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DSP-II

"Preserving The Air Force's Options" (U)

Prepared by

Guido W. Aru and Carl T. Lunde
DEFENSE SUPPORT PROGRAM
Space Program Operations

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Programs Group
THE AEROSPACE CORPORATION
El Segundo, CA 90245

Prepared for

SPACE AND MISSILE SYSTEMS CENTER
US AIR FORCE MATERIEL COMMAND
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Los Angeles, CA 90009-2960

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DSP-II - "Preserving The Air Force's Options" (U)

Prepared by:

Guido W. Aru, Project Manager
System Analysis
Defense Support Program

Carl T. Lunde, Engineering Specialist
Electronic Systems Department
Electronics And Sensors Division

Approved by:

Barbara K. Ching, Assoc. Principal Director
Systems Engineering
Defense Support Program

Everitt V. Bersinger, Principal Director
Defense Support Program
Space Program Operations

Paul R. Leuthauser, Major, USAF
Director For System Engineering
Defense Support Program

John R. Kidd, Colonel, USAF
System Program Director
Defense Support Program

Abs. (U)

(U) The Air Force is committed to the development of the Follow-on Early Warning System (FEWS) to replace the Defense Support Program (DSP). Potential technical risks lie ahead -- few, if any, programs have ever become cheaper, lighter, or faster during EMD. In addition, fiscal uncertainties lie ahead -- these are particularly vexatious since they are subject to higher-level DoD, Congressional, and Executive polices, priorities, and direction. As a result, DSP will likely be around longer than anticipated. It is prudent, then, to fully explore, understand, and consider the alternatives available to the Air Force should the FEWS program experience technical or programmatic delays, redirection, or cancellation.

(U) It is within this context, as well as Aerospace's role as general systems engineer for the Air Force, that this report has been prepared -- exploring potential evolutionary upgrades to the DSP which preserve the Air Force's options for space-based Tactical Warning and Attack Assessment (TW/AA). These upgrades are designed to enhance the DSP's capabilities to meet the post-Cold War New World Order requirements while simultaneously reducing life-cycle costs in-line with the President's proposed budget reductions. Technology insertion and Pre-Planned Product Improvement (P^3I) options are explored which, if exercised, provide near-term enhancements and cost savings prior to FEWS FOC or a low-cost and low-risk alternative should the FEWS program be canceled. If the evolutionary DSP upgrade program outlined herein as DSP-II is pursued, it will require approximately $1 billion in funding through FY99 versus $5 billion for FEWS. In addition, DSP-II offers the potential for over $10 billion in total life-cycle cost savings through 2015.

Preface (U)

(U) The purpose of this Technical Operating Report (TOR) is to explore alternatives and methods to preserve the Air Force's options for Space-Based Tactical Warning and Attack Assessment Systems. Although the Air Force, specifically Air Force Space Command (AFSPACECOM) and the Air Force Program Executive Office for Space (AFPEO/SP), is committed to the development of the Follow-on Early Warning System (FEWS) to replace the existing Defense Support Program (DSP), there are potential technical risks and fiscal uncertainties which may adversely impact the schedule or the very future of the FEWS program. The fiscal uncertainties are particularly troublesome in that they are outside the direct control of the Air Force and are driven by higher-level DoD, Congressional, and Executive policies and budget priorities. As a result, it is prudent to fully explore and understand the alternatives available to the Air Force should the FEWS program experience delays or face cancellation. It is within this context, as well as within Aerospace's role as general system engineer for the Air Force, that this report is prepared.

(U) There are two principal objectives of this report: the first is to examine the role of DSP as a safety net for FEWS in the event of FEWS schedule slips or program cancellation as discussed above, and the second is to examine the benefit from potential near-term enhancements to the DSP to provide improved interim capabilities prior to FEWS. Both of these objectives are accomplished by examining the application of Pre-Planned Product Improvements (P^3I) and Technology Insertion options to upgrade the DSP. In order to control cost and risk, while simultaneously providing for near-term performance enhancements, alternatives are delineated for progressive P^3I and technology insertion retrofits to DSP-I Satellites 21 through 25, culminating with the advent of DSP-II as Satellite 26. Evolutionary enhancements to the DSP ground segment are also examined. Options are provided for near-term centralization of processing to reduce Operations and Maintenance (O&M) costs using System 8 for the Global Mission (Strategic) and Talon Shield for the Theater Mission (Tactical).

(U) In considering the type of evolutionary upgrades to apply to DSP-I, the Draft FEWS Operational Requirements Document (ORD), dated October 1992, was used as the source requirements document. The performance requirements and design/implementation specified in the Draft FEWS ORD were balanced against military utility, cost, risk, and schedule. Integrated Weapons System Management (IWSM) concepts, which encourage consideration of other than 100% solutions (i.e., cost-effective methods to provide the 80% to 90% solution), were also applied in the development of the DSP upgrades. Options for additional DSP performance enhancements to approach the 100% solution (as defined by the Draft FEWS ORD) are provided along with their Life-Cycle Cost (LCC) impact and risk.

(U) Many of the concepts presented within this report were an outgrowth of the DSP/Brilliant Eyes Synergy Study conducted between November, 1992 and February, 1993 in response to tasking from the Office of the Secretary Of Defense (OSD) and SAF/AQ to examine synergy issues and concepts between DSP, FEWS, and Brilliant Eyes. The results of the DSP/BE synergy study were rejected by the study's Steering Committee and the AFPEO/SP because the synergistic DSP/BE system failed to meet all of the design and implementation detail specified by the Draft Follow-on Early Warning System (FEWS) Operational Requirements Document (ORD). In particular, the synergistic DSP/BE system failed to provide crosslinks between all satellites and on-board mission processing on all satellites. In the proposed concept, only Brilliant Eye's satellites had crosslinks and on-board mission processing. Thus, these results were not carried forward to AFSPACECOM, SAF/AQ, nor the OSD. They are documented herein, however, so that when a re-evaluation of the protracted nuclear warfighting survivability requirements driving crosslinks and on-board mission processing is conducted -- in light of budget priorities and the New World Order -- these ideas will have been preserved and available for further study and/or implementation.

Acknowledgements (U)

(U) This Technical Operating Report (TOR) is the result of many thousands of man-hours spent since November developing, analyzing, and assessing various potential evolutionary upgrades to the Defense Support Program (DSP). These studies involved not only Aerospace Corporation personnel, but also personnel from Aerojet Electronic Systems Division, TRW, Tecolote, and the US Air Force.

(U) The authors wish to thank all of those who contributed to this study. In particular, the following people are recognized for their significant contributions to this effort:

(U) The Aerospace Corporation: Lou Bodnar for his analysis of the DSP-II weights and volumetric envelopes; Charlie Dippel for his support to the sensor studies; Patricia Enns for her analysis of spacecraft sub-systems; Tony Gregory for his invaluable insight into Brilliant Eyes in support of the DSP/BE synergy study; Mike Jacobs for his critiques of DSP/BE synergistic system performance; Kam Lee and Paul Montag for their satellite GAP availability anelyses; Benjamin Savagian for his analyses of SGLS/SDLS uplinks/downlinks and future crosslink concepts; Ted Stinis for conducting reviews of the DSP and FEWS requirements; Tom Stocker for his support of the performance analysis; David Truong for his work on launch vehicle interfaces; and Allen Tungseth for his analysis of the attitude control and propulsion systems.

