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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 1999		
PROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3					R-1 ITEM NOMENCLATURE Joint Warfighting PE 0603727D8Z					
<i>COST (In Millions)</i>	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost to Complete	Total Cost
Total Program Element (PE) Cost	8.255	18.679	7.872	7.790	7.751	7.706	7.624	7.615	Continuing	Continuing
Joint Warfighting/P727	8.255	18.679	7.872	7.790	7.751	7.706	7.624	7.615	Continuing	Continuing

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT:**

In May 1998 the Secretary of Defense appointed Commander-in-Chief, United States Atlantic Command (CINCUSACOM) as the Defense Department's Executive Agent for Joint Experimentation. Subsequently, the Department realigned resources to support ACOM's new role. FY 99 funding from this Program Element was redirected to support the initial stand-up of ACOM's Joint Experimentation Directorate. Funding for joint experiments was transferred to ACOM. Funding to support the Joint Advanced Warfighting Program concept development, the digital network infrastructure, and technology feeder support for joint experimentation was retained in this PE. Program Element 0603727N has been established to provide ACOM with their own funding source in FY 00. Consequently, the FY 98 accomplishments and FY 99 plans in this exhibit include ACOM's activities. Detailed funding changes are in section B.

The Joint Warfighting PE supports three related activities: the Joint Advanced Warfighting Program (JAWP), the Information Technology Backbone (ITB), and technology feeder support for joint experimentation. While these activities strongly support ACOM's joint experimentation efforts, a separate program element has been retained since the activities support other organizations in addition to ACOM, and they require a degree of independence from ACOM to function as envisioned.

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The JAWP was established by OSD, with the support of the Vice Chairman of the Joint Chiefs, to serve as a catalyst for innovation and change. This program's focus is on assisting in the formulation and assessment of advanced concepts and capabilities, plus identifying enabling technologies and integration options for the Department. These concepts drive changes in the doctrine, organization, training and education, materiel and leadership (DOTML) of the Services. The JAWP serves a key role in identifying, exploring and evaluating breakthrough warfighting capabilities. It builds on the lessons learned from earlier Service experiments that have underscored the importance of having a firm conceptual basis upon which to build experiments. The JAWP concentrates on joint vice Service unique revolutionary concepts. In identifying and elaborating innovative Joint concepts and capabilities, and associated enabling technologies, the JAWP will not only take into account Service efforts but those of CINCs and Defense Agencies as well. The JAWP promotes integration and assists implementation. The JAWP's work complements and supports the activities of the Atlantic Command (ACOM), the Joint Staff, and the Office of the Secretary of Defense. It provides an independent source for formulating advanced concept candidates for joint experimentation. The JAWP is composed of both civilian analysts and technologists, and military operators. The civilians provide a level and quality of expertise not generally available in the Department of Defense. The active duty military provide current operational perspective to concepts under investigation and serve as a vital link to ongoing relevant activities in the Services.

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The Information Technology Backplane provides an advanced network infrastructure that extends commercial capabilities to provide capabilities needed to meet JV2010 needs. Information Superiority is a key JV2010 building block and the ITB provides the means to experiment with the digital transmission capabilities that will be available in five years. The ITB is not a new physical network. It is a virtual network that capitalizes on existing physical networks such as the Defense Information Systems Network (DISN), the Defense Information Systems Agency (DISA)-Defense Advanced Research Projects Agency (DARPA) Leading Edge Services Network, the Defense Research and Engineering Network (DREN), and the experimental Advance Technology Demonstration (ATD) net. The ITB has many users from sites served by existing networks but the funding included in this PE is the incremental funding needed to support joint experimentation. For example, this PE provides the circuit costs to extend the ITB from the experimentation site to the nearest point on the backplane (where no other network exists), and only the "extra" backplane costs generated by the Joint Warfighting Experiments. Since joint experiments are very dependent on advanced distributed simulation, or on limited live command post exercises that are being driven by simulations, a robust network is needed to interconnect the various sites. Often times, these simulations press the state of the art in networking capability, including that of requiring Type-I encryption for protected communications. The ITB also supports new bandwidth intensive applications such as video teleconferencing and high definition television.

