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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>
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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	878.234	122.817	133.962	176.486	-	176.486	-	-	-	-	-	-
2039: <i>COOP Engagement</i>	878.234	105.111	94.681	91.299	-	91.299	-	-	-	-	-	-
3240: <i>CEC Increment II</i>	0.000	17.706	39.281	85.187	-	85.187	-	-	-	-	-	-

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 582

A. Mission Description and Budget Item Justification

Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture to support integrated fire control.

CEC distributes sensor data from each USMC Command Control Unit, US Navy Ship, and US Navy Aircraft, or Cooperating Unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data-rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

CEC significantly improves our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC provides critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

The CEC Program Office oversees CEC development for all services with funding provided for their respective combat systems. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directional system providing high data throughput as well common time and common positional frame of reference. The CEP is a high capacity distributed processor that processes data from all integrated radars. The data is passed to the ship's combat system as a high quality, common, continuous, engageable track.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

Network Enabled Electronic Defense System (NEEDS) modifies CEC software to add significant Electronic Warfare capability.

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CEC operates in increasingly contentious cyber-space. Measures are being taken to robustly mitigate, and where possible completely remediate cyber vulnerabilities.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	127.924	143.667	175.605	-	175.605
Current President's Budget	122.817	133.962	176.486	-	176.486
Total Adjustments	-5.107	-9.705	0.881	-	0.881
• Congressional General Reductions	-	-0.640			
• Congressional Directed Reductions	-	-9.065			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-5.107	0.000			
• Program Adjustments	0.000	0.000	4.537	-	4.537
• Rate/Misc Adjustments	0.000	0.000	-3.656	-	-3.656

Change Summary Explanation

FY 2021 decrease of \$9.705M is due to Congressional Reductions.

FY 2022 increase of \$0.881M is due to \$4.537M Program Adjustments and \$-3.656M due to Rate/Misc Adjustments.

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Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>				Project (Number/Name) 2039 / <i>COOP Engagement</i>			
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
2039: <i>COOP Engagement</i>	878.234	105.111	94.681	91.299	-	91.299	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 582												

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CEC distributes sensor data from each USMC Command Control Unit, US Navy Ship, and US Navy Aircraft, or Cooperating Unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data-rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