(U) Aerojet Electronic Systems Division: For their analysis of DSP evolutionary concepts and potential DSP synergy with Brilliant Eyes, the following people are recognized: Bill Mullooly, DSP Program Manager; Harvey Clouser, DSP/BE Synergy study leader; Dick Castleberry, Cal Chestain, John Conklin, Gene Dryden, Martha Fortson, Guners Grabis, Dick Lehmann, Ellen Linder, Ken Marks, and Amiel Shulsinger.

(U) TRW: Arnold Galloway and Art Terry for their evaluation of the DSP spacecraft section of the DSP/BE synergy study.

(U) Tecolote: Linda Huang for her contributions to DSP/BE synergy study cost analysis of DSP-II.

(U) Atlas Launch Vehicle SPO: Colonel Mark Lacelllade, Program Maneger Atlas II; Major Milt Tucker, Deputy Program Manager Atlas II; and Captain Bailey for their help in understanding the capabilities, volumetric constraints, and limitetions of the Atlas IIAS launch vehicle.

(U) The authors also recognize Roger Hall, Major (sel.), USAF, for his outstanding effort in leading the DSP/BE synergy study. He suffered many grueling late-night and weekend hours helping develop the concepts presented herein. Of even greater significance, Major (sel.) Hall endured presenting some of these concepts to less-then-receptive audiences while managing to not become a friendly-fire statistic.

(U) This Technical Operating Report (TOR) is divided into seven sections, including the Executive Overview, the main body, and five appendices.

(U) The *Executive Overview* is 27 pages in length and provides a top-level review of the DSP evolutionary upgrade program known as DSP-II. The cost, risk, performance, and schedule of the DSP-II program is summarized here. Top-level comparisons to the FEWS program are also provided.

(U) The main body of the report, *DSP-II - Preserving The Air Force's Options*, is 113 pages in length. It provides a detailed description of the DSP-II program, including the satellite, launch vehicle, and ground processing sub-systems. Options for transitioning from today's DSP-I system to the DSP-II system are also reviewed here.

(U) Appendix A - *DSP-II Space Segment Details* provides a low-level description of the DSP-II satellite and launch vehicle. The technology insertion and Pre-Planned Product Improvement (P^3I) approach employed to create the DSP-II satellite is also delineated.

(U) Appendix B - *DSP-II Ground Segment Details* provides a thorough description of the DSP-II Global and Theater Systems as well as a description of the ground segment transition approach.

(U) Appendix C - *DSP-II Cost And Schedule* presents the DSP-II program schedule, life-cycle cost estimates, and the methodology behind the cost estimates. Details of Tecolote's and Aerospace's quasi-Independent cost estimates are delineated.

(U) Appendix D - *DSP-II Capabilities And Performance* describes the performance analysis used to estimate DSP-II system performance. In addition, a summary of system performance is presented along with the deviations from the draft FEWS ORD.

(U) Appendix E - *DSP-II / Brilliant Eyes Synergy* presents a potential concept for a synergistic DSP-II / BE system. The operational concepts, cost, performance, and schedule are reviewed. The topic of DSP-II / BE synergy is not discussed in any of the other sections of this report.

Table Of Contents (U)

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DSP-II

"Preserving The Air Force's Options"

EXECUTIVE OVERVIEW (U)

April 23, 1993

Presented By

Guido W. Aru

And

Carl T. Lunde

Presented To

Colonel John Kidd

[redacted]

(U) The purpose of this Technical Operating Report (TOR) is to explore alternatives and methods to preserve the Air Force's options for Space-Based Tactical Warning and Attack Assessment Systems. Although the Air Force, specifically Air Force Space Command (AFSPACECOM) and the Air Force Program Executive Office for Space (AFPEO/SP), is committed to the development of the Follow-on Early Warning System (FEWS) to replace the existing Defense Support Program (DSP), there are potential technical risks and fiscal uncertainties which may adversely impact the schedule or the very future of the FEWS program. The fiscal uncertainties are particularly troublesome in that they are outside the direct control of the Air Force and are driven by higher-level DoD, Congressional, and Executive policies and budget priorities. As a result, it is prudent to fully explore and understand the alternatives available to the Air Force should the FEWS program experience delays or face cancellation. It is within this context, as well as within Aerospace's role as general system engineer for the Air Force, that this report is prepared.

(U) There are two principal objectives to this report: the first is to examine the role of DSP as a safety net for FEWS in the event of FEWS schedule slips or program cancellation as discussed above, and the second is to examine the benefit from potential near-term enhancements to the DSP to provide improved interim capabilities prior to FEWS. Both of these objectives are accomplished by examining the application of Pre-Planned Product Improvements (P^3I) and Technology Insertion options to upgrade the DSP. In order to control cost and risk while simultaneously providing for near-term performance enhancements, alternatives are delineated for progressive P^3I and technology insertion retrofits to DSP-I Satellites 21 through 25, culminating with the advent of DSP-II as Satellite 26. Evolutionary enhancements to the DSP ground segment are also examined, providing options for near-term centralization of processing to reduce Operations and Maintenance (O&M) costs using System 8 for the Global Mission (Strategic) and Talon Shield for the Theater Mission (Tactical).

(U) In considering the type of evolutionary upgrades to apply to DSP-I, the Draft FEWS Operational Requirements Document (ORD), dated October 1992, was used as the source requirements document. The performance requirements and design/implementation specified in the Draft FEWS ORD were balanced against military utility, cost, risk, and schedule. Integrated Weapons System Management (IWSM) concepts, which encourage consideration of other than 100% solutions (i.e., cost-effective methods to provide the 80% to 90% solution), were also applied in the development of the DSP upgrades. Options for additional DSP performance enhancements to approach the 100% solution (as defined by the Draft FEWS ORD) are provided along with their Life-Cycle Cost (LCC) impact and risk.

(U) This report also compares the cost, risk, performance, and schedule of the FEWS program with the upgraded DSP program (DSP-II). The two programs are also considered in the context of the "Changing Acquisition Environment" as defined by the report: "DoD Space Investment Strategy - A Report To The SAF/AQ", prepared by: AFMC Space And Missile System Center and AFSPACECOM. The nature of the changing acquisition environment and the priority of the system development factors is discussed on the following page.