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UNCLASSIFIED

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The third effort supported by this PE is technology feeder support for joint experiments. There are many technology demonstrations, advanced technology demonstrations, and advanced concept and technology demonstrations that can provide advanced technologies to support joint experiments. For example, the Joint Staff has prepared 72 desired operational capabilities based on JV2010 concepts and 21st Century Challenges. For each Challenge, the Joint Staff has prepared roadmaps that provide opportunities to assess each Challenge. The roadmap for the battlefield awareness challenge shows 42 Advanced Concept Technology Demonstrations (ACTDs) that have the potential to demonstrate some aspect of a desired operational capability supporting battlefield awareness. This effort provides technology managers the resources to expand the scope of a test or demonstration to collect data for the joint staff or ACOM, thereby leveraging the OSD and Service ACTD investment.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY1998 Accomplishments:

(V) USACOM was officially designated Executive Agent for Joint Experimentation on October 1, 1998. However in FY 98 an extensive effort was focused on four objectives: the stand-up of USACOM J-9 organization, the development of the Joint Experimentation process, concept development and selection, and development of the experimentation program for FY 99-01. Additionally, USACOM sponsored the live fly portion of Information Superiority Experiment 1.1 in 4th quarter FY 1998. Leveraging the United States Air Force's Expeditionary Forces Experiment (EFX) 98, USACOM investigated and tested new concepts and organizations to enhance Joint Suppression of Enemy Air Defenses (JSEAD) against mobile targets. Data assessment is ongoing and is included in ACOM's FY 1999 Joint Experimentation program. (\$4.055 Million)

(U) The Joint Advanced Warfighting Program (JAWP) was established in April 1998. Working for the Office of the Secretary of Defense, the Joint Staff, the Atlantic Command (ACOM) and their subordinate activities in support of Joint Warfighting Experimentation, it has: (1) identified key elements of a joint experimentation process; (2) began development of candidate advanced concepts for joint experimentation; (3) began development of an exemplar joint experiment; (4) developed prototype experimentation plans; (5) conducted research and seminars to classify works on future operational concepts and future security environments that are relevant to joint experimentation; and (5) planned for seminars and workshops with other government organizations to identify complimentary and supporting technology programs and activities. (\$1.500 million)

(U) An Information Technology Backplane (ITB) compliant with the Joint Technical Architecture, and Advanced Battlespace Information System (ABIS) was integrated and put in place, thereby providing an environment of existing information technology components into which prototype

UNCLASSIFIED

UNCLASSIFIED

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and other emerging products can be inserted, exercised and evaluated with respect to interoperability and joint warfighting potential. The ITB builds upon existing networks and complements, not duplicates, other networking efforts by Defense Information Systems Agency (DISA), Defense Advanced Research Projects Agency (DARPA), Director Defense Research and Engineering/ High Performance Computing Management Office (DDR&E/HPCMO) and Naval Research Lab (NRL). The ITB was extended into ACOM (Joint Training, Analysis and Simulation Center) and Institute for Defense Analyses.

(U) In the commercial environment, Asynchronous Transfer Mode (ATM) is the protocol of choice for simultaneously processing multiple applications that have huge amounts of data with low latency. ATM provides an economical method to dynamically combine large, low latency data streams like video and voice over a single transmission resource. The 98 accomplishments all relate to our efforts to evolve ATM services to meet JV2010 requirements, while still using commercial of the shelf equipment. In the network management area we provided the means to separate hundreds of switches into logical groups that can be administered by different organizations/services. Work also began on a Java-based network management tool that automatically discovers these logical groups of switches and simplifies their interconnection. In the network security area work began to strengthen the authentication needed to access ATM switch management features using Kerberos security. In the area of Quality of Service (QoS), drivers were implemented to map the Internet Protocol flows to ATM Quality of Service. We also deployed Multiple Protocol Over ATM (MPOA), which eliminates traditional router bottlenecks by creating ATM virtual circuit shortcuts. In the area of ATM applications we implemented Voice-Telephone-Over-ATM, which enables a site to carry both voice from standard handsets and data over a single network connection. In the area of test tools work began on tools that will exercise network devices to assist in lab bench testing, live network testing and network monitoring. Finally, network equipment will be acquired to support ACOM's end node, field two deployable network suites, and upgrade test beds. (\$2.700 Million)

UNCLASSIFIED

UNCLASSIFIED

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(U) FY1999 Plans:

(U) USACOM's experimentation activities are broken into three categories: (1) USACOM Generated Events - Events developed 'in-house' by USACOM J-9 specifically to support assessment of one or more concepts; (2) Major Leveraged Events - Events that are planned, developed and executed by CINC, Service, or Agency in which USACOM plays a major role in modifying the event to support assessment of one or more concepts; and (3) Minor Leveraged Events - Events intended to provide relatively small amounts of information in a more narrowly focused area for further development. Capitalizing on existing resources and work accomplished by the Joint Staff and Services, USACOM's FY 99 experimentation focus is to provide "Proof of Concept" of the Experimentation Process by conducting Joint Experiment Number I (JE-1). In addition, USACOM will leverage ongoing Service sponsored Experiments to test various warfighting concepts. In total USACOM will be involved in the execution and assessment of one USACOM Generated Event (JE-1), two Major Leveraged Events, and ten Minor Leveraged Events. USACOM will sponsor other concept development studies and Red Team vulnerability assessments. Experiment support technologies including prototypes, advanced technologies, surrogates, and integration materials will be used to support experimentation efforts. Concurrently, USACOM will host a series of Futures Seminars and Warfighter Reviews as a part of the baseline analysis on mid-term and future concepts. Analysis, modeling and simulation and wargames are an integral part of the FY 99 plan. Advanced planning for FY 00 and 01 experiments will be conducted in parallel of ongoing FY 99 experiments. (\$ 10.562 M)

The Joint Advanced Warfighting Program (JAWP) will support JV2010 implementation and the Joint Experimentation work in the Office of the Secretary of Defense, the Joint Staff, and the Atlantic Command (ACOM) and subordinate elements. Efforts will be both on front-end identification and elaboration of concepts and capabilities, plus support for the conduct of experiments. It will continue to develop and refine candidate advanced warfighting concepts and capabilities using wargames, and modeling and simulation. It will identify promising and enabling technologies. It will collect and analyze data to support the formulation of the Department's overall Joint Experimentation efforts. The JAWP will begin to evaluate these concepts and systems through simulation, wargaming and analysis. The JAWP will help in the construct, design and conduct of joint warfighting experiments. The JAWP will have a major role in executing the simulation portion of ACOM's Joint Experiment-1. It will also participate in other experiments during the year that support advanced joint warfighting. The JAWP will look specifically at the Revolution in Military Affairs to analyze the impact of revolutionary technological concepts on doctrine and investment strategies. Workshops, seminars and conferences will be held to inform the discussions and shape the debate on future concepts and exercises. It will begin to conduct vulnerability assessments using "Red Teaming" techniques to identify weaknesses and avoid surprises. Transformation will also be a key focus. The JAWP will begin to identify programs, systems and methods to improve and expedite the process of executing and implementing the recommended changes, which result from the joint

UNCLASSIFIED

UNCLASSIFIED

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experimentation process and the development of new technological capabilities. Included in these latter activities, the JAWP will evaluate the systems and products developed during the Synthetic Theater of War (STOW) Advanced Concept Technology Demonstration (ACTD) for use in support a robust modeling and simulation capability which can provide near and mid term support to ACOM's experimentation activities. The Defense Modeling and Simulation Office will oversee the JAWP M&S activities to insure that they are consistent with department policy and the DOD High Level Architecture for simulations. \$4.3 Million)

The Information Technology Backplane will be expanded and network services and equipment will be provided to ACOM. In the network security area work will continue on the authentication system for web servers and ATM switch management. The ITB will also serve as a NSA alpha and beta test site for cryptographic testing (specifically the KG-75 Release 3 FASTLANE and the KG-175 TACLANE). In the area of ATM applications workstation voice-over-data capability will be converted to a standards based system which will allow users at workstations to conduct voice calls using the microphone and speakers attached to the computer. Work will also be continued on tools to exercise network devices, to assist in lab bench testing, live network testing, and network monitoring.

A significant part of the ITB effort will provide direct support to ACOM. Circuits will be upgraded to 155Mbs and network management provided between ACOM, IDA, the Joint Advanced Warfighting Program, and Naval Research Lab (NRL). Since NRL is a physical hub, network access to other Defense Research and Engineering Network sites such as Space and Naval Warfare Center, Army Research Lab, etc, will be leveraged without cost to this program. ACOM will also be provided a distributed file system node capable of accessing high-end computing resources and sharing files across the High Performance Computing Office of the DDR&E. Coordination will begin with appropriate OSD ACTD managers and service activities such as USA-CECOM and USAF-Rome Labs to define the network architecture for ACOM's Joint Contingency Force experiment in FY 00. (\$1.817 Million)

(U) Experimentation Feeder Support: ACOM's Campaign Plan, dated 1 December 1998, provides the list of ACOM generated events, major leveraged events and minor leveraged events for FY 99-01. The next step is to develop detailed concept papers for each of the eight concept areas that ACOM is pursuing. The Deputy Under Secretary of Defense (Advanced Systems and Concepts) in coordination with ACOM and the Joint Staff will assist in determining which ACTDs, ATDs, and/or Technology Demonstrations best support ACOM's experimentation events. This funding will be provided to the selected technology managers to support a joint experiment. Funding will be provided for efforts such as system integration, and logistics and test support. (\$2.00 Million)

UNCLASSIFIED

UNCLASSIFIED

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UNCLASSIFIED

UNCLASSIFIED

(U) **FY2000 Plans:**

(U) The JAWP will continue to build on its FY99 efforts to support the Department's Joint Experimentation efforts. The focus will be on increased involvement in additional Service/joint exercises and the Atlantic Command's (ACOM) Joint Experimentation activities, with emphasis on advancing the understanding of specific concepts and in conducting experimentation. Opportunities will be identified to leverage and integrate Service and other agency programs, as well as activities such as Advanced Technology Demonstrations and Advanced Concept Technology Demonstrations. Data collection and independent analysis will be conducted and used to produce reports and papers intended to inform the OSD, Joint Staff and ACOM leadership of experimentation results and to make recommendations for future activities. In addition, the JAWP will identify breakthrough concepts and technologies that could produce revolutionary future warfighting capabilities. Vulnerability assessments and "Red Teaming" will be conducted to improve the validity and robustness of experimentation. A major effort during the FY will be a focus on the transformation process. The JAWP will work on the identification of vehicles and opportunities that can be used in the early transition of new concepts and technologies in to actual operational military capabilities. (\$4.300 Million)

(U) The ITB will continue to be upgraded to reflect emerging protocols that show promise from advanced research network testbeds. In the area of network management Kerberos authentication will be extended into Simple Network Management Protocol Version 3 (SNMPv3). In the area of applications, the capability for a workstation voice user to communicate with a standard handset voice user will be provided. Efforts in support of ACOM will continue. Selected circuits will be upgraded from 155Mbps to 622Mbps. This will enable experimentation with "killer applications" such as High Definition Television (HDTV), which produces data at gigabit per second rates. Lower bandwidth, high quality HDTV will be purchased and installed at key sites. HDTV provides mission planners and commanders the ability to observe real-time or near-real-time temporally meaningful data. ACOM will be provided with the network infrastructure that supports their Joint Contingency Force experiment. (\$1.572 Million)

(U) Experimentation Feeder Support for Joint Experimentation will continue. ACOM's Campaign Plan 00, which will be published in April 99, will provide additional experimentation detail and refinements to the current plan. Integrated concept teams will have had the opportunity to prepare more detailed experimentation and assessment plans. Once the concepts and experimentation plans are more clearly articulated, technologies supporting the experiments will be identified. It is anticipated that plans for the Joint Olympic event in the FY 04 timeframe will become clearer and work will begin to align the technologies supporting this major integrating exercise. Once again, this funding is only intended to leverage ongoing developments to support joint experiments, and not to fund the development itself.(\$2.000 Million)

(U) **FY 2001 Plans:**

(U) The Joint Advanced Warfighting Program (JAWP) will continue support of the Department's Joint Experimentation activities. It will mature those promising concepts developed and demonstrated during the previous two years. It will exploit successes and continue to serve as a catalyst for change and transformation. (\$4.300 Million) The IT Backplane will be upgraded to reflect emerging protocols that show promise from

UNCLASSIFIED

UNCLASSIFIED

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advanced research network testbeds. Support will continue for ACOM and other joint experimentation sites. ATM enabled applications and experiments will permit ACOM to conduct experiments using emerging technologies that will be commercially available in the 2000-2003 timeframe. (\$1.490 Million)

(U) Experimentation Feeder Support will continue to support Joint Experimentation and the FY 04 Olympic event. (\$2.000 Million)

UNCLASSIFIED

UNCLASSIFIED

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(U) B. <u>Program Change Summary</u>	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	8.761	23.700	27.332	30.212	Continuing
Appropriated Value		18.700			Continuing
Adjustments to Appropriated Value					
a. Congressionally Directed undistributed reduction	-0.506	-0.021			
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment					
c. Other			-19.460	-22.422	Continuing
Current President's Budget	8.255	18.679	7.872	7.790	Continuing

Change Summary Explanation:

- (U) **Funding:** Reductions based on planning adjustments. FY00-05 funding was transferred to the Navy's Joint Experimentation Program PE 0603727N.
- (U) **Schedule:** Not Applicable
- (U) **Technical:** Not Applicable
- (U) **C. Other Program Funding Summary Cost** Not Applicable
- (U) **D. Acquisition Strategy:** Not Applicable
- (U) **E. Schedule Profile** Not Applicable