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The CEC Program Office oversees CEC development for all services with funding provided for their respective combat systems. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directional system providing high data throughput as well common time and common positional frame of reference. The CEP is a high capacity distributed processor that processes data from all integrated radars. The data is passed to the ship's combat system as a high quality, common, continuous, engageable track.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: E-2D</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Conduct E-2D DSSC 4 CEC software FQT. Prepare for conduct of E-2D DSSC 4 DT and OT. Complete Formal Qualification Testing (FQT) and Independent Verification and Validation (IV&V) testing in support of certification of CEC software for fielding with E-2D DSSC-4. Continue detailed design efforts for E-2D DSSC 5 CEC software, including interface development and integration of CEC capabilities, and of E-2D CEC networking, sensor, and tracker capability and performance improvements included in DSSC 5 software and associated hardware. Support development of E-2D DSSC 6 CEC requirements, and interface and design documentation.</p> <p>FY 2022 Base Plans: Complete software development and test for E-2D DSSC 5 CEC software, including interface development and integration of CEC capabilities, and of E-2D CEC networking, sensor, and tracker capability and performance improvements included in DSSC 5 software and associated hardware. Conduct E-2D DSSC 5 CEC software FQT. Prepare for conduct of E-2D DSSC 4 OT. Prepare for conduct of E-2D DSSC 5 DT and OT. Begin detailed design efforts for E-2D DSSC 6 CEC software including interface development and integration of CEC capabilities, and of E-2D CEC networking, sensor, and tracker capability and performance improvements included in DSSC 6 software and associated hardware.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to concurrent DSSC 4, DSSC 5, and DSSC 6 development and test efforts in FY22.</p>	3.874	4.262	4.534	0.000	4.534
	-	-	-	-	-
<p>Title: B/L 2.1 INTEGRATION AND FOT&E TESTING</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Complete Developmental Testing (DT-D2) of AN/USG-2B with CVN 78. Conduct testing of CEC AN/USG-3B with E-2D DSSC-4 onboard E-2D Test Aircraft from Test Squadron VX-20, supported by multiple Land Based Test Sites. Conduct Live Fire Test 7 (LFT 7) at White Sands Missile Range (WSMR). Conduct tracking events prior to each live fire event. Commence CEC Operational Test (OT-D3) of AN/USG-2B with DDG 1000 combat system. Complete CEC Developmental Test (DT-D4) of AN/USG-2B with Aegis ACB 16 at the Wallops Island Land Based Test Sites and at sea onboard USN Ships. Conduct CSSQT aboard USS COWPENS (CG 63), USS</p>	10.925	12.020	12.789	0.000	12.789
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>GETTYSBURG (CG 64), USS SHOUP (DDG 86), and FRANK E. PETERSEN (DDG 121). Continue testing of NEEDS on multiple USN Ships. Continue testing of CET and CTT on multiple USN Ships. Continue planning for FFG(X) Developmental Test (DT) events. Conduct CSSQT aboard USS GERALD R. FORD (CVN 78).</p> <p>FY 2022 Base Plans: Commence Operational Testing (OT-D2) of AN/USG-2B with CVN 78 onboard USS GERALD R FORD (CVN 78) with support from multiple Land Based Test Sites. Conduct underway NIFC-CA At Sea Live Fire Test 7 (AS 7). Complete CEC Operational Test (OT-D3) of AN/USG-2B with DDG 1000 combat system onboard USS ZUMWALT (DDG 1000). Commence Operational Testing (OT-D4) of AN/USG-2B with Aegis ACB 16 with support from multiple Land Based Test Sites. Commence CEC Developmental Test (DT-Dx) of AN/USG-2B with Aegis ACB 20 at the Wallops Island Land Based Test Sites. Complete testing of CEC AN/USG-3B with E-2D DSSC-4 onboard E-2D Test Aircraft from Test Squadron VX-20. Continue planning for FFG(X) Developmental Test (DT) events.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to execution of OT on CVN 78 and DDG 1000, commencement of DT for ACB-20 and the planned underway NIFC-CA Live Fire Test.</p>					
<p>Title: SYSTEM IMPROVEMENTS</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Support multiple CSSQT events for AEGIS 9.2.1 and 9.2.2 platforms. Support CSCP for AEGIS 9.2.2. Continue development of CEC S/W in support of AEGIS CP 22-1, conduct two SBRs, a PRP in support of AEGIS CP 22-1 CSSQT in FY21 and FQT/IV&V to support PCP and CSCP planned in FY22. Conduct a System Requirements Review (SRR) and Software Functional Review (SFR) and commence development of CEC S/W to support the AEGIS Virtual Pilot Ship Increment II (VPS Inc II) project. Commence development of CEC S/W in support of AEGIS CP 23-1 and 23-2, including integration of new sensor AN/SPS-73(V)18 and select CEC Increment 2 capabilities. Continue software development for AN/SPY-6(V)1 and AEGIS B/L 10 integration. Develop and test SW ERs #5, #6 and #7. Conduct two SBRs for AEGIS B/L 10. Complete development, including environmental qualification, Engineering Change Proposal (ECP) and Technical Data Package (TDP) of the PDMC-R H/W. Continue robust systems engineering in conjunction with shipboard, airborne, and land-based combat systems to integrate MiND technology in CEC in support of enhanced network capability deployment in FY24. Continue</p>	16.123	20.184	25.784	0.000	25.784
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>development of software features in the DDS as well as the CEP to support MiND technology integration and CEN capability implementation. Continue generation of a Technical Data Package (TDP) that includes development and upgrades to CEC hardware to support MiND/CEN operation. Continue development and modifications to CEC Special Test Equipment (STE) in support of testing MiND/CEN capability. Continue robust systems engineering in conjunction with navigation systems and shipboard, airborne, and land-based combat systems to integrate Non-GPS Aided Positioning, Navigation, and Timing [PNT] for Surface Ships (NoGAPSS) technology in CEC in support of Assured PNT capability deployment in FY24.</p> <p>FY 2022 Base Plans: Conduct a PCP for CEC S/W in support of CSCP for AEGIS CP 22-1. Support CSSQT events for CP 22-1 platforms. Continue development of CEC S/W in support of AEGIS CP 23-1 and 23-2 - conduct two SBRs, a PRP to support ALO for CP 23-1 and 23-2 platforms, and FQT/IV&V to support PCP and CSCP planned in FY23. Continue development of CEC S/W for the AEGIS VPS Inc II project including two SBRs and a PRP to support a Combat System integration event. Commence development of CEC S/W to support AEGIS CP 24-1 and 24-2. Conduct FQT/IV&V of CEC S/W (CLIN0001 Completion Task on current CEC Design Agent/Engineering Services contract) to support a PRP for ALO for DDG 125 with AEGIS B/L 10.0. Continue development CEC S/W to support AEGIS B/L 10.0 integration and test activities. Commence CEC S/W development to support the AEGIS B/L 10.1 development, including coordination of this development for the Frigate Weapon System onboard the FFG(X) class. Continue robust systems engineering in conjunction with shipboard, airborne, and land-based combat systems to integrate MiND technology in CEC in support of enhanced network capability deployment in FY24. Continue development of software features in the DDS as well as the CEP to support MiND technology integration and CEN capability implementation. Continue generation of a Technical Data Package (TDP) that includes development and upgrades to CEC hardware to support MiND/CEN operation. Continue development and modifications to CEC Special Test Equipment (STE) in support of testing MiND/CEN capability. Continue robust systems engineering in conjunction with navigation systems and shipboard, airborne, and land-based combat systems to integrate Non-GPS Aided Positioning, Navigation, and Timing [PNT] for Surface Ships (NoGAPSS) technology in CEC in support of Assured PNT capability deployment in FY24.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
Increase is due to concurrent development of system improvements for in-service Aegis and SSDS baselines as well as development for new platforms including Virtual Pilot Ship (VPS) and FFG(X).						
Title: NETWORK ENABLED ELECTRONIC DEFENSE SYSTEM (NEEDS)						
Articles:						
		2.080	1.121	0.516	0.000	0.516
		-	-	-	-	-
FY 2021 Plans: Complete Flight testing of CEC Software onboard E-2D aircraft. Support Combat System Certification Panel (CSCP) for AWS 9.2.2 and Aegis Lightoff (ALO) on DDG 122 and Combat System Lightoff (CSLO) on CVN 73. Continue integration of NEEDS with E-2D CEC software.						
FY 2022 Base Plans: Perform fixes for residual software problems.						
FY 2022 OCO Plans: N/A						
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease is due to transitioning from development, certification, and to residual PTR fixes.						
Title: FIELD ACTIVITIES						
Articles:						
		8.774	9.944	10.579	0.000	10.579
		-	-	-	-	-
FY 2021 Plans: Continue field activity support of CEC development and fielding efforts (including Software Engineering / Integration Agent (SE/IA), Technical Direction Agent, In-Service Engineering Agent, Integrated Logistics Support planning) and program management support. Facilitate fielding of systems improvements and maintenance efforts.						
FY 2022 Base Plans: Continue field activity support of CEC development and fielding efforts (including Software Engineering / Integration Agent (SE/IA), Technical Direction Agent, In-Service Engineering Agent, Integrated Logistics Support planning) and program management support. Facilitate fielding of systems improvements and maintenance efforts.						
FY 2022 OCO Plans: N/A						
FY 2021 to FY 2022 Increase/Decrease Statement:						