Defense Support Program

Purpose (U)

Explore Alternatives And Methods To Preserve The Air Force's Options For Space-Based Tactical Warning And Attack Assessment Systems

- Examine The Role Of DSP As A Safety Net For FEWS In The Event Of FEWS Schedule Slips Or Program Cancellation
  - Evaluate Near-Term DSP-I Enhancements To Provide Improved Interim Capabilities
  - Assess Continuation Of An Evolving DSP As An Alternative To FEWS (Safe Exit)
  - Apply IWSM Concepts To Evaluate Other Than 100% Solutions
- Evaluate Evolutionary Upgrades To DSP-I
  - Examine Pre-Planned Product Improvement (P^3I) And Technology Insertion Options
  - Provide Near-Term Performance Enhancements Through Satellite 21-25 Retrofits
  - Balance Performance And Risk Against Cost And Schedule
- Compare FEWS With Upgraded DSP-I (DSP-II)
  - Compare Cost, Risk, Performance, And Schedule
  - Provide Options For Additional DSP Performance Enhancements
  - Evaluate Programs Within The Context Of The Changing Acquisition Environment

Priority Of System Develo[illegible]nt Factors Reordered (U)

From: "DoD Space Investment Strategy - A Report To The SAF/AQ"
Prepared By: AFMC Space And Missile System Center and AFSPACECOM

Cold War Cost Drivers For Space Systems

(U) "The Cold War has made space systems expensive for several reasons. First, for the past thirty years or so, we have been building systems that have never been built before. Whole new technologies have had to be invented to make today's space systems possible. Microelectronics is perhaps the most profound example. Second, the threat driving space systems development was so unacceptable that cost was not an obstacle. We built systems to do the job regardless of cost. We could not afford to consider cost. Performance was the primary driver. Nuclear survivability of spacecraft was an especially difficult requirement that had a significant impact on cost. Third, time was of the essence as space systems were the key to our deterrence capability; to have them in place as soon as possible was essential to our national security. Fourth, security needs forced program development into rigid security compartments."

(U) "The result was a crisis-driven acquisition process. Technology was developed concurrent with system procurement, with resulting delays and redesign. The threat was expanding and system designs were seldom stable. The result was constant redesign to meet the expanding requirement. In addition, security barriers discouraged efforts for commonality across systems or sharing of resources."

Cold War Procurement Rationale No Longer Applies

(U) "Today, we have breathing room for the first time in thirty years. We are now able to look at the threat today, and our systems in context and proceed on a more ordered and efficient path. We can now allow technology to mature to the level where no additional development is needed after a full-scale engineering development has begun. The relaxation of security compartments now allow much cross-program sharing to occur in technologies, standards, and common resources (e.g., common satellite control systems)."

Defense Support Program

Changing Acquisition Environment

Priority Of System Development Factors Reordered (U)

From: "DoD Space Investment Strategy - A Report To The SAF/AQ"
Prepared By: AFMC Space And Missile Systems Center And AFSPACECOM

Cold War

- Performance
- Schedule
- Risk
- Cost

→

New World

- Cost
- Risk
- Performance
- Schedule

Cold War Cost Drivers For Space Systems

"...the threat driving space systems development was so unacceptable that cost was not an obstacle. We built systems to do the job regardless of the cost. We could not afford to consider cost. Performance was the primary driver. Nuclear survivability of spacecraft was an especially difficult requirement that had a significant impact on cost."

Cold War Procurement Rationale No Longer Applies

"Today, we have breathing room for the first time in thirty years. We are now able to look at the threat today, and our systems in context and proceed on a more ordered and efficient path."

DSP History (U)

(U) The Defense Support Program (DSP) has undergone a continuous evolution since its beginnings in the late 1960s - DSP itself evolved from the MIDAS and Program 461 satellite series of the 1960-to-1968 period. The capabilities and performance of both the space- and ground-segments have been continuously evolving to meet the changing threats and user needs of the Cold War era. The satellite constellation has also grown from supporting only surveillance of the eastern hemisphere to providing world-wide coverage, including significant dual- and triple-coverage.

(U) The trend in the evolution of the DSP space segment has been towards larger and more capable satellites with increased Mean Mission Duration (MMD). The latest DSP satellite, DSP-I, is significantly larger and requires significantly more power than it predecessor - the Sensor Evolutionary Development (SED) satellite. SED was actually a retrofit to the Phase II satellites numbers five and six (i.e., 5R and 6R). The increased weight and power of DSP-I is principally to accommodate the LASER Crosslink Subsystem (LCS), Advanced RADEC-I (AR-I), as well as an improved IR sensor which includes Above-The-Horizon (ATH) and Medium Wavelength IR (MWIR) capabilities. These enhancements, plus radiation hardening of the spacecraft, were added to provide the capability for survivability in a massive protracted nuclear war with the Soviet Union.

(U) The DSP ground segment has also evolved during the history of the program. Initially, a single Overseas Ground Station (OGS) was built in Australia to provide processing of the single eastern hemisphere satellite. A few years later, the CONUS Ground Station (CGS) was constructed to support the expanding satellite constellation. In the mid-1980s a third site was built, the European Ground Station (EGS). Also, the Mobile Ground Segment (MGS) was developed to provide ground system survivability. Most recently, in reaction to the tactical missile threat, a new DSP ground station (Talon Shield) is being readied at the National Test Facility (NTF) to provide a prototype for a dedicated DSP tactical processing system.

[redacted] Aside from growth in the number of ground stations, the ground stations have also grown in their functions and capabilities. The initial monocular processing capabilities of the OGS were expanded at the CGS in the mid-1970s to include "DUAL" processing which provided for the capability to fuse data from two satellites for improved performance against short-duration / low-intensity events. At that time, the short-duration / low-intensity event of concern was the Cold War [redacted] the US coast. Today, that threat is gone, but it has been "replaced" with the tactical missile threat. s

[redacted] The Slow Walker m

[redacted] was fostered by the Navy in the late 1970s and became operational in the early 1980s.

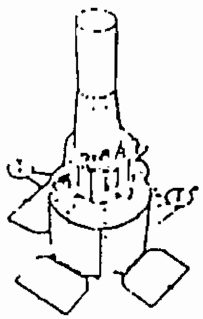
[redacted] In the late-1980s, the Army became interested in the use of DSP data for tactical missile warning -- due in part to the demonstrated capabilities of the DSP to detect these missiles during the Iran / Iraq "war of the cities". In 1990, the Army embarked on the Tactical Surveillance Demonstration (TSD) program to develop a prototype dedicated DSP tactical processing system. With the enormous success of DSP in providing warning of all Iraqi Scud missile attacks against the allied forces in Desert Storm, the Air Force also became interested in the tactical mission. This interest has been manifested in the Talon Shield effort which builds on the Army's TSD program. Talon Shield also builds on the Navy TENCAP's Radiant Ivory effort to provide [redacted] data fusion to enhance [redacted]

[redacted]

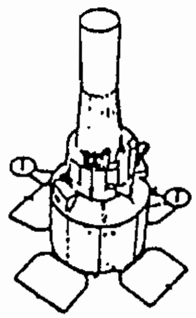
Defense Support Program

DSP History (U)

