army Intelligence and Information Warfare Directorate; Office of Naval Intelligence; Marine Corps Tactical Systems Support Activity; the Army Communications and Electronics Research, Development and Engineering Command (CERDEC); and several partner nations. <p>FY 2019 Plans:</p> <ul style="list-style-type: none"> - The NCRC will continue to implement improvements needed to increase capacity and support increased demand at the current cyber ranges. - The NCRC will continue to build out additional dedicated Persistent Testing and Training Environments to support testing and training customers. 	10.000	71.626	67.934	-	67.934

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul style="list-style-type: none"> - The NCRC will continue to operate in support of the growing acquisition program cybersecurity T&E requirements. - The NCRC will continue to provide Cyber Table Top support for acquisition programs to help assess and address cyber security as early as possible in development. - The NCRC will continue to provide support to US Cyber Command, Joint Staff, and other training and certification events by developing representative blue, red and gray environments. - The NCRC will continue to support DOT&E cyber assessments. - The NCRC will continue to support US Cyber Command cyber activities. - The NCRC will continue to expand testing of Industrial Control Systems and Avionics Systems test beds. - The NCRC will increase capacity by establishing additional cyber ranges in support of both cyber T&E and training requirements. - The NCRC will conduct engineering activities to plan for technical refresh of emerging end of life and end of service computing assets. - The NCRC will continue to assess cyber range requirements in close cooperation with the Executive Agents for Cyber Test Ranges and Cyber Training Ranges to build priority cyber range capability and capacity to meet identified RDT&E community and CMF needs. - The NCRC will continue analyses of capability to determine requirements and standards needed to join these cyber test facilities with existing acquisition system hardware-in-the-loop, software-in-the-loop, and systems integration laboratories to test systems in a realistic cyber contested environment. - The NCRC will continue to expand the JMN connectivity as needed to provide access to cyber range resources. <p><i>FY 2020 Base Plans:</i></p>					

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul style="list-style-type: none"> - The NCRC will continue to implement improvements needed to increase capacity and support increased demand at the current cyber ranges. - The NCRC will continue to build out additional dedicated Persistent Testing and Training Environments to support testing and training customers. - The NCRC will continue to operate in support of the growing acquisition program cybersecurity T&E requirements. - The NCRC will continue to provide Cyber Table Top support for acquisition programs to help assess and address cyber security as early as possible in development. - The NCRC will continue to provide support to US Cyber Command, Joint Staff, and other training and certification events by developing representative blue, red and gray environments. - The NCRC will continue to support DOT&E cyber assessments. - The NCRC will continue to support US Cyber Command cyber activities. - The NCRC will increase capacity by establishing additional cyber ranges in support of both cyber T&E and training requirements. - The NCRC will conduct engineering activities to plan for technical refresh of emerging end of life and end of service computing assets. - The NCRC will continue to assess cyber range requirements in close cooperation with the Executive Agents for Cyber Test Ranges and Cyber Training Ranges to build priority cyber range capability and capacity to meet identified RDT&E community and CMF needs. - The NCRC will continue analyses of capability to determine requirements and standards needed to join these cyber test facilities with existing acquisition system hardware-in-the-loop, software-in-the-loop, and systems integration laboratories to test systems in a realistic cyber contested environment. 					

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- The NCRC will continue to expand the JMN connectivity as needed to provide access to cyber range resources.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Program Adjustments					
Accomplishments/Planned Programs Subtotals	10.000	71.626	67.934	-	67.934

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
N/A

E. Performance Metrics

- Amount of increase in computing power
- Number of events capable of supporting
- Number of cyber ranges available

UNCLASSIFIED

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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
100: JMETC	-	22.172	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Mission Environment Test Capability (JMETC) program provides a Department of Defense (DoD) enterprise-wide test capability to support system-to-system interoperability testing, mission-level environment testing, and cyber event operations, including cyber testing, cyber training, cyber experimentation, and cyber mission rehearsal. The JMETC program implements the infrastructure capabilities defined in the DoD "Testing in a Joint Environment Roadmap" to provide acquisition program managers a robust nation-wide capability to "test like we fight." The JMETC program provides a persistent, distributed test and evaluation (T&E) capability that supports system development to measure and improve interoperability performance and cyber resiliency, which otherwise would not be readily available to Service/Component acquisition programs. The JMETC program is funded within the Research, Development, Test and Evaluation (RDT&E) Management Support Budget Activity because it provides test capability in support of RDT&E programs. By linking distributed facilities, as well as providing the necessary tools, services and subject matter expertise, the JMETC program allows acquisition programs to efficiently evaluate their warfighting capability in a realistic joint mission environment. The JMETC Program has been aligned to advance the National Defense Strategy (NDS), to test the development of resilient, survivable, federated networks and information ecosystems from the tactical level up to strategic planning, as well as test and assess cyber defenses, building a more lethal force.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: JMETC	22.172	0.000	0.000	0.000	0.000
Description: Due to the ever increasing cyber test requirements, the JMETC Program developed a strategy to expand cyber test range capabilities. The cyber test range expansion is being implemented in Project 88 in FY 2019. To ease the ability to track and monitor cyber test infrastructure investments, the JMETC projects were realigned and consolidated under Project 88: JMETC National Cyber Range (NCR) Complex.					
FY 2019 Plans: Activities realigned under Project 88: JMETC National Cyber Range (NCR) Complex. All cyber activities within the JMETC Program being executed under Project 88 in FY 2019.					
FY 2020 Base Plans: Activities realigned under Project 88: JMETC National Cyber Range (NCR) Complex.					
FY 2020 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	22.172	0.000	0.000	0.000	0.000

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C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
Activities realigned under Project 88: JMETC National Cyber Range (NCR) Complex.

E. Performance Metrics
Activities realigned under Project 88: JMETC National Cyber Range (NCR) Complex.