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Increase is due to increased systems engineering efforts associated with CEC development and fielding efforts including CEC Block II capabilities.					
Title: COMMON ARRAY BLOCK (CAB) ANTENNA Articles:	7.746 -	0.000 -	0.000 -	0.000 -	0.000 -
FY 2021 Plans: CAB antenna development cancelled and will not continue beyond FY20. Transition to development of future improved, scalable CEC antenna.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
Title: NAVAL INTEGRATED FIRE CONTROL-COUNTER AIR (NIFC-CA) Articles:	6.625 -	3.605 -	7.755 -	0.000 -	7.755 -
FY 2021 Plans: Continue robust systems engineering for NIFC Increment 3 in close coordination with other NIFC pillars. Continue Modeling and Simulation (M&S) to inform operational and design analysis, and provide limited support to NIFC Increment 3 interface and integration design document development and test support and testing. Begin requirement discussions with USMC.					
FY 2022 Base Plans: Support NIFC At-Sea and Live Fire test events. Address issues discovered during NIFC Increment 2 Improvements testing. Continue robust systems engineering for NIFC Increment 3 in close coordination with other NIFC pillars. Support NIFC Increment 3 interface and integration design document development and test support and testing. Continue requirement discussions with USMC.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to concurrent At-Sea and Live Fire test event planning and execution.					
Title: FIRE CONTROL LOOP IMPROVEMENT INITIATIVE (FCLIP) PHASE 2 Articles:	4.453 -	1.547 -	0.000 -	0.000 -	0.000 -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p><i>FY 2021 Plans:</i> Complete the Combat System Shipboard Qualification Test (CSSQT) for CVN 70. Conduct data analysis. Deliver element certified software to four ships and support Combat System Light Off (CSLO) on LPD 28 and CVN 73.</p> <p><i>FY 2022 Base Plans:</i> N/A</p> <p><i>FY 2022 OCO Plans:</i> N/A</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Decrease is due to completion of development effort.</p>					
<p><i>Title:</i> CEC INCREMENT 2</p> <p align="right"><i>Articles:</i></p> <p><i>Description:</i> CEC Increment 2 refers to initial efforts to expand CEC tracking capabilities to include surface tracking and other experimental / proof of concept efforts. CEC Increment 2 does not cover efforts associated with CEC Increment II. CEC Increment II is covered under PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC Increment II starting in FY20.</p> <p><i>FY 2021 Plans:</i> Continue ABMA experimentation and risk reduction efforts for ABMA. Continue efforts with advanced warfare coordination for Electronic Warfare (EW) features in conjunction with the CRFEW project. Support maturation and transition of technology initiatives.</p> <p><i>FY 2022 Base Plans:</i> Continue ABMA experimentation and risk reduction efforts for ABMA. Mature and transition CRFEW algorithms for integration into CEC BLK II.</p> <p><i>FY 2022 OCO Plans:</i> N/A</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></p>	1.818	1.200	0.929	0.000	0.929
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
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Decrease in funding due to completion of algorithm maturation efforts in FY22 and focus on transition of algorithms for integration in CEC BLK II.

Title: PROGRAM PROTECTION	9.205	11.371	12.084	0.000	12.084
Articles:	-	-	-	-	-
FY 2021 Plans: Provide CEC Program Protection support to manage risks from foreign intelligence collection threats to CEC hardware, software, or supply chain exploitation. CEC critical program information (CPI) is required to be protected with anti-tamper. The effort will further the use of anti-tamper protection within the program. CEC will work closely with the Cyber Assessment Agency and Defense Assessment Management Office to access impacts to the program from exploitation. The effort will further maintain the Program Protection Plan (PPP) and updates to the program Security Classification Guide (SCG).					
FY 2022 Base Plans: Provide CEC Program Protection support to manage risks from foreign intelligence collection threats to CEC hardware, software, or supply chain exploitation. CEC critical program information (CPI) is required to be protected with anti-tamper. The effort will further the use of anti-tamper protection within the program. CEC will work closely with the Cyber Assessment Agency and Defense Assessment Management Office to access impacts to the program from exploitation. The effort will further maintain the Program Protection Plan (PPP) and updates to the program Security Classification Guide (SCG).					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to continued integration phase, sustainment management, and increased development efforts to meet export requirements.					

Title: ENTERPRISE AIR SURVEILLANCE RADAR (EASR)	7.452	6.600	7.334	0.000	7.334
Articles:	-	-	-	-	-
FY 2021 Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
<p>Continue CEC Software Baseline 11 development for SSDS Baseline 12 and EASR. Commence NGSSR integration testing and continue EASR integration testing at Wallops Island with SSDS. Prepare to deliver first CEC with NGSSR capability to LHD 2, LPD 29 and LHA 7 in the 1st quarter of FY 22.</p> <p>FY 2022 Base Plans: Continue Baseline 11 Integration and Test with SSDS Baseline 12 and EASR. Commence Formal Developmental Testing. Conduct Formal Qualification Testing (FQT) and Independent Verification and Validation (IV&V) testing in support of final certification of software to support fielding. Commence fielding CEC Baseline 11 on non EASR SSDS ships.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to transition to FQT, IV&V, DT Testing.</p>					
<p>Title: DIGITAL WARFARE TACTICAL NETWORKING INITIATIVE IMPLEMENTATION</p>					
<p align="right">Articles:</p>					
<p>FY 2021 Plans: Continue leading a Cross Functional Team (CFT) with participation from key naval tactical network organizations and fleet representation to conduct systems engineering and experimentation for improving tactical data dissemination to support further development of Integrated Fire Control concepts. Support Program of Record (PoR) Communication-as-a-Service (CaaS) development. This includes CaaS implementation across multiple radios, waveforms, and network architectures; development of Model Based System Engineering (MBSE) SysML models; continue implementation of radio interface with Tactical Targeting Network Technology (TTNT); and formulate solutions toward the development of Naval Tactical Grid and Distributed Maritime Operations. Support preparation for element level System Requirements Review (SRR) to incorporate CaaS across multiple radios waveforms, and network architectures. Continue support in preparing for FY22 Demonstration.</p> <p>FY 2022 Base Plans: Digital Warfare Tactical Networking Initiative efforts transition to PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II in FY22. FY22 Base Plans are identified under PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II.</p> <p>FY 2022 OCO Plans:</p>					
	23.100	9.955	0.000	0.000	0.000
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Decrease is due to transition from demonstration preparation and requirements analysis to start of software implementation and transition of effort to PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II in FY22.					
<i>Title:</i> CEC CYBER RESILIENCY	1.416	5.850	8.057	0.000	8.057
<i>Articles:</i>	-	-	-	-	-
<i>FY 2021 Plans:</i> Conduct a CEC Cybersecurity Tabletop (CTT) exercise, review and analyze results, and develop strategies in conjunction with CEC AC1 and Block II developers to translate findings into design requirements and executable cybersecurity system upgrades. Support conduct of the NCDSO analysis in FY21. Execute revised plans for cybersecurity improvement initiatives to CEC and interfacing combat system/sensor elements and enclaves. Develop and support implementation of cybersecurity improvement initiatives in upgraded CEC hardware and software suites, and perform robust cybersecurity system engineering in coordination with interfacing platforms to address cybersecurity issues and reduce the CEC cybersecurity risk posture. Conduct Information Assurance Vulnerability Management (IAVM) testing, implement improvements suggested as a result of testing, and support CEC cybersecurity compliance requirements. Participate in CyberSafe evaluation and certification initiatives.					
<i>FY 2022 Base Plans:</i> Continue implementation of CEC CTT findings, cross domain interface solutions, and various other CEC cybersecurity enhancement capabilities (most classified) in CEC 10.x and 11.x software baselines, Gold disk releases, and hardware upgrades. Ensure cybersecurity requirements are fully considered and implemented in SDP Next development efforts. Review results of the NCDSO analysis conducted in FY20/FY21 and translate those findings into CEC cybersecurity risk reduction requirements, design enhancements, and executable cybersecurity system upgrades. Define and support conduct of IA testing of CEC software baselines, Gold Disk releases, and hardware upgrades underway in FY22. Participate in CEC Block II development efforts to ensure cybersecurity requirements are defined, considered, and implemented. Ensure Web Services capability implementation in CEC combat system integration efforts meets required cybersecurity standards. Ensure ATO and other cybersecurity compliance requirements are met, and support PEO IWS, SEA 03, and platform combat system cybersecurity data calls. Support combat system and CEC cybersecurity interface and hardware/software design requirement definition, development, and implementation.					
<i>FY 2022 OCO Plans:</i>					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / Cooperative Engagement Capability	Project (Number/Name) 2039 / COOP Engagement

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: FY22 increase from FY21 due to deferment of efforts from FY21 to FY22 and beyond.					
Title: ANTENNA DEVELOPMENT	0.000	7.022	0.938	0.000	0.938
Articles:	-	-	-	-	-
FY 2021 Plans: Initiate trade studies, technology surveys, and documentation for prototype development of future improved, scalable CEC antenna.					
FY 2022 Base Plans: Complete trade studies, technology surveys, and documentation for prototype development of future improved, scalable CEC antenna.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease in funding due to ramping down of effort under CEC Project 2039 / CEC in preparation for transition of effort to CEC Project 3240 / CEC Increment II.					
Title: ELEKTRA	1.520	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2021 Plans: Elektra algorithm transition has been postponed to the following year.					
FY 2022 Base Plans: ELEKTRA efforts transition to PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II in FY22. FY22 Base Plans are identified under PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Increase from FY21 in Project 2039 to FY22 in Project 3240 is due to the postponement of the transition from FY21 to FY22.					
Accomplishments/Planned Programs Subtotals	105.111	94.681	91.299	0.000	91.299

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SCN: Navy, SCN	43.400	33.372	18.502	-	18.502	-	-	-	-	-	-
• APN/0204152N: Navy, APN	21.155	17.982	18.341	-	18.341	-	-	-	-	-	-
• OPN/2606: CEC	30.452	26.006	24.641	-	24.641	-	-	-	-	-	-
• RDT&E/0206313M: USMC	1.009	1.603	1.651	-	1.651	-	-	-	-	-	-
• O&M,N/0206626M: USMC	3.520	2.212	2.278	-	2.278	-	-	-	-	-	-
• PMC/0206313M: USMC	0.000	1.252	0.000	-	0.000	-	-	-	-	-	-
• OPN/0960: CG MOD	2.900	0.300	1.400	-	1.400	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Full Rate Production for CEC AN/USG-3B variant approved April 2014. Latest revision of CEC Acquisition Strategy (AS) approved by ASN (RDA) on 29 June 2020. Latest revision of CEC Acquisition Plan (AP) approved Q2 FY 2021.