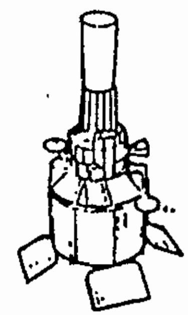
DSP Has Continuously Evolved For Over Twenty Years Adapting To Changing Threat And New Mission Requirements



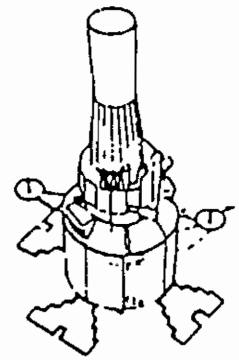
Phase I
- Sats 1-4
- 907 Kgs
- 400 W
- 1.25 Years
- BTH SWIR



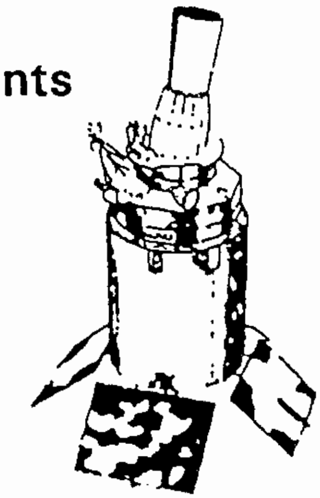
Phase II
- Sats 5-7
- 1043 Kgs
- 480 W
- 2 Years



MOS/PIM
- Sats 8-13
- 1170 Kgs
- 500 W
- 3 Years
- Multi-Orbit Capability



SED
- Sats 5R/6R
- 1685 Kgs
- 664 W
- 3 Years
- Expand BTH
- Adv. RADEC
- Hardening



DSP-I
- Sats 14-22
- 2348 Kgs
- 1225 W
- 5 Years
- ATH
- BTH MWIR
- LCS & MDM

('70s) ('90s)

- Strategic Ground Processing
- Improved Strategic Capabilities
- Evolving Tactical Systems
  - Army TSD
  - Talon Shield
  - IR&D Efforts

Continuation Of DSP's Evolution (U)

(U) The DSP-II concept is to continue the evolution of the DSP program in order to preserve the Air Force's options for space-based Tactical Warning and Attack Assessment capabilities in the event of technical or fiscal problems with the development of the Follow-on Early Warning System (FEWS). As with any new program of the size and scope of FEWS, there are many technical challenges which can greatly delay the program. Examples of programs which have suffered technical problems and schedule delays include: Milstar, Teal Ruby, DSM, C-17, etc. Also, because of the significant expense associated with a new program start, national budget priorities, as dictated by the President and Congress, may result in schedule extensions or program cancellation in favor of a less-costly alternative.

(U) The Defense Support Program (DSP) has remained in a "holding pattern" for some time now because of the Air Force's interest in pursuing a replacement early warning system. In the early-1980's, the replacement program was known as the Advanced Warning System (AWS). With the advent of SDI, the Boost Surveillance and Tracking System (BSTS) was created to provide Ballistic Missile Defense (BMD) surveillance capabilities. When the BMD goals were abandoned in the late-1980s, the replacement program became known as AWS again. In the early 1990s, the program name was changed to FEWS. As a result, no significant investments have been made in Pre-Planned Product Improvements (P^3I) or technology insertion for the DSP satellite since the development of the DSP-I Satellite 14 in the early 1980s. The Air Force is currently going on contract for "cookie-cutter" DSP-I Satellites 23-25. This lack of investment is resulting in the use of obsolete technology in the production of the DSP satellite, and actually results in higher-than-necessary production costs due to the materials and processes involved (e.g., PbS detectors, off-focal plane multiplexing, outdated electronics, etc.).

(U) Because of the very real technical and fiscal threats to fielding a new early warning system within projected schedules, it is prudent to examine both near- and long-term methods to continue the DSP to provide a viable national capability well into the future. The evolutionary upgrades to DSP described within this report are designed to reflect the new National priorities as defined by: (1) budget realities which will mandate continued reductions in defense spending for the foreseeable future; (2) the post-Cold War New World Order which dictates new defense strategies based on regional conflicts and limited nuclear war potential, and not the massive protracted nuclear war with the now non-existent Soviet Union; and, (3) the evolving threat which is characterized by a proliferation of tactical missiles to third world countries which can threaten US and allied forces.

(U) The evolutionary DSP concept addresses the budget realities by employing Technology Insertion and Pre-Planned Product Improvements (P^3I) to control cost and risk. Progressive retrofits to existing and planned satellites (21 through 25) can be made to provide near-term performance improvements and life extension prior to FEWS. Because of the New World Order which changes the threat from protracted nuclear war-fighting, which requires significant expense to achieve survivability (e.g., on-board processing, LASER crosslinks, etc.), to regional conflicts and limited nuclear war potential, changes to the satellite can be made to significantly reduce weight and power requirements. These changes would enable the use of a smaller launch vehicle, which could save approximately $150 Million per launch. As a direct result of these investments in P^3I and technology insertion, the life expectancy, or Mean Mission Duration (MMD), can also be increased from 5 years to 8.5 years. Thus, if FEWS is significantly delayed or canceled, this evolutionary approach will result in near-term performance improvements and life-extension as well as a low-cost, in-place program for DSP Satellites 26 and beyond.

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Defense Support Program

DSP-II
Continuation Of DSP's Evolution (U)

Continue DSP Evolution To Reflect
Budget Realities, New World Order, And Evolving Threats

- Preserve The Air Force's Options
  - Potential For Problems And Delays In FEWS
  - Budget Priorities May Force Cancellation Of FEWS
- Provide A Viable DSP Program For The Future
  - Employ Technology Insertion And P^3I To Control Cost And Risk
    - Implemented Through Evolutionary retrofits To Existing Satellites
  - Reduce Satellite Weight To Enable Utilization Of The Atlas IIAS Medium Launch Vehicle (MLV) For Significant Reduction In DSP Launch Costs
  - Evolve The Ground Segment To Centralize Operations And Reduce O&M Costs
- Enhance DSP System Performance In Critical Areas
  - Tactical Missile Performance
  - Tactical Parameter Accuracy
  - "All-Source" Data Fusion To Fully Exploit All National Capabilities

DSP-II Concept

(U) The DSP-II satellite concept is illustrated on the opposite page. It is an evolutionary approach, building on existing DSP sensor and spacecraft designs. Pre-Planned Product Improvements (P^3I) and technology insertion are employed to provide a cost-effective and low-risk approach to provide improved performance and increased Mean Mission Duration (MMD). This evolutionary approach also results in a significant weight reduction which enables the utilization of the Atlas II AS Medium Launch Vehicle (MLV), reducing launch costs by approximately $150 Million per launch. Combined with reduced manufacturing costs and the improved MMD, the life-cycle costs of the DSP program are significantly reduced.

(U) The DSP-II spacecraft reuses the SED 5R/6R spacecraft structure which is significantly smaller and lighter than the DSP-I spacecraft structure. The larger DSP-I spacecraft structure was built to accommodate the LASER Crosslink Subsystem (LCS), AR-I (power requirements), and Mission Data Message (MDM) payloads to support the survivability requirements of the Cold War era. In the New World Order, where survivability is no longer paramount, the functions of these payloads can be accomplished via alternative means, specifically: bent-pipes can be used to relay data to the CONUS for consolidated processing at significantly less cost than crosslinks; the GPS endo-atmospheric NUDET detection capability can be used in place of the DSP-based AR-I capability; and, Milstar and other communication systems can be used in place of the Mission Data Message (MDM) subsystem.

(U) The electronic subsystems of the spacecraft will be based on DSP-I electronics. Technology insertion will be applied, however, to update and redesign (for parts obsolescence) the electronics to increase their life, decrease power requirements, and improve manufacturability. The Si solar cells will also be replaced with GaAs/Ge solar cells to improve power generation and end-of-life performance, and a NiH_2 battery will also replace the three NiCd batteries used today.

(U) An SDLS is added to the DSP-II spacecraft. This link will be combined with an on-board representative-return processor to provide a jam-resistant / survivable downlink at the 64Kbps data rate. This link can support Global (strategic) and Theater (tactical) missions, and also (when combined with the on-board representative-return processor) provides a future growth-path for an on-board mission processor and low-data rate crosslink should a high-level of survivability become a requirement to counter a future protracted nuclear war threat.

(U) The DSP-II sensor builds on the DSP-I sensor. P^3I and technology insertion are used to upgrade specific subsystems such as the focal plane and the thermal control system to improve manufacturability and performance. For example, the current DSP-I focal plane employs PbS detectors and off-focal plane multiplexing. PbS detectors are no-longer manufactured, and off-focal plane multiplexing results in a tedious and costly manufacturing and assembly process. Low-risk technology exists to employ HgCdTe detectors and provide on-focal plane multiplexing to greatly reduce costs and improve performance.

(U) The upgrades to the DSP satellite would be accomplished in an evolutionary manner. Phased upgrades would begin with DSP Satellite 21 and culminate with DSP-II Satellite 26. This phased program provides for a low-risk approach to achieving reduced life-cycle costs and improved performance. An evolutionary approach to improving the ground segment would also be employed, providing near-term cost reduction through centralization of processing within the CONUS. The Global (strategic) mission would be accomplished using an upgraded System 8, and the Theater (tactical) mission would be performed with Talon Shield. In the long-term, a new generation Global and Theater ground system would be developed as an evolutionary growth from both System 8 and Talon Shield. The performance capabilities of the combined space and ground segments would approach the FEWS requirements as defined by the October 1992 Draft FEWS ORD.

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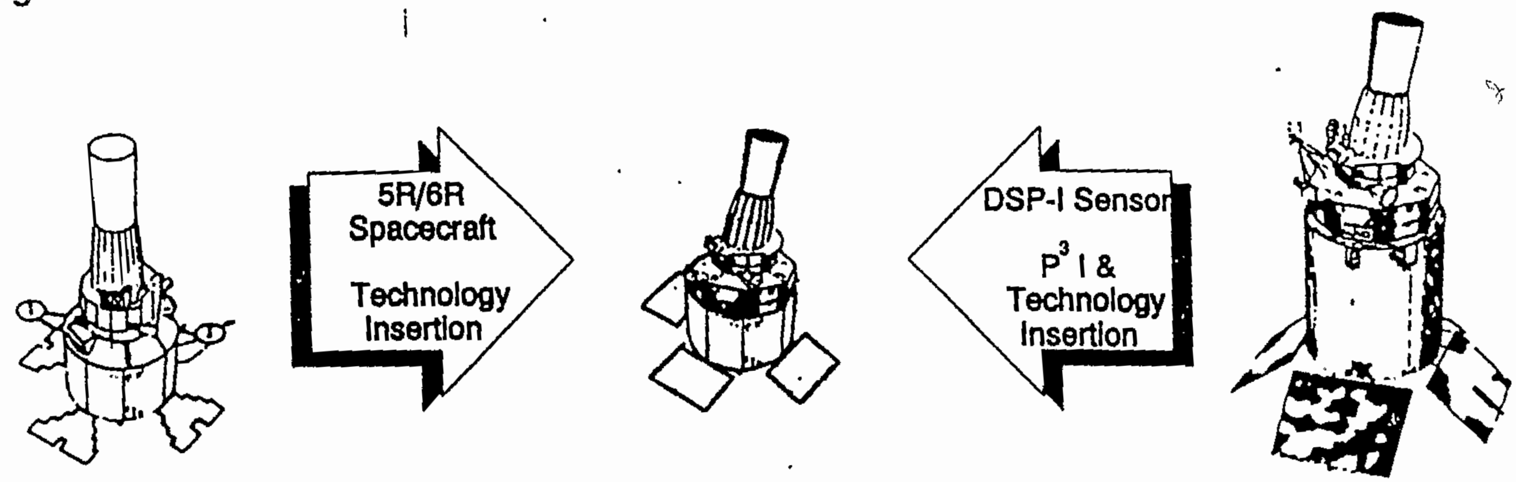
Defense Support Program

DSP-II Concept (U)

Technology Insertion And P^3I Improve Performance While Controlling Cost And Risk
Weight Reductions Enable Utilization Of Atlas IIAS To Significantly Reduce Launch Costs



SED 5R/6R — DSP-II — DSP-I

- DSP-II Uses 5R/6R Spacecraft Structure
  - DSP-I LCS And MDM Removed
  - SDLS Added
  - Low-Risk Technology Insertion
    - GaAs/Ge Solar Cells
    - NIH_2 Battery
    - Electronics Parts Obsolescence
  - 10-Year Design Life
- Weight Savings Enables Use Of Atlas IIAS Medium Launch Vehicle (MLV)
- DSP-II Builds On DSP-I Sensor
  - AR-I Removed
  - Rep-Return Processor Added
  - P^3I Improvements
    - Upgraded Focal Plane
    - Passive Thermal Control
  - Phased Upgrades Begin With Sat 21 And Culminate With Sat 26
- Approaches FEWS ORD Performance

An overview of the DSP-II system is illustrated on the opposite page. [redacted] would employ four or five geo-synchronous orbit DSP satellites with coverage augmentation provided by [redacted] The constellation size would be determined by an assessment of the threat. Remembering that the Earth's surface is 78% water, [redacted] four-satellite constellation with [redacted] and monocular coverage of all possible SLBM areas. The use of geosynchronous orbits enables [redacted] (i.e., the capability for tactical and strategic coverage as discussed above). [redacted] requires five satellites to provide similar coverage, otherwise, predictable [redacted]

The DSP-II system would provide the capability to support all missions: Integrated Tactical Warning and Attack Assessment (ITW&AA), Theater Missile Defense (TMD) surveillance, The performance of the system would meet the vast majority of the FEWS requirements as defined in the Draft FEWS ORD dated October 1992.

(U) From an operational perspective, the system will provide centralized processing within the CONUS. This will eliminate the need for overseas ground stations which have significant operating and personnel expenses. Data from all overseas DSP satellites would be relayed to the CONUS via redundant bent-pipes, just as is done today with data for one of the DSP satellites. The relay stations would be established at existing US facilities overseas, thus requiring only minimal expense in additional manpower for antenna and communication equipment maintenance. It is currently envisioned by AFSPACECOM and the DSP SPO that this connectivity will be established in the next one or two years to eliminate the European Ground Station (EGS) and potentially the Australian Overseas Ground Station (OGS) for a substantial near-term savings in DSP O&M costs.

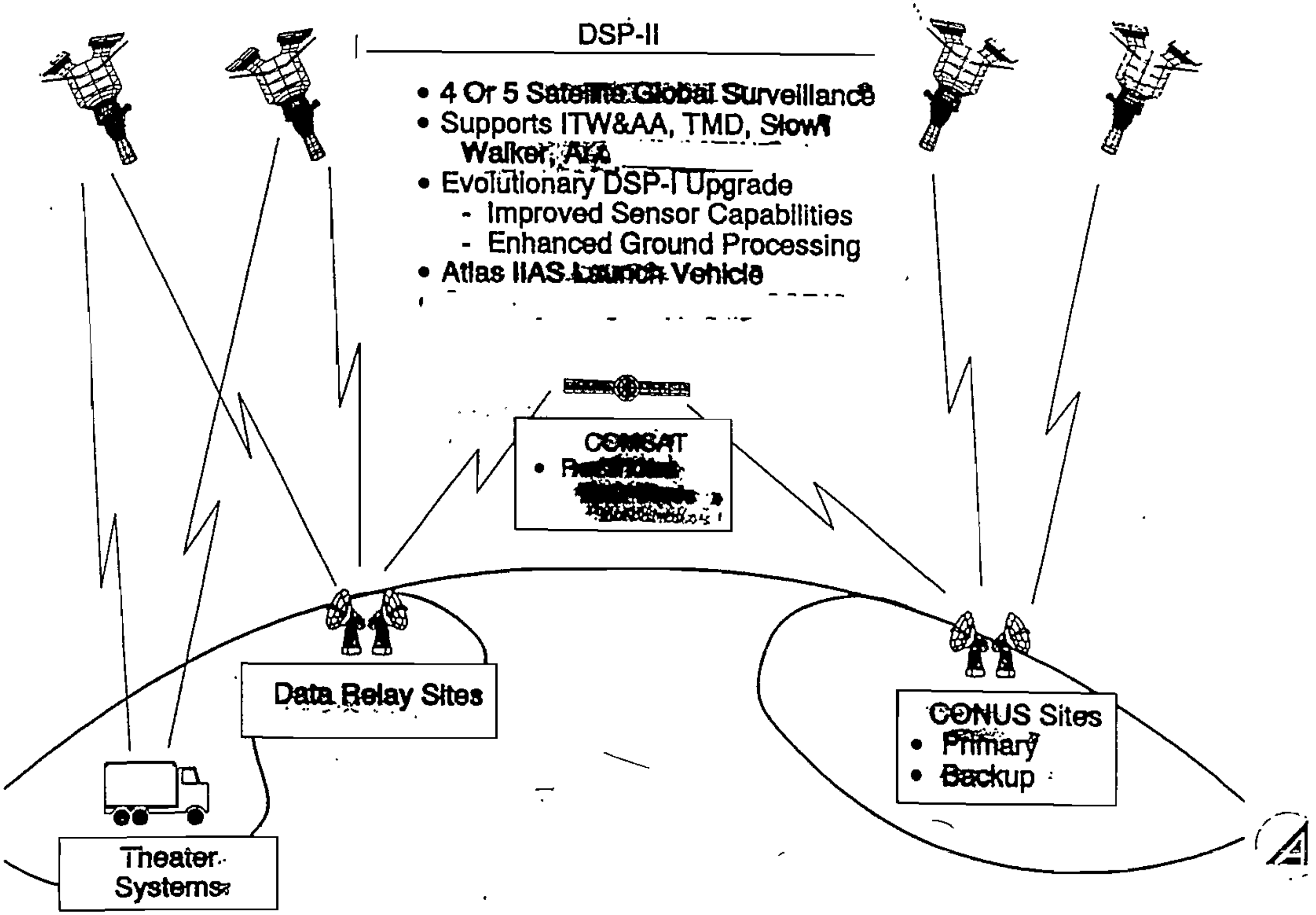
The current generation [redacted] This could also be accomplished in the very near-term, resulting in an additional significant savings in O&M costs. [redacted] Theater System (MTS) would be developed to provide an organic in-theater DSP processing capability. This system would permit fusion of DSP data with other organic surveillance systems for improved mission performance and military utility. [redacted] would be based on a ruggedized version of the Global in-CONUS processing system, [redacted]. The [redacted] serve in a dual role as a "survivable" ground system. Although [redacted] nuclear exchange, could operate through limited nuclear strikes [redacted] capability in-line with the potential future third-world nuclear threat, [redacted] survivable system employing crosslinks and on-board [redacted]

Defense Support Program

DSP-II System Overview (U)

DSP-II

- 4 Or 5 Satellite Global Surveillance
- Supports ITW&AA, TMD, Slow Walker, AIA
- Evolutionary DSP-I Upgrade
  - Improved Sensor Capabilities
  - Enhanced Ground Processing
- Atlas IIAS Launch Vehicle



The evolved DSP system provides considerable mission capabilities to support the needs of the strategic, tactical, and [redacted] The combined space and ground segment evolution are specifically designed to support the threat posed in the post-Cold War New World Order. This threat is dominated by an increasing proliferation of tactical missiles throughout the third world, particularly in the eastern hemisphere, and by a decreasing emphasis on engagement in a protracted massive global nuclear war with the now non-existent Soviet Union. The evolutionary approach also provides a path for future growth to provide increased survivability by employment of crosslinks and on-board mission processing -- through the SDLS uplink/downlink and the on-board representative-return processor -- without requiring any significant investment at this time.

DSP-II provides for maximum exploitation of other national capabilities through data fusion. The Global System, which supports all missions, provides for in-CONUS fusion of DSP data with [redacted] and All-Source data. The Theater System, which supports the tactical mission and provides a "survivable" backup to the Global System, provides in-theater DSP fusion with organic system assets to maximize military utility to the theater users. Thus, the system capitalizes on the nation's significant investment in national and theater-organic systems through a modest investment in ground processing systems.

As was demonstrated during Desert Storm, the existing DSP system (without the benefit of Talon Shield) offers significant capability to support theater users. With the addition of capabilities already proven by the Army's Tactical Surveillance Demonstration (TSD) and being developed under Talon Shield, DSP's performance will be improved further as shown in the table below. With the envisioned enhancements to the ground segment (includi[redacted]nd All-Source fusion), and the evolution of the DSP sensor's capabilities (improved sensitivity and Area-Of-Interest (AOI) processor, etc.), DSP-II provides for a cost-conscious, low-risk evolutionary path to achieve the majority of, and in some cases exceed, the performance requirements specified in the FEWS Operational Requirements Document (ORD).

Parameter	[redacted]	[redacted]	[redacted]	[redacted]
Launch Point (CEP)[a]	[redacted]	[redacted]	[redacted]	[redacted]
Launch Azimuth (68%ile)	[redacted]	[redacted]	[redacted]	[redacted]
Launch time (68%ile)	[redacted]	[redacted]	[redacted]	[redacted]
Initial alert sent (90%ile)	[redacted]	[redacted]	[redacted]	[redacted]
Man-validated report sent (90%ile)	[redacted]	[redacted]	[redacted]	[redacted]

Defense Support Program

DSP-II System Capabilities (U)

- Supports ITW&AA Mission Requirements
  - Assured And Timely Global Tactical Warning (TW)
  - Unambiguous And Accurate Attack Assessment (AA)
  - Indefinite Survivability Through HEMP-, Small-, And Medium-Attacks
  - All-Source Fusion Maximizes Exploitation Of National Capabilities
- Meets Theater Missile Defense Surveillance Needs
  - Assured And Timely Theater Detection For Warning
  - Accurate State Vector Information For Active Defense
  - Accurate Launch Point Information For Counter-Strike Operations
  - Provides In-Theater Data Fusion With Organic Systems To Maximize Capabilities
- Supports Slow Walker Mission Requirements
  - All-Source Fusion Maximizes Capabilities

DSP-II Schedule (U)

The DSP-II schedule through 2006 is shown on the opposite page. The satellite launch dates are derived from the Option 1 space segment transition approach as described in Appendix A - DSP-II Space Segment Details. These dates are based on a satellite GAP availability of 0.9. For the period through 2003, the current three-plus-one satellite constellation is assumed. For the period beyond 2004, a four-satellite constellation is assumed. The actual constellation size (4; 5; [illegible]) would be determined by an assessment of the threat. Remembering, however, that the Earth's surface is 78% water, a properly positioned four-satellite constellation w[redacted]rovides for stereo coverage of all current tactical missile threat regions, and monocular coverage of all possible SLBM areas. The use of geosynchronous orbits enables the <u>effective use</u> of a four-satellite constellation (i.e., the capability for tactical and strategic coverage as discussed above). inclined orbits [redacted] ires five satellites to provide similar coverage, otherwise, predictable coverage gaps would exist.

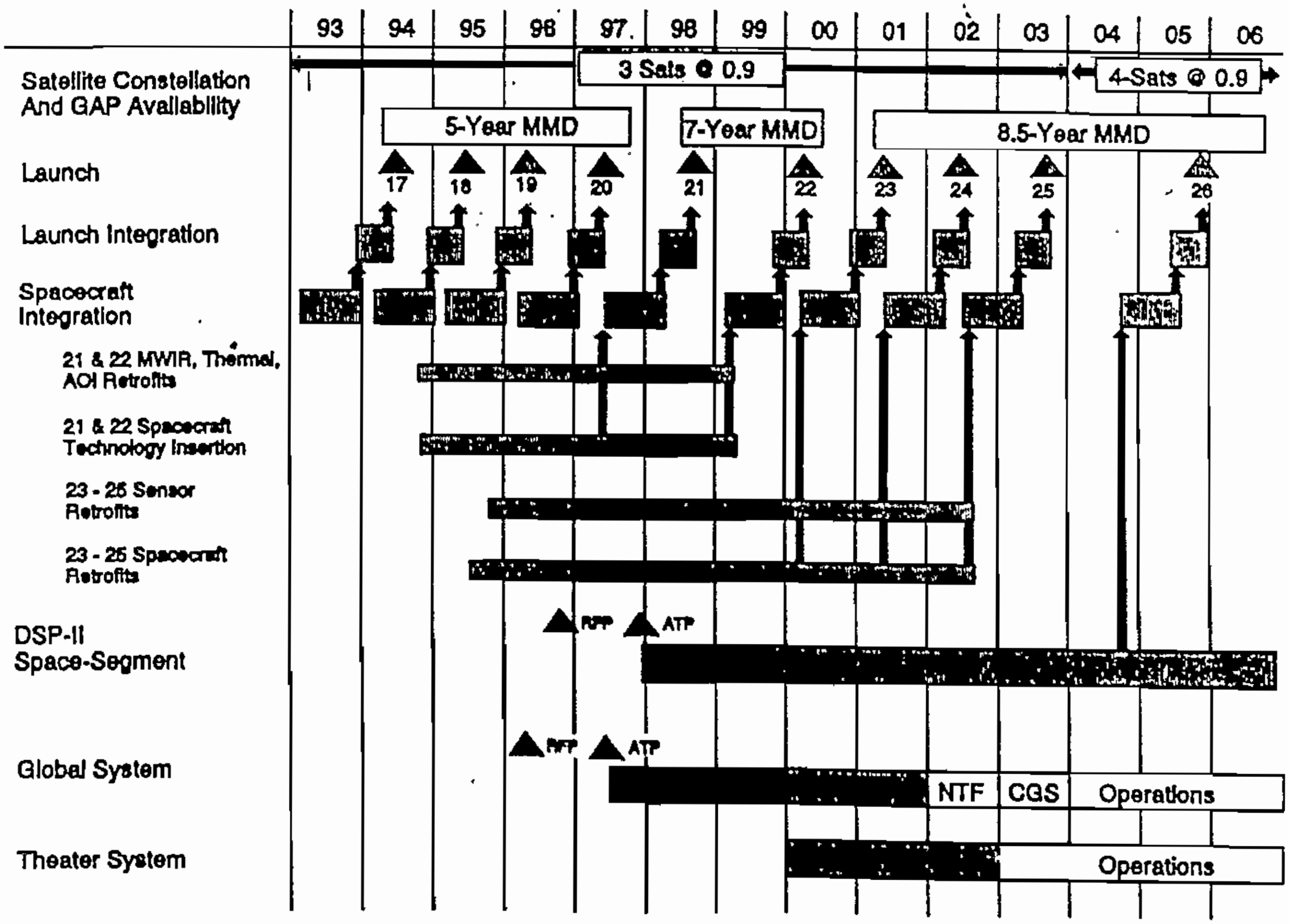
(U) Because of the retrofits to DSP-I Satellites 21 through 25, a four-satellite constellation with virtually all DSP-II capabilities (excluding the on-board representative-return processor and the SDLS) would be available in 2003. If a five-satellite DSP constellation is desired, the Satellite 26 launch date could be move to the left one year by providing ATP for DSP-II in early 1997 vice early 1998 as shown.

(U) The sensor and spacecraft retrofit schedules for DSP-I satellites 21 through 25 are also shown. The details of the retrofits are discussed in the "DSP-II Space Segment and Transition Options" section as well as in Appendix A - "DSP-II Space Segment Details".

(U) The Global and Theater System schedules shown are based on the vision that the DSP-II system will achieve operational capability with the launch of the retrofitted Satellite 25, which provides a four-satellite constellation. If required, a five-satellite constellation would become operationally available with the accelerated launch of Satellite 26 in 2004 as discussed above. Because of the evolutionary approach in developing the DSP-II, the evolved existing DSP ground system (System 8 and Talon Shield) will be able to support the DSP-II satellites. Also, the DSP-II Global and Theater Systems will be able to supported the retrofitted DSP-I satellites. Therefore, the schedule for the DSP-II ground segment can be adjusted to the right as dictated by budget priorities without causing a gap in the Global or Tactical missions. Of course, delaying the DSP-II ground segment acquisition will delay new features and enhancements such as the capability for in-theater processing and organic system fusion for the Theater (tactical) mission.

Defense Support Program

DSP-II Schedule (U)



- DSP-II Space-Segment Assumes Satellite 21-25 Technology Insertion And P³I Implemented. Without These, The DSP-II Space-Segment Schedule Must Be Adjusted To The Left Two Years.

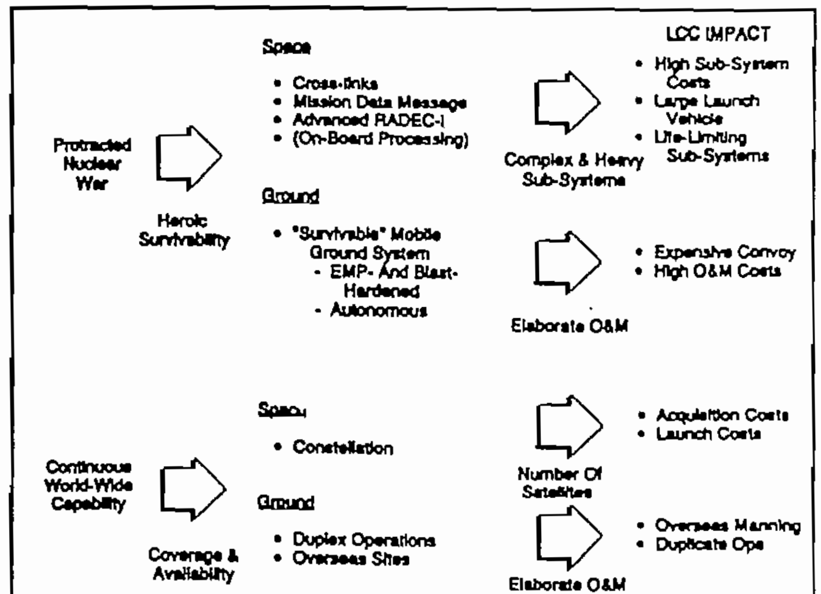
(U) The DSP-II Life-Cycle Costs (LCC) were derived from quasi-independent assessments by The Aerospace Corporation and Tecolote (some specific sensor retrofit and RDT&E costs were also independently estimated by Aerojet Electronic Systems Division). In all instances, the worst-case estimates were used. For example, Aerospace estimated DSP-II spacecraft RDT&E at $200 Million since a previous design was being used (i.e., 5R/6R), but Tecolote estimated $300 Million. As is shown in the table opposite, the $300 Million figure is utilized.

(U) The table shows life-cycle costs for either a four- or five-satellite DSP-II constellation. The number of satellites required is derived by a GAP analysis assuming a point availability of 0.9 for the specified constellation (this is the GAP availability assumed by FEWS). It should be noted that significantly fewer DSP-II satellites are required than for a comparable FEWS constellation through the same timeframe. This is because the retrofitted DSP-I satellites 21 through 25, which have comparable capabilities to DSP-II, are available with this approach.

(U) Operations and Maintenance (O&M) costs are shown from 2003 through 2015. These costs are assessed at about $150 Million/year and become effective with the activation of the DSP-II Global and Theater Systems which centralize operations within the CONUS and provide a mobile theater system. This is a conservative estimate based on today's costs of maintaining three DSP ground stations (two overseas) and an autonomous survivable Mobile Ground System (MGS) with different hardware and software than the fixed ground systems. The DSP-II ground system provides standardization between the Global and Theater system hardware and software. An additional $200 Million is added for a five-satellite constellation in order to be extra conservative.

(U) The life-cycle costs also assume that the Option 1 space segment transition approach as described in Appendix A - Space Segment Details is utilized. If another approach is used, it can impact the transition costs. Selection of another transition approach could also impact the DSP-II RDT&E costs and risks.

(U) The life-cycle costs are controlled by early identification and consideration of the DSP system cost drivers as shown in the figure on the right. In considering the type of evolutionary upgrades to apply to DSP-I, the performance requirements and design/implementation specified in the Draft FEWS ORD were balanced against military utility, cost, risk, and schedule. Integrated Weapons System Management (IWSM) concepts, which encourage consideration of other than 100% solutions (i.e., cost-effective methods to provide the 80% to 90% solution), were also applied in the development of the DSP upgrades. Options for additional DSP performance enhancements to approach the 100% solution (as defined by the Draft FEWS ORD) are provided along with their Life-Cycle Cost (LCC) impact and risk in a subsequent section.



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Defense Support Program

Summary Of DSP-II Life Cycle Costs To 2015 (U)

Subsystem Cost ('93 $Mil)	Cost / Unit	4-Sat DSP-II Constellation	5-Sat DSP-II Constellation
No Of DSP-II Satellites[1]	--	7	11
Spacecraft Non-Recurring (RDT&E) Average Unit Cost	 300 80	 300 560	 300 880
Sensor Non-Recurring (RDT&E) Average Unit Cost	 250 140	 250 980	 250 1,540
Launch Segment Launch Vehicle Payload Launch Services	 110 40	 770 280	 1,210 440
Ground Segment (Non-Recurring) Software & Integration Global System Theater System	 400 200 150	 400 200 150	 400 200 150
O&M (2003 Thru 2015)	--	2,000	2,200
Transition (DSP-I To DSP-II)[2]	3,720	3,720	3,720
Total LCC (FY93 $ Mil)	--	**9,610**	**11,290**

[1] Number of DSP-II satellites required beyond Satellite 25 for 0.9 GAP Point Availability Through 2015

[2] Assumes Space-Segment Transition Option 1 (Maximum cost using Option 3 is $4,440 Mil)

(U) The costs of the DSP-I, DSP-II, and FEWS satellites are shown in the chart on the opposite page. This chart also illustrates the cost and weight history of the DSP satellites. The FEWS costs shown are from: "The Cost and Operational Effectiveness Analysis (COEA) for the Advanced Space-Based Tactical Warning And Attack Assessment System", prepared by: Space-Based Warning Division Directorate of Aerospace Control and Force Application, Deputy Chief Of Staff/Plans, Air Force Space Command; dated 17 September 1991. The costs from this document in FY91 dollars were adjusted to FY93 dollars. Launch costs shown are based on Titan IV/IUS for DSP-I, Atlas IIAS/Star 48B-18 for DSP-II, