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<b>Exhibit R-2, RDT&amp;E Budget Item Justification</b>				<b>DATE:</b> May 2009				
Appropriation/Budget Activity RDT&E, Defense-Wide/07				R-1 Item Nomenclature Joint Spectrum Center /PE 0303153K				
Cost (in Millions)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Joint Spectrum Center /JS1	18.303	19.267	18.944					

**A. Mission Description and Budget Item Justification:**

The Defense Spectrum Organization (DSO) is responsible for developing comprehensive and integrated spectrum planning and long-term strategies to address current and future needs for DoD electromagnetic (EM) spectrum access. The DSO supports DoD on national and international spectrum issues, spectrum coordination, and in the pursuit of emerging spectrum-efficient technologies in DoD acquisitions. The DSO serves as the DoD center of excellence for EM spectrum management, planning, policy implementation, and operational matters, and provides direct support to the ASD (NII)/DoD CIO, the Chairman of the Joint Chiefs of Staff, Combatant Commanders (COCOMs), Secretaries of Military Departments (MILDEPs), and Directors of Defense Agencies. The DSO was established by merging and realigning the spectrum assets and resources of DISA's Defense Spectrum Office, hereafter referred to as the Strategic Planning Office (SPO), and the Joint Spectrum Center (JSC). On 1 October 2008 the Global Electromagnetic Spectrum Information System (GEMSIS) Program Office was transferred to the DSO, thus consolidating all DISA EM spectrum activities in one organization.

The Joint Spectrum Center's (JSC) mission is to enable DoD's effective use of the EM spectrum in support of national security and military objectives. The JSC is responsible for developing and maintaining DoD standard information systems that support DoD spectrum related activities and processes. Specifically, JSC designs, develops, and maintains DoD automated spectrum management systems, evaluation tools, and databases employed by DoD. The JSC databases are the prime sources of information for DoD use of the EM spectrum. The JSC provides technical measurement and analysis in support of spectrum policy decisions and ensuring the development, acquisition, and operational deployment of systems that are compatible with other spectrum dependent systems operating within the same EM environment. Additional focus is centered on improving future warfighter EM spectrum utilization through technological innovation accomplished by researching, studying, and steering the direction of research and development (R&D) emerging technology efforts from a spectrum perspective. The JSC is the DoD focal point for Electromagnetic Environmental Effects (E<sup>3</sup>), and EM interference resolution assistance to operational units including deployable support to COCOM Joint Task Forces. The JSC mission is integral to other vital activities such as Information Operations (IO), Electronic Warfare (EW) and other special projects as directed by the Joint Staff. This program element is under Budget Activity 07 because it supports operational systems development.

The Global Electromagnetic Spectrum Information System (GEMSIS) is envisioned as a net centric emerging capability providing commanders with an increased common picture of spectrum situational awareness of friendly and hostile forces while transparently deconflicting competing mission requirements for spectrum use. This capability will enable the

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transformation from the current preplanned and static assignment strategy into autonomous and adaptive spectrum operations. GEMSIS will provide a long-term solution for spectrum management as a family of spectrum capabilities and a joint enabling concept. As a family of spectrum capabilities, GEMSIS will support all levels of warfare (strategic, operational, and tactical) and National Strategy through the fielding of supportable and adaptive radio frequency (RF) spectrum-dependent capabilities. Military readiness, mobilization, strategic operations, logistics, and space-based capabilities depend on the availability of the electromagnetic spectrum to plan and execute missions. Global communications, the sustaining infrastructure; and interagency, local government, and coalition operations similarly depend on spectrum planning and execution. The GEMSIS architecture will provide GIG-based capabilities enabling the seamless exchange of spectrum access resources, equipment supportability assessments, mission planning and rehearsal guidance, and acquisition decision support inputs DoD wide.

The Strategic Planning Office (SPO) mission is to provide integrated strategies, policies, processes, and practices to achieve global spectrum access for national security obligations. The SPO provides comprehensive and integrated spectrum planning strategies for DoD by improving EM spectrum management and electromagnetic environmental effects (E3) business processes; updating spectrum supportability roles and responsibilities throughout the spectrum management community; and enhancing acquisition and requirements processes to assure spectrum access. SPO also is responsible for promoting EM spectrum and E3 awareness and education through outreach programs; advocating and defending DoD's EM spectrum needs in national and international EM spectrum forums by developing and executing realistic allocation/reallocation strategies; proactive DoD preparation for the World Radiocommunication Conference (WRC); and integrating spectrum-related technology issues in national and international policy development and execution. The SPO is leading efforts to transform spectrum management to support current and future net-centric operations and warfare. SPO activities are funded in the Defense-wide Operations and Maintenance appropriation.

Accomplishments/Planned Program:

Spectrum Knowledge Resources	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
Subtotal Cost	7.151	8.773	7.907

This function includes development and updates of DoD systems such as net-centric spectrum tools and the Spectrum Requirements System (SRS) which provide critical frequency assignment and equipment data that is necessary in predicting and avoiding spectrum conflicts. This area also includes software updates of SPECTRUM XXI, the joint standard DoD

UNCLASSIFIED

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spectrum management system. SPECTRUM XXI ensures DoD has adequate spectrum access to accomplish its missions by addressing the regulatory requirements of host nation spectrum administrations and by enabling a common operating picture of the spectrum use for the warfighter. FY 2008 efforts resulted in a new eXtensible Markup Language (XML) based structure for spectrum related information. This structure, which is defined as Standard Spectrum Reference Format (SSRF) delineated in Military Communications Electronics Board Publication 8, is also defined by the NATO Spectrum Management Allied Data Exchange Format (SMADEF) within NATO and is being adopted by the Combined Communications Electronics Board (CCEB) nations, provides a unique opportunity for fluid exchange of essential spectrum management information to support domestic and international operations. FY 2008 also resulted in a new release of the Joint Data Maintenance Center (JDMC) enabling more efficient Joint Equipment Tactical and Space (JETS) Database record entry, eliminating elaborate work-arounds required by data analysts, and improving the record cloning feature to reduce analyst data entry. Also completed were the development, testing and release of SPECTRUM XXI version 4.2.3 server and client software, and performance of an Oracle database version and hardware upgrade to the SPECTRUM XXI central server and all four regional servers. Other software capabilities delivered include Host Nation Spectrum Worldwide Database Online (HNSWDO) v3.0 and the Spectrum Certification System (SCS) data migration to the Equipment Location Certification Information Database (EL-CID). FY2009 efforts will result in the release of HNSWDO V3.1 that will include workflow enhancements for improving the efficiency of the Host Nation spectrum coordination process. FY 2010 efforts will produce a net-centric spectrum tool prototype that will provide the functionality of the legacy Joint E3 Evaluation Tool (JEET) in a web-based Service Oriented Architecture (SOA). FY 2010 efforts will also result in the initial operational capability (IOC) of the Net-Centric JSC Data Repository (JDR) which includes interfaces that permit users and trusted spectrum management applications/tools to export data in the SSRF, thereby supporting improved spectrum efficiency, better coordination for operations and improved spectrum situational awareness. FY 2009 - FY 2010 efforts will include continued SPECTRUM XXI server and client software development, and continued Data Transformation efforts, specifying, advising, testing and implementing rewrites of existing software to accommodate migration of the JSC data repository to Pub 8 compliance. This will include data maintenance tools, tactical data maps, space satellite data maps, data metrics tools, and the Business Objects Joint Data Access Web Browser replacement for the legacy Joint Data Access Web Server (JDAWS).

UNCLASSIFIED

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Electromagnetic Environmental Effects (E3)	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
Subtotal Cost	2.889	2.979	3.068

The E3 Program supports the DoD requirements generation system, the DoD acquisition process, operational test and evaluation, and EM compatibility standardization. Algorithms and E3 analytical tools are developed for functions such as Hazards of Electromagnetic Radiation to Ordnance (HERO) risk assessments in support of the COCOMS and the Joint Task Force (JTF). Assessments are conducted to determine system and equipment limitations in the operational EM environment. Efforts also include the development and maintenance of the JSC Ordnance E3 Risk Assessment Database (JOERAD), a decision support system that helps the warfighter make critical decisions about the hazards associated with the use of introduced ordnance within complex EM environments. FY 2008 funding resulted in development of JOERAD v9.4.1. This tool gives the warfighter the ability to compare the maximum allowable environment (MAE) to which an ordnance item can be exposed (without creating a safety or operational reliability problem) with the output from the radio frequency (RF) emitter suites found on various operational land, sea, and air platforms. This tool automates the analysis process and assists in mission planning and impact assessments. In FY 2009 DSO will continue to perform HERO Impact Assessments, forward deployed surveys and continued deployment of JOERAD. FY 2010 resources will result in continued performance of electromagnetic environmental (EME) ship surveys, forward deployed surveys, and HERO impact assessments. FY 2010 efforts will result in the conversion of JOERAD to a network connected capability, JOERAD 10.0.

Emerging Spectrum Technology (EST)	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
Subtotal Cost	3.819	4.140	3.719

The DSO has the responsibility to investigate emerging spectrum related technologies and evaluate their applicability to improve future warfighter EM spectrum utilization through technological innovation. This is accomplished by researching, studying, and steering the direction of research and development (R&D) emerging technology efforts from a spectrum perspective. This effort provides development of EST roadmaps; and detailed survey and review of emerging technologies to identify trends and analyze their implications on DoD spectrum management and supportability processes and procedures. A key focus of the EST efforts in on dynamic spectrum access (DSA) technologies.

UNCLASSIFIED

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The DSO has been actively supporting DoD efforts in support of the National Telecommunications and Information Administration (NTIA)'s execution of the President's Spectrum Policy Initiative (PSPI). The principle technical and regulatory efforts take place in Working Level Groups (WLGs). The JSC is the lead DoD representative to WLG-E - Enhance Spectrum Engineering and Analytical Tools, the primary technical working level group. In FY 2008, the JSC provided programmatic recommendations NTIA on execution of PSPI testbed activities. FY 2008 also resulted in completion of a Radar Metrics Development Research Report, defining a set of metrics (such as bandwidth, repetition rate, beam width, etc.) for existing categories of radars, and showing how each of the chosen metric values serves to support mission requirements. Also in FY 2008, DSO hosted the Dynamic Spectrum Access (DSA) EST Workshop and developed DSA Capabilities Roadmap v1.0. DSA technology has the potentially to revolutionize spectrum management. DSA is realized through wireless networking architectures and technologies that enable wireless devices to dynamically adapt their spectrum access according to criteria such as policy constraints, spectrum availability, propagation environment, and application performance requirements. FY 2009 - FY 2010 will include preparing recommended technology enhancements to the Defense Spectrum Management Architecture (DSMA) (future edition); further investigation of the impact of DSA systems on the electromagnetic environment (EME); and performance of various technical assessments, including establishing the technical foundation for protecting legacy systems as DSA is implemented; and continued development of the DSA Roadmap.

Global Electromagnetic Spectrum Information System (GEMSIS)	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
Subtotal Cost	4.444	3.375	4.250

GEMSIS is envisioned as a net centric emerging capability providing commanders with an increased common picture of spectrum situational awareness of friendly and hostile forces while transparently deconflicting competing mission requirements for spectrum use. This capability will enable the transformation from the current preplanned and static assignment strategy into autonomous and adaptive spectrum operations. In FY08, GEMSIS initiated transition planning activities for the Coalition Joint Spectrum Management Planning Tool (CJSMPPT) Joint Capabilities Technology Demonstration (JCTD) capabilities and responsibilities from the U.S. Army to support GEMSIS Increment One efforts. The PMO also initiated GEMSIS Increment One test planning process with Joint Interoperability Test Command and began efforts to reduce risk in terms of data usability, accuracy, and information assurance. The GEMSIS Analysis of Alternatives (AoA) for Increment 2 was also initiated to analytically compare the operational effectiveness, suitability, and Life-Cycle cost of alternatives that satisfy established spectrum capability Joint Requirements Oversight Council approved

UNCLASSIFIED

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Initial Capabilities Document requirements.

In FY 2009, the PMO will document a standard GEMSIS architecture framework for Increment 1 (Host Nation Spectrum Worldwide Database Online (HNSWDO) & CJSMPPT). GEMSIS will complete the transition of CJSMPPT JCTD approved capabilities, identify CJSMPPT data quality and interoperability improvements and recommendations, and transition CJSMPPT data into the Joint Spectrum Center Data Repository. The PMO will complete analysis and assessment of Certification and Accreditation areas with appropriate mitigation and corrective action for identified risks. Additional accomplishments will include transitioning HNSWDO V3.1 into GEMSIS Increment One, initiate development of HNSWDO upgrade based on customer identified requirements and begin a HNSWDO Business Process Management Pilot Program. Additionally the PMO will initiate efforts to improve net-centricity and spectrum data standardization for Increment One and begin the federation and catalogue of services for spectrum management tools.

In FY 2010, the PMO will design and develop training program improvements for GEMSIS Increment 1. GEMSIS will also continue to develop, test, and deliver GEMSIS Increment One approved enhancements and update the standard architecture framework accordingly. Other efforts will include continuing: the transition of CJSMPPT data into the Joint Spectrum Center Data Repository; the federation and catalogue of services spectrum management tools; and continuing efforts to improve net-centricity and spectrum data standardization for Increment One. Lastly, the PMO will complete the HNSWDO Business Process Management Pilot Program.

**B. Program Change Summary:**

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
FY 2009 President's Budget	18.534	19.319	19.962
FY 2010 President's Budget	18.303	19.267	18.944
Total Adjustments	-0.231	-0.052	-1.018

Change Summary Explanation: Funding changes in FY 2008 reflect a below threshold reprogramming to mission critical requirements within the Agency. The FY 2009 reflects reductions of -\$0.052 million for Economic Assumptions. FY 2010 reductions of -\$1.018 million are due to the HNSWDO and CJSMPPT transition from development to sustainment and

UNCLASSIFIED

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operations; and in economic assumptions.

**C. Other Program Funding Summary:**

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>To</u> <u>Complete</u>	<u>Total</u> <u>Cost</u>
O&M, DW	24.721	30.163	31.859						Cont'g	Cont'g
Procurement, DW	0.000	0.000	0.492						Cont'g	Cont'g

**D. Acquisition Strategy:** Engineering support services for DSO are provided via contract. No in-house government capability exists, nor is it practical to develop one that can provide the expertise necessary to fulfill the mission and responsibilities of DSO. Full and open competition was used for the acquisition of the current contracts with ITT Industries, Inc. GEMSIS's acquisition approach is to adopt proven best practices through a variety of acquisition mechanisms.

**E. Performance Metrics:**

1. Initial deployment of the Net-Centric JSC Data Repository (JDR) which will enable spectrum managers and E3 analysts to exchange spectrum information in a format consistent across NATO and CCEB counterparts for full coordination of spectrum operations and situational awareness.
2. Publish three emerging spectrum technology analyses per year
3. Implement DSA Roadmap actions/recommendations.
4. Continued incorporation of JOERAD into Navy ship software inventory.
5. Continued presentation of E3 technical courses.
6. Conduct 7 -10 HERO/ EME Analyses per year.
7. Support through analyses, planning, and policy recommendations, emerging spectrum-dependent technologies to enhance DoD operational capabilities by:
  - a. Identifying beneficial and potentially threatening spectrum technologies with respect to DoD spectrum access and operations (percent of
  - b. spectrum-dependent technologies assessed).

UNCLASSIFIED

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- c. Forming strategic alliances with government, industry and academia to advocate, influence, and promote spectrum dependent emerging technologies (percent of partnerships formed after outreach and engagement).
- 8. Expand GEMISIS integration, development and deployment by:
  - a. Initiate implementation of the Service Oriented Architecture (SOA) for GEMISIS Increment One.
  - b. Continue to develop, test and deliver GEMISIS Increment One approved enhancements.
  - c. Update the standard architecture framework for GEMISIS Increment One.
  - d. Continued transition of CJSMPPT data into the JSC Date Repository (JDR).
  - e. Continued federation and catalogue of services spectrum management tools.
  - f. Complete HNSWDO Business Process Management Pilot Program.
  - g. Continued improvement in net-centricity and spectrum data standardization for Increment One.
  - h. Design and development of training program improvements for Increment One.

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Exhibit R-3 Cost Analysis										DATE: May 2009				
Appropriation/Budget Activity RDT&E, Defense-Wide/07			Program Element Joint Spectrum Center / PE 0303153K					Project Name and Number Joint Spectrum Center / JS1						
Cost Category	Contract Method & Type	Performing Activity & Location	Total PY Cost (\$000)	FY08 Cost (\$000)	FY08 Award Date	FY09 Cost (\$000)	FY09 Award Date	FY10 Cost (\$000)	FY10 Award Date	FY11 Cost (\$000)	FY11 Award Date	Cost to Complete (\$000)	Total Cost (\$000)	Target Value of Contract
Engineering/Technical Support	MIPR	Various	0.423	0.974	10/07	1.743	10/08	1.800	10/09			Cont'g	Cont'g	Cont'g
Contractor Engineering Technical/Spt	C/CPIF/FFP	ITT Industries, Inc.	11.978	12.885	10/07	13.053	10/08	12.894	10/09			Cont'g	Cont'g	Cont'g
Engineering/Technical Support Contractor	MIPR	Various	N/A	3.727	Var.	N/A	N/A	0.000	N/A			Cont'g	Cont'g	Cont'g
Engineering Technical/Spt	TBD	TBD	N/A	N/A	N/A	4.471	08/09	4.250	10/09			Cont'g	Cont'g	Cont'g
Test Support/Gov't Test and Eval Support	MIPR	JITC, Ft. Hauchuca	N/A	0.717	6/08	N/A	N/A	0.000	N/A			Cont'g	Cont'g	Cont'g
<b>Total</b>			12.401	18.303		19.267		18.944						

Exhibit R-4, RDT&E Program Schedule Profile																Date: May 2009																
Appropriation/Budget Activity RDT&E, Defense-Wide, 07								Program Element Number and Name PE 0303153K /Joint Spectrum Center								Project Number and Name JS1/Joint Spectrum Center																
Fiscal Year	FY 2008				FY 2009				FY 2010				FY 2011				FY 2012				FY 2013				FY 2014				FY 2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Spectrum XXI Enhancements Development				▲				△								△																
Host Nation Spectrum Worldwide Database Online (HNSWDO) Testing	▲	▲																														
JOERAD Netcentric Services Integration			▲					△																								
JOERAD NCS 3.0 IV&V Test Plan, Documentation, Software Release, and IV&V Report												△																				
Perform Forward Deployed and EME Ship Surveys and conduct HERO Impact Assessments				▲				△								△																
Complete Test Plan and Testing of Integrated Intersite Model (IIM) Version 0.4		▲						△																								

Exhibit R-4, RDT&E Program Schedule Profile																Date: May 2009																
Appropriation/Budget Activity RDT&E, Defense-Wide, 07								Program Element Number and Name PE 0303153K /Joint Spectrum Center								Project Number and Name JS1/Joint Spectrum Center																
Fiscal Year	FY 2008				FY 2009				FY 2010				FY 2011				FY 2012				FY 2013				FY 2014				FY 2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
IIM IOC for stand-alone version to access the JDR / IOC Release.								△				△																				
EST Adaptive Networks Assessments				▲				△				△																				
Continued Development of Spectrum Scorecard	▲	▲	▲	▲																												
Dynamic Spectrum Access (DSA) Technical Framework	▲	▲	▲	▲																												
Continued DSA Research				△	△	△	△	△	△	△	△	△																				
GEMSIS Systems Engineering Support and Development (Incr. 1)				▲				△				△																				
GEMSIS Systems Engineering Support and Development (Incr. 2)												△																				

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<b>Exhibit R-4a Schedule Detail</b>		<b>DATE:</b> May 2009						
Appropriation/Budget Activity RDT&E, Defense-Wide/07	Program Element Joint Spectrum Center / PE 0303153K	Project Name and Number Joint Spectrum Center / JS1						
<u>Schedule Profile</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>
Spectrum XXI Enhancements Development	4Q	4Q	4Q					
Host Nation Spectrum Worldwide Database Online (HNSWDO) Testing	1Q, 2Q							
JOERAD Netcentric Services Integration	3Q	2Q						
JOERAD NCS 3.0 IV&V Test Plan, Documentation, Software Release, and IV&V Report		4Q						
Perform Forward Deployed and EME Ship Surveys and conduct HERO Impact Assessments	4Q	4Q	4Q					
Complete Test Plan and Testing of Integrated Intersite Model (IIM) Version 0.4	2Q	2Q						
IIM IOC for stand-alone version to access the JDR to import MCEB Publication 8 XML data. IOC Release.		4Q	3Q					
Emerging Spectrum Technologies Adaptive Networks Assessments	4Q	4Q	4Q					
Continued Development of Spectrum Scorecard	1Q-4Q							
Development of Dynamic Spectrum Access (DSA) Technical Framework	1Q-4Q							
DSA Research (electromagnetic environment (EME), sensing methods, spectrum densities)		1Q-4Q	1Q-4Q					
GEMSIS Systems Engineering Support and Development (Increment 1)	4Q	4Q	2Q					
GEMSIS Systems Engineering Support and Development (Increment 2)			2Q					