Contracts:
 Common Array Block (CAB) antenna - contract competitively awarded Q4 FY 2013.
 CEC Design Agent/Engineering Services (DA/ES) follow-on sole source contract awarded Q4 FY 2013. A sole source 15 month CEC DA/ES contract extension awarded Q4 FY 2018.
 CEC DA/ES contract competitively awarded Q3 FY 2019. For DA, the contractor will maintain the CEC hardware and software development environment and testing infrastructure including; Systems and Software Laboratories, the external RF Range, the Compact Antenna Range, and the CEC Classified Development LAN. For ES, the contractor will develop software implementing CEC capability improvements; support advance studies and integration; and perform CEC software sustainment and support.
 CEC Production - Contract competitively awarded in Q2 FY 2015.
 CEC SDP-S Production - Contract competitively awarded in Q4 FY 2017.
 CEC PAAA Competitive - Contract competitively awarded in Q3 FY 2020.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
AN/USG-2/3 Design Agent/Engineering Services	C/CPFF	Raytheon : St. Petersburg, FL	158.762	10.302	Oct 2019	12.981	Oct 2020	14.837	Oct 2021	-		14.837	-	-	-
TDA	C/CPFF	JHU/APL : Laurel, MD	109.161	10.224	Oct 2019	12.532	Oct 2020	14.311	Oct 2021	-		14.311	-	-	-
SI/DA	C/CPAF	General Dynamics : Fairfax, VA	23.979	0.000		0.000		0.000		-		0.000	-	-	-
SI/DA	C/CPAF	Award Fees : Not Specified	2.903	0.000		0.000		0.000		-		0.000	-	-	-
DDG 1000	C/CPAF	Raytheon : Massachusetts	10.983	0.000		0.000		0.000		-		0.000	-	-	-
DDG 1000	C/CPAF	Award Fees : Not Specified	0.447	0.000		0.000		0.000		-		0.000	-	-	-
NIFC-CA Integration	Various	Various : Various	54.370	6.625	Oct 2019	3.605	Oct 2020	7.755	Oct 2021	-		7.755	-	-	-
In-Service Engineering Activity	WR	NSWC : Port Hueneme, CA	13.224	1.563	Oct 2019	1.399	Oct 2020	2.578	Oct 2021	-		2.578	-	-	-
Software Support Activity/ SEIA	WR	NSWC : Dahlgren, VA	26.715	1.296	Oct 2019	1.360	Oct 2020	2.645	Oct 2021	-		2.645	-	-	-
Production Engineering Activity	WR	NSWC : Crane, IN	6.870	0.512	Oct 2019	0.656	Oct 2020	0.742	Oct 2021	-		0.742	-	-	-
JTRS	Various	Various : Various	8.500	0.000		0.000		0.000		-		0.000	-	-	-
Various	WR	Various : Various	31.873	0.000		0.000		0.000		-		0.000	-	-	-
NAVSSI	WR	NIWC : San Diego, CA	0.368	0.000		0.000		0.000		-		0.000	-	-	-
Certification	MIPR	NSA : Fort Meade, MD	1.200	0.000		0.000		0.000		-		0.000	-	-	-
Certification	WR	NIWC : Charleston, SC	0.930	0.000		0.000		0.000		-		0.000	-	-	-
Joint Exercises	WR	Various : Various	3.744	0.000		0.000		0.000		-		0.000	-	-	-
LBTS Testing	WR	CDSA Dam Neck : Virginia Beach, VA	8.995	0.500	Oct 2019	0.600	Oct 2020	0.650	Oct 2021	-		0.650	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
LBTS Testing	WR	SCSC : Wallops Island, VA	8.583	0.500	Oct 2019	0.600	Oct 2020	0.600	Oct 2021	-		0.600	-	-	-
E-2D Integration	Various	Various : Various	57.640	3.874	Oct 2019	4.262	Oct 2020	4.534	Oct 2021	-		4.534	-	-	-
MSI/NCCT	MIPR	Wright Patterson AFB : Dayton, OH	1.228	0.000		0.000		0.000		-		0.000	-	-	-
Common Array Block Development	C/CPFF	Raytheon : St. Petersburg, FL	75.110	7.746	Oct 2019	0.000		0.000		-		0.000	-	-	-
NEEDS	Various	Various : Various	46.452	2.080	Oct 2019	1.121	Oct 2020	0.516	Oct 2021	-		0.516	-	-	-
AMDR	Various	Various : Various	17.308	0.000		0.000		0.000		-		0.000	-	-	-
JTMC	C/CPFF	Raytheon : St. Petersburg, FL	1.000	0.000		0.000		0.000		-		0.000	-	-	-
FCLIP	Various	Various : Various	31.823	4.453	Oct 2019	1.547	Oct 2020	0.000		-		0.000	-	-	-
CEC Increment 2	Various	Various : Various	4.790	1.818	Oct 2019	1.200	Oct 2020	0.929	Oct 2021	-		0.929	-	-	-
Program Protection	C/BA	NSMA : Washington, DC	20.390	9.205	Oct 2019	11.371	Oct 2020	12.084	Oct 2021	-		12.084	-	-	-
EASR	Various	Various : Various	7.438	7.452	Oct 2019	6.600	Oct 2020	7.334	Oct 2021	-		7.334	-	-	-
Crypto Modernization	Various	Various : Various	4.552	0.000		0.000		0.000		-		0.000	-	-	-
Digital Warfare Tactical Networking Initiative Implementation	Various	Various : Various	17.750	23.100	Oct 2019	9.955	Oct 2020	0.000		-		0.000	-	-	-
FTIIP	Various	Various : Various	6.500	0.000		0.000		0.000		-		0.000	-	-	-
Cyber Resiliency	Various	Various : Various	4.434	1.416	Oct 2019	5.850	Oct 2020	8.057	Oct 2021	-		8.057	-	-	-
ELEKTRA	Various	Various : Various	0.000	1.520	Oct 2019	0.000		0.000		-		0.000	-	-	-
ANTENNA DEVELOPMENT	Various	Various : Various	0.000	0.000		7.022	Oct 2020	0.938	Oct 2021	-		0.938	-	-	-
Subtotal			768.022	94.186		82.661		78.510		-		78.510	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Test/ACB Support	C/CPFF	Raytheon : St. Petersburg, FL	8.649	1.321	Oct 2019	1.480	Oct 2020	1.795	Oct 2021	-		1.795	-	-	-
Test/ACB Support	C/CPFF	JHU/APL : Laurel, MD	7.220	1.777	Oct 2019	1.933	Oct 2020	2.033	Oct 2021	-		2.033	-	-	-
Test Support	WR	NRL : Washington, DC	0.313	0.000		0.000		0.000		-		0.000	-	-	-
Test/ACB Support	WR	NSWC : Port Hueneme, CA	29.926	2.105	Oct 2019	2.261	Oct 2020	2.281	Oct 2021	-		2.281	-	-	-
Air Operations Test Support	WR	NAVAIR (PMA207) : Patuxent River, MD	13.547	1.190	Oct 2019	1.346	Oct 2020	1.500	Oct 2021	-		1.500	-	-	-
Test Data Reduction Analysis	WR	NSWC : Corona, CA	22.185	1.583	Oct 2019	1.739	Oct 2020	1.931	Oct 2021	-		1.931	-	-	-
Test Support	WR	COMOPTEVFOR : Norfolk, VA	16.338	1.394	Oct 2019	1.550	Oct 2020	1.796	Oct 2021	-		1.796	-	-	-
Test/ACB Support	WR	NSWC : Dahlgren, VA	6.604	1.555	Oct 2019	1.711	Oct 2020	1.453	Oct 2021	-		1.453	-	-	-
Subtotal			104.782	10.925		12.020		12.789		-		12.789	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Program Management Support	C/FFP	Booz Allen & Hamilton : Washington, DC	5.070	0.000		0.000		0.000		-		0.000	-	-	-
Program Management Support	C/FFP	Tech Marine : Washington, DC	0.360	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			5.430	0.000		0.000		0.000		-		0.000	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy								Date: May 2021					
Appropriation/Budget Activity 1319 / 7				R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>				Project (Number/Name) 2039 / <i>COOP Engagement</i>					
	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	878.234	105.111		94.681		91.299		-		91.299	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Fiscal Year	FY20				FY21				FY22			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones		◆ CSB/Gate 6 FY20	◆ CEC AS			◆ CSB/Gate 6 FY21			◇ CSB/Gate 6 FY22			
Program Milestones - CEC						◆ CEC AP Production						
CEC System Improvements					◆ SBR 20.3		◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
CEC Aegis Weapon System (AWS) BL 10.0	◆ SFR	◆ Delta SFR			◆ SBR 20.3		◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3			
CEC SSDS BL 12							◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	
CEC Sustainment	◆ SSWG FY20	◆ PSWG FY20			◆ SSWG FY21	◆ PSWG FY21			◇ SSWG FY22	◇ PSWG FY22		
CEC Cyber				◆ SBR 20.2	◆ SBR 20.3		◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
Contracts												
CEC Competitive Production (Current)									△			
CEC Future Competitive Production								△ RFP Release				△ Contra
CEC Signal Data Processor - Sierra (SDP-S) Competitive Production		▲										
CEC SDP-S Competitive Production	▲ CEC SDP-S First SDP-S Delivery								△			
CEC DA/ES Follow-On Competitive												
Common Array Block (CAB) Antenna Competitive				▲								
Plannar Array Antenna Assembly (PAAA) Production			▲ Contract Award									

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / Cooperative Engagement Capability	Project (Number/Name) 2039 / COOP Engagement

Fiscal Year	FY20				FY21				FY22					
Quarter	1	2	3	4	1	2	3	4	1	2	3	4		
Test & Evaluation		▲ NIFC At Sea Event-6					◇ CEC TEMP Rev 6 Change 1						◇ CEC TI	
		◆ OT-IIIIF SS TRACKEX Phase 1					△ NIFC LFT -7 TRACKEX			△ NIFC LFT-8 Event				
								△ NIFC At Sea Event-07/09						
			▲ DT-Dx CEC USG-3B on DSSC 4					△		△ OT-Dx CEC USG-3B on DSSC 4				
			▲ DT-D2 CEC USG-2B on CVN 78					△			△ OT-D2 CEC USG-2B on			
								△						
								▲ DT - D4 AWS 9.2.1/9.2.2				△		△
								▲ DT-D3 CEC USG-2B on DDG 1000				△		△
								▲			△ OT-D3 CEC USG -2B on I			
														△ DT CEC USG-2
													△ DT CEC USG-2I	

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date: May 2021**

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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<p>Legend</p> <ul style="list-style-type: none"> Actual Milestone Completion Planned Milestone Completion Actual Event Start/Completion Planned Event Start/Completion Current Date Delivery Period based on Last Order Date 	<p>ACB: Advance Capability Build</p> <p>AC/FD: Advance Capabilities/Future Developments</p> <p>AWS: Aegis Weapon System</p> <p>AP: Acquisition Plan</p> <p>AS: Acquisition Strategy</p> <p>APB: Acquisition Program Baseline</p> <p>CAB: Common Array Block</p> <p>Common Array Block - Shipboard</p> <p>CDD: Capability Development Document</p> <p>CEC: Cooperative Engagement Capability</p> <p>CEN: CEC Enhanced Network</p> <p>CSSQT: Combat System Shipboard Qualification Trials</p> <p>CTT: CEC Technical Training</p> <p>DA/ES: Design Agent/Engineering Services</p> <p>DT: Developmental Test</p> <p>DWO: Digital Warfare Office</p> <p>ERS: Enterprise Radar Suite</p>	<p>FCLIP: Fire Control Loop Improvement Project</p> <p>FNC: Future Naval Capability</p> <p>FOC: Full Operational Capability</p> <p>FSBR: Final Software Build Review</p> <p>FTIIP: Far Term Interoperability Improvement Project</p> <p>FY: Fiscal Year</p> <p>HS: Hypersonic</p> <p>ILA: Independent Logistics Assessment</p> <p>IPR: Internal Program Review</p> <p>LFT: Live Fire Test</p> <p>NIFC: Naval Integrated Fire Control</p> <p>NIFC P: Naval Integrated Fire Control Passive</p> <p>NIFC-CA: Naval Integrated Fire Control - Counter Air</p> <p>NoGAPSS: Non-GPS Aided PNT (Position, Navigation and Timing) for Surface and Subsurface</p>	<p>Acronym List</p> <p>OT: Operational Test</p> <p>OY: Option Year</p> <p>PAAA: Planar Array Antenna Assembly</p> <p>PDR: Preliminary Design Review</p> <p>PH: Phase</p> <p>PSWG: Product Support Working Group</p> <p>RFP: Request For Proposal</p> <p>SBR: Software Build Review</p> <p>SBT: Sea Based Terminal</p> <p>SDP-S: Signal Data Processor - Sierra</p> <p>SFR: System Functional Review</p> <p>SRR: System Requirements Review</p> <p>SSDS: Ship Self Defense System</p> <p>SS TRACKEX: Supersonic Tracking Exercise</p> <p>SSWG: Supply Support Working Group</p> <p>SWBLR: Software Baseline Review</p>	<p>TEMP: Test and Evaluation Master Plan</p> <p>TIM: Technical Interchange Meeting</p> <p>TRR: Technical Readiness Review</p>
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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2039				
CSB/Gate 6 FY20	2	2020	2	2020
CEC AS	3	2020	3	2020
CEC AP Production	2	2021	2	2021
CSB/Gate 6 FY21	2	2021	2	2021
CSB/Gate 6 FY22	1	2022	1	2022
SI SBT 19.3	1	2020	1	2020
SI SBT 20.2	4	2020	4	2020
SI SBR 20.3	1	2021	1	2021
SI SBR 21.1	3	2021	3	2021
SI SBR 21.2	4	2021	4	2021
SI SBR 21.3	1	2022	1	2022
SI SBR 22.1	3	2022	3	2022
SI SBR 22.2	4	2022	4	2022
CEC Aegis ACB 20 SFR	1	2020	1	2020
CEC Aegis ACB TIM 19.3	1	2020	1	2020
CEC Aegis ACB Delta SFR	2	2020	2	2020
CEC Aegis ACB SBR 20.3	1	2021	1	2021
CEC Aegis ACB SBR 21.1	3	2021	3	2021
CEC Aegis ACB SBR 21.2	4	2021	4	2021
CEC Aegis ACB 21.3	1	2022	1	2022
CEC Aegis ACB FQT/IV&V 1	1	2022	1	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CEC SSDS ACB SBR 21.1	3	2021	3	2021
CEC SSDS ACB SBR 21.2	4	2021	4	2021
CEC SSDS ACB SBR 21.3	1	2022	1	2022
CEC SSDS ACB SBR 22.1	3	2022	3	2022
CEC SSDS ACB FQT/IV&V 1	3	2022	4	2022
SSWG FY 20	1	2020	1	2020
PSWG FY 20	2	2020	2	2020
SSWG FY 21	1	2021	1	2021
PSWG FY 21	3	2021	3	2021
SSWG FY 22	1	2022	1	2022
PSWG F Y22	3	2022	3	2022
CEC Cyber SBR 20.2	4	2020	4	2020
CEC Cyber SBR 20.3	1	2021	1	2021
CEC Cyber SBR 21.1	3	2021	3	2021
CEC Cyber SBR 21.2	4	2021	4	2021
CEC Cyber SBR 21.3	1	2022	1	2022
CEC Cyber SBR 22.1	3	2022	3	2022
CEC Cyber SBR 22.2	4	2022	4	2022
CEC Competitive Production (Current)	1	2020	4	2022
RFP Release-CEC Future Competitive Production	3	2021	3	2021
CEC Future Competitive Production	4	2022	4	2022
CEC SDP-S Competitive Production	1	2020	4	2022
CEC SDP-S First SDP-S Delivery	1	2020	1	2020
CEC DA/ES Follow-On Competitive	1	2020	4	2022
CAB Antenna Competitive	1	2020	4	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 2039 / <i>COOP Engagement</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Plannar Antenna Array Assembly (PAAA) Production	3	2020	4	2022
NIFC-CA At Sea Event-6	2	2020	2	2020
NIFC-CA At Sea Event-7	4	2021	4	2021
NIFC-CA LFT-7 Event	3	2021	3	2021
NIFC-CA LFT-8 Event	1	2022	1	2022
OT-IIF Supersonic Trackex (SS TRX)	1	2020	1	2020
DT-D2 CEC USG-2B on CVN 78	1	2020	3	2021
DT-D5 CEC USG-3B on DSSC 3	1	2020	4	2020
DT-Dx CEC USG-3B on DSSC 4	1	2021	4	2021
OT-Dx CEC USG-3B on DSSC 4	4	2021	2	2022
DT-Dx CEC USG-2B on AWS CP 22-1	1	2022	4	2022
OT-D2 CEC USG-2B on CVN 78	1	2022	4	2022
DT-D3-CEC USG-2B on DDG 1000	1	2020	4	2021
OT-D3 USG-2B on DDG 1000	1	2021	2	2022
DT-Dx CEC USG-2B on Aegis ACB 20	4	2022	4	2022
DT-D4 Aegis 9.2	2	2020	3	2022
OT-D4 Aegis 9.2	4	2022	4	2022
CEC TEMP Rev 6 Change 1	3	2021	3	2021
CEC TEMP Rev 7	4	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>
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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
3240: <i>CEC Increment II</i>	0.000	17.706	39.281	85.187	-	85.187	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 582

A. Mission Description and Budget Item Justification

CEC Capability Development Document (CDD) Increment II evolves Increment I capabilities by enhancing the current naval air defense and sensor network system capabilities through the expansion of network capacity as well as extension into other warfare mission domains. CEC CDD Increment II shall integrate new sensor types and track data sources into the network, such as surface search radars and passive detection sensors, as well as relevant data from other networks. CEC CDD Increment II shall accommodate more CUs and provide a more complete, robust, and resilient situational awareness picture, composite identification, and Integrated Fire Control (IFC), with assured communications for Integrated Air and Missile Defense (IAMD), surface warfare, and electronic mission warfare domains.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: CEC FAR-TERM INTEROPERABILITY IMPROVEMENT PROJECT (FTIIP)	6.341	6.669	5.865	0.000	5.865
Articles:	-	-	-	-	-
FY 2021 Plans: Continue integration coordination with Aegis, SSDS, E-2D, and USMC CTN programs. Complete technology development of algorithms to support Mode-S, ADS-B, and AIS integration into CEC. Complete technology development for integration with EW sensor elements for new sources of data on targets of interest. Begin software design / development for CEC integration with Mode-S, ADS-B, AIS, and EW Sensors.					
FY 2022 Base Plans: Continue integration coordination with Aegis, SSDS, E-2D, and USMC CTN programs. Continue software design / development for CEC integration with Mode-S, ADS-B, AIS, and EW Sensors. Begin land based testing for Mode-S, ADS-B, AIS and EW Sensors.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease is due to transition from algorithm conceptual exploration and development in FY21 to tactical software development in FY22.					
Title: NIFC HYPERSONIC	1.557	5.863	6.442	0.000	6.442

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p align="right">Articles:</p> <p>FY 2021 Plans: Begin software development efforts to expand CEC speed, acceleration and altitude attributes for inclusion in the CEC Composite Tracking environment to address advanced stressing threats. Finalize regression analysis to characterize required system hardware improvements required to support existing capabilities plus NIFC Hypersonic improvements.</p> <p>FY 2022 Base Plans: Continue software development efforts to expand CEC speed, acceleration and altitude attributes for inclusion in the CEC Composite Tracking environment to address advanced and more stressing threats (hypersonics). Validate NIFC Hypersonics system network performance requirements to support system hardware improvements.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to continued robust systems engineering and software development efforts in FY 2022.</p>	-	-	-	-	-
<p>Title: CRYPTO MODERNIZATION</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Continue a cryptographic modernization effort for Signal Data Processor (SDP), to include development of a new Programmable Cryptographic Module (PCM), in support of the significant increase in cryptographic performance that is required to enable more resilient networks and add additional protections to the CEC network.</p> <p>FY 2022 Base Plans: Continue a cryptographic modernization effort for Signal Data Processor (SDP), to include the continued development of a new Programmable Cryptographic Module (PCM), in support of the significant increase in cryptographic performance that is required to enable more resilient networks and add additional protections to the CEC network.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	5.523	7.402	9.960	0.000	9.960

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021		
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>			
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Increase is due to maturization of Programmable Cryptographic Module (PCM) prototype and shift to initial integration and testing the PCM prototypes with tactical software.					
Title: NIFC Passive	4.285	14.370	12.482	0.000	12.482
Articles:	-	-	-	-	-
FY 2021 Plans: In Close Coordination with PEO IWS 2.0 and PMA-231, continue integration of Coordinated Radio Frequency [RF] Electronic Warfare [EW] (CRFEW) technology in CEC in support of developing an adaptive layer interface between CEC and the SLQ32(v)6. Continue robust systems engineering efforts for CEP and DDS software development to route EW data via the CEC DDS network, ingest EW data into the CEP track picture, and use EW data to enhance Composite ID recommendations to Combat Systems.					
FY 2022 Base Plans: In Close Coordination with PEO IWS 2.0 and PMA-231, continue integration of Electronic Warfare [EW] capabilities in CEC support of developing a SLQ-32(V)6 adaptive layer interface. Continue robust systems engineering efforts for CEP and DDS software development to route EW data via the CEC DDS network, ingest EW data into the CEP track picture, and use EW data to enhance Composite ID recommendations to Combat Systems.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease due to transition from conceptual design interface analysis and development activities in FY21 to only development activities in FY22.					
Title: FIRECAPE	0.000	0.000	6.843	0.000	6.843
Articles:	-	-	-	-	-
FY 2021 Plans: Initial FIRECAPE efforts have been postponed to the following year.					
FY 2022 Base Plans: Initiate interface development to support Force Level Effector Coordination (FLEC) algorithms being developed under ELEKTRA.					
FY 2022 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy				Date: May 2021	
Appropriation/Budget Activity 1319 / 7		R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>		Project (Number/Name) 3240 / <i>CEC Increment II</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to initiation of FIRECAPE effort in FY22.					
Title: Communications-as-a-Service (CaaS)					
Articles:					
<p>FY 2021 Plans: Communications-as-a-Service (CaaS) transitions to the Program Office at the end of FY20. Conduct review of requirements and artifacts delivered by ONR with the design agent. Conduct System Requirements Review (SRR) and prepare for System Functional Review (SFR). Conduct robust systems engineering in conjunction with shipboard, airborne, and landbased combat systems, as well as Tactical Data Link (TDL) owners, to begin implementation of CaaS. Start maturation of Model Based System Engineering (MBSE) SysML models.</p> <p>FY 2022 Base Plans: Continue Communications-as-a-Service (CaaS) robust systems engineering in conjunction with shipboard, airborne, and landbased combat systems, as well as Tactical Data Link (TDL) owners. Conduct System Functional Review (SFR). Continue maturation of Model Based System Engineering (MBSE) SysML model and begin implementation of CaaS. Commence Communications-as-a-Service (CaaS) Agile SW development and maturation. Conduct preparations for C2P, Common Data Link (CDL), Tactical Targeting Networking Technology (TTNT), and Cooperative Engagement Capability (CEC) integration testing. Conduct preparations for element certification including cyber certification. Conduct At-Sea Test.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to transition to detailed design and tactical software implementation of CaaS algorithms.</p>					
Title: DIGITAL WARFARE TACTICAL NETWORKING INITIATIVE IMPLEMENTATION					
Articles:					
<p>FY 2021 Plans:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021		
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / Cooperative Engagement Capability	Project (Number/Name) 3240 / CEC Increment II			
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
Digital Warfare Tactical Networking Initiative efforts transition to PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II in FY22. FY21 Plans are identified under PE 0607658N / Cooperative Engagement Capability Project 2039 / COOP Engagement.					
FY 2022 Base Plans: Continue leading a Cross Functional Team (CFT) with participation from key naval tactical network organizations and fleet representation to conduct systems engineering and experimentation for improving tactical data dissemination to support further development of Integrated Fires Control concepts. Continue preparation and execute FY22 Demonstration.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease from FY21 in Project 2039 to FY22 in Project 3240 is due to transition from demonstration preparation and requirements analysis to start of software implementation. Increase from FY21 to FY22 in Project 3240 is due to transition of efforts from Project 2039 to Project 3240.					
Title: ELEKTRA					
Articles:					
	0.000	0.000	17.605	0.000	17.605
	-	-	-	-	-
FY 2021 Plans: ELEKTRA efforts transition to PE 0607658N / Cooperative Engagement Capability Project 3240 / CEC Increment II in FY22. FY21 Plans are identified under PE 0607658N / Cooperative Engagement Capability Project 2039 / COOP Engagement.					
FY 2022 Base Plans: Optimize algorithms across multiple platforms with graceful degradation. Synchronize tactical data from heterogeneous distributed assets that allows for rapid iteration. Develop sensor-effect-target assignment recommendations for all kill chains. Leverage S&T algorithm designs to develop human-machine supervisory control interfaces for conducting integrated air and missile defense (IAMD) in an integrated fires environment,					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Increase from FY21 in Project 2039 to FY22 in Project 3240 is due to the postponement of the transition from FY21 to FY22. Increase from FY21 to FY22 in Project 3240 is due to transition of efforts from Project 2039 to Project 3240.					
Accomplishments/Planned Programs Subtotals	17.706	39.281	85.187	0.000	85.187

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

N/A

Remarks

D. Acquisition Strategy

The CEC Increment II Acquisition Strategy (AS) is covered under the Cooperative Engagement Capability / COOP Engagement Project 2039 Acquisition Strategy (AS). CEC Increment II Capability Development Document (CDD) approved 18 March 2020.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>
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Fiscal Year	FY20				FY21				FY22			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones			◆ MS B									
		◆ CEC AC/FD Approval										
Program Milestones			◆ SRR		◆ SFR							
CEC Far Term Interoperability Improvement Project (FTIIP)							◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
Naval Integrated Fire Control Passive (NIFC P)							◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
CEC Naval Integrated Fire Control (NIFC) Hypersonic (HS)							◇ SBR 21.1	◇ SBR 21.2	◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
FIRECAPE									◇ SBR 21.3		◇ SBR 22.1	◇ SBR 22.2
CEC Comms and Interoperability for IF (CIIF) Comms as a Service NFC							◇ SBR 21.1	◇ SBR 21.2	◇ SBR		◇ SBR 22.1	◇ SBR 22.2
CEC ELEKTRA											◇ SRR	
Digital Warfare Tactical Networking Initiative Implementation			◆ IPR 3				◇ IPR 4		◇ Demo			

- Legend**
- ◆ Actual Milestone Completion
 - ◇ Planned Milestone Completion
 - ▲ Actual Event Start/Completion
 - △ Planned Event Start/Completion
 - ⋮ Current Date

AC/FD: Advance Capability/Future Developments
 CDD: Capability Development Document
 CEC: Cooperative Engagement Capability
 DA/ES: Design Agent/Engineering Services
 CIIF: Comms and Interoperability for IF

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3240				
CEC AC/FD Approval	2	2020	2	2020
MS B	3	2020	3	2020
SRR	3	2020	3	2020
SFR	1	2021	1	2021
HW PDR	4	2021	4	2021
HW CDR	2	2022	2	2022
CEC FTIIP SBR 20.3	1	2021	3	2021
CEC FTIIP SBR 21.1	3	2021	3	2021
CEC FTIIP SBR 21.2	4	2021	4	2021
CEC FTIIP SBR 21.3	1	2022	1	2022
CEC FTIIP SBR 22.1	3	2022	3	2022
CEC FTIIP SBR 22.2	4	2022	4	2022
NIFC Passive SBR 20.3	1	2021	1	2021
NIFC Passive SBR 21.1	3	2021	3	2021
NIFC Passive SBR 21.2	4	2021	4	2021
NIFC Passive SBR 21.3	1	2022	1	2022
NIFC Passive SBR 22.1	3	2022	3	2022
NIFC Passive SBR 22.2	4	2022	4	2022
CEC NIFC Hypersonic SBR 20.3	1	2021	1	2021
CEC NIFC Hypersonic SBR 21.1	3	2021	3	2021
CEC NIFC Hypersonic SBR 21.2	4	2021	4	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / <i>Cooperative Engagement Capability</i>	Project (Number/Name) 3240 / <i>CEC Increment II</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CEC NIFC Hypersonic SBR 21.3	1	2022	1	2022
CEC NIFC Hypersonic SBR 22.1	3	2022	3	2022
CEC NIFC Hypersonic SBR 22.2	4	2022	4	2022
CEC FIRECAPE SBR 21.3	1	2022	1	2022
CEC FIRECAPE SBR 22.1	3	2022	3	2022
CEC FIRECAPE SBR 22.2	4	2022	4	2022
CEC CIIF CaaS FNC SBR 20.3	1	2021	1	2021
CEC CIIF CaaS FNC SBR 21.1	3	2021	3	2021
CEC CIIF CaaS FNC SBR 21.2	4	2021	4	2021
CEC CIIF CaaS FNC SBR 21.3	1	2022	1	2022
CEC CIIF CaaS FNC SBR 22.1	3	2022	3	2022
CEC CIIF CaaS FNC SBR 22.2	4	2022	4	2022
CEC ELEKTRA SRR	3	2022	3	2022
DWO IPR 3	3	2020	3	2020
DWO IPR 4	3	2021	3	2021
DWO DEMO	1	2022	1	2022