Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Office of Secretary Of Defense											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603755D8Z: *High Performance Computing Modernization Program*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	23.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
P507: *High Performance Computing Modernization Program*	0.000	23.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

The President's Budget Request for FY 2012 realigned the High Performance Computing Modernization Program (HPCMP) from the Office of the Secretary of Defense (OSD), program element (PE) 0603755D8Z to the Department of the Army, PE 0603461A. Due to Continuing Resolution Authority restrictions in early FY 2012, $23.000 million was executed from OSD PE 0603755D8Z. The balance of the FY 2012 appropriated budget was executed from 0603461A. FY 2013 and out-year funding for the HPCMP was and will continue to be requested under 0603461A.

A. Mission Description and Budget Item Justification

Today, the Department of Defense (DoD) faces many challenges. The High Performance Computing Modernization Program (HPCMP) provides cost effective tools the Department needs to address the most difficult defense problems. These tools include modern high performance computing hardware, parallel software, wide area networking services and the expertise to use them. The HPCMP helps enables DoD personnel to:

- Conduct basic research into areas such as materials, fuels, turbulence, proteins, electromagnetic fields, signal image relationships, structural response, blast effects, and combustion;
- Conduct applied research into areas such as aerodynamics applied to fighter and transport manned and unmanned aircraft, automated target recognition; hydrodynamics applied to new hull forms, structural performance of new armor and penetrator concepts, and explosives performance;
- Design elements of weapon systems such as the Hellfire missile, F-35, MRAP, C-17, the Javelin missile, and directed energy weapons systems;
- Test and evaluate weapons system performance on systems such as F-16, F-22, F-35, C-17, FCS, AIM-9X, GBU-39 and Striker;
- Immediately support urgent operations for efforts such as counter IED, hurricane Katrina related flood modeling, and the 2010 gulf oil spill migration modeling.

High Performance Computing has been identified as a key enabling technology essential to achieving the DoD's research development, test and evaluation (RDT&E) objectives. Validated requirements collected across the DoD reflect the needs of 4,400 scientists and engineers located at hundreds of locations (DoD Laboratories, Test Centers, academic institutions and commercial businesses). The integrated HPCMP consists of DoD Supercomputing Resource Centers (DSRCs), the Defense Research and Engineering Network (DREN), and Software Application Support. DSRCs are responsible for as large a part of DoD`s RDT&E computational workload as feasible. DSRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. Dedicated HPC project investments (DHPIs) augment the DSRCs to form the total HPCMP computational capability. DHPIs address critical HPC requirements that cannot be met at DSRCs,

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such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All elements of the HPCMP are interconnected with all S&T and T&E user sites via the Defense Research and Engineering Network. DREN provides the flexible wide area network fabric needed by the RDT&E community to support technology demonstrations and distributed test and evaluation events in addition to providing access to the supercomputing centers. The Software Application Support component develops critical common DoD applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, and builds collaborative programming environments. The Computational Research and Engineering Acquisition Tools and Environments (CREATE) produces supercomputer-based engineering design and test tools, improving the acquisition process for major weapons systems.

The High Performance Computing Modernization Program transferred from the Office Secretary of Defense to the Department of the Army in FY 2012.

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	23.000	0.000	0.000	-	0.000
Total Adjustments	23.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Baseline Adjustments	23.000	-	-	-	-

Change Summary Explanation

The HPCMP was realigned from OSD to the Department of the Army in FY 2012. Due to Continuing Resolution Authority restrictions in early FY 2012, $23.000 million was executed from OSD PE 0603755D8Z. Program funding for the remainder of FY 2012 and out-years can be found in Army PE 0603461A.

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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
P507: *High Performance Computing Modernization Program*	0.000	23.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

The President's Budget Request for FY 2012 realigned the High Performance Computing Modernization Program (HPCMP) from the Office of the Secretary of Defense (OSD), program element (PE) 0603755D8Z to the Department of the Army, PE 0603461A. Due to Continuing Resolution Authority restrictions in early FY 2012, $23.000 million was executed from OSD PE 0603755D8Z. The balance of the FY 2012 appropriated budget was executed from 0603461A. FY 2013 and out-year funding for the HPCMP was and will continue to be requested under 0603461A.

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) High Performance Computing (HPC) Modernization Program supports the needs of the warfighter for technological superiority and military dominance on the battlefield by providing advanced computational services to U.S. weapons system scientists and engineers. By exploiting continuous advances in HPC technology, the defense research, development, test and evaluation (RDT&E) community is able to resolve critical scientific and engineering problems more quickly and with more precision. The results of these efforts feed directly into the acquisition process by improving weapons system designs through an increased fundamental understanding of materials, aerodynamics, chemistry, fuels, acoustics, signal image recognition, electromagnetics, and other areas of basic and applied research. As such, HPC has been identified as a key enabling technology essential to achieving the objectives of the DoD's RDT&E.

The program primarily provides supercomputing services through DoD Supercomputing Resource Centers (DSRCs). Additionally, support for specialized programs is provided through dedicated HPC project investments (DHPIs). DHPIs support a one-time need and have no support tail within the HPC Modernization Program. Centers and DHPIs directly support the DoD RDT&E laboratories and test centers and are accessible to local and remote scientists and engineers via high-speed network access. An integral part of the program is providing for the adaptation of broadband, widely used applications and algorithms to address RDT&E requirements, along with continued training of users as new system designs and concepts evolve. The program pursues continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise.

Annually validated requirements, collected across the DoD reflect the needs of 4,400 scientists and engineers located at hundreds of locations (DoD Laboratories, Test Centers, academic institutions and commercial businesses), and to drive program decisions. The integrated HPC program consists of DoD Supercomputing Resource Centers; the Defense Research and Engineering Network (DREN); and Software Application Support. DSRCs are responsible for as large a fraction of DoD`s S&T and T&E computational workload as feasible. DSRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. DHPIs augment the DSRCs to form the total HPC Modernization Program computational capability. DHPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All elements

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of the HPC Modernization Program are interconnected with all S&T and T&E user sites via the DREN. Additionally, the Software Application Support component develops critical common DoD applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, and builds collaborative programming environments.

True modernization of DoD`s HPC capability and fulfillment of the program's vision and goals requires an on-going program strategy that addresses all aspects of HPC. While advancing the level of hardware performance is critical to success, the higher objective is to enable better scientific research, T&E environments, and technology development for superior weapons, warfighting, and related support systems. The Program goals are to (1) acquire, deploy, operate and maintain best-value supercomputers; (2) acquire, develop, deploy and support software applications and computational work environments that enable critical DoD research, development and test challenges to be analyzed and solved; (3) acquire, deploy, operate and maintain a communications network that enables effective access to supercomputers and to distributed S&T/T&E computing environments; (4) continuously educate the RDT&E workforce with the knowledge needed to employ computational modeling effectively and efficiently; and (5) promote collaborative relationships among the DoD computational science community, the national computational science community and minority serving institutes.

The DREN provides wide area network (WAN) connectivity among the Department's S&T and T&E communities. The DREN is implemented through an Intersite Services Contract awarded to MCI (WORLDCOM) during FY 2002. A new DREN network services contract was awarded in FY 2011. DREN currently provides services to sites throughout the continental United States, Alaska, Hawaii, and can be extended overseas where necessary. A Secret DREN using common Secret systems high key with NSA certified Type-1 encryptors that can transport classified traffic at OC-3 (155 Mbps) has also been deployed. The HPC Modernization Program employs state-of-the-art WAN security and strong host and user security creating a defense-in-depth security architecture.

The High Performance Computing Modernization Program transferred from the Office Secretary of Defense to the Department of the Army in FY 2012.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Department of Defense Supercomputing Resource Centers	6.000	0.000	0.000
Description: The program supports DoD Supercomputing Resource Centers that are responsible for as large a fraction of DoD's S&T and T&E computational workload as feasible. Dedicated HPC project investments (DHPIs) support a one-time need and have no legacy within the HPC Modernization Program. ***FY 2012 Accomplishments:*** Successfully devolved the HPCMP to the Department of the Army to support continued sustainment and modernization of HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the S&T and T&E community HPC requirements. Continued computational services to scientists and engineers located at DoD Laboratories, Test Centers, academic institutions and commercial businesses. These services enabled basic research, applied research, design elements of weapon systems, test and evaluation of weapons system			
Title: Networking	11.000	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's S&T and T&E communities and provides the computer and network security for the HPCMP. ***FY 2012 Accomplishments:*** Successfully devolved the HPCMP to the Department of the Army to support a continuance of DREN services that link all elements of the program and provide network security and enhancements. Maintained a flexible WAN fabric allowing the DoD RDT&E community to support technology demonstrations and distributed T&E events. Continued collaborative work with the federal networking community and standards associations to assure the DREN remains compatible with technology changes.			
Title: Software Applications ***Description:*** Software Applications provide for the adaptation of broadband, widely used applications and algorithms to address RDT&E requirements, continued training of users as new system designs and concepts evolve, and continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise. ***FY 2012 Accomplishments:*** Successfully devolved the HPCMP to the Department of the Army in support of continued software applications development. This enabled continued development of supercomputer-based engineering designs and test tools to improve the acquisition for major weapons systems; a greater emphasis on engineering applications; development of shared scalable applications to exploit scalable HPC assets; an Academic Outreach Program to universities across the United States; and computational and computer science support to the DoD HPC user community.	6.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	23.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A.

E. Performance Metrics

Strategic Goals supported are as follows:

Defense Supercomputing Resource Centers - Method of Measurement: Habus (HPCMP standard measurement of computational performance)

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FY 2010: Existing Baseline – 2024.0/ Planned Performance Improvement - Requirement Goal – 2000.0/ Actual Performance Improvement – 2251.0
FY 2011: Existing Baseline – 4275.0/ Planned Performance Improvement - Requirement Goal – 475.0 (Change to a two year procurement cycle reduced the Requirement Goal to 475 from 1575. The remaining increases will occur in FY 2012 and FY 2013)/ Actual Performance Improvement – 476.0
FY 2012: Defense Supercomputing Resource Centers were transferred to Department of the Army.

Networking - Method of Measurement: Gigabits per second

FY 2010: Existing Baseline – 30.6/ Planned Performance Improvement - Requirement Goal – 1.0/ Actual Performance Improvement – 2.1
FY 2011: Existing Baseline – 32.7/ Planned Performance Improvement - Requirement Goal – 1.0/ Actual Performance Improvement – 1.388
FY 2012: Networking was transferred to Department of the Army.

Software Applications - Methods of Measurement: Customer Satisfaction on a 0-5 scale

FY 2010: Existing Baseline – 4.2/ Planned Performance Improvement - Requirement Goal – 4.2/ Actual Performance Improvement – 4.2
FY 2011: Existing Baseline – 4.2/ Planned Performance Improvement - Requirement Goal – 4.2/ Actual Performance Improvement – 4.2
FY 2012: Software Applications were transferred to Department of the Army.

Comment: All FY 2010 and FY 2011 actual performance metrics met or exceeded those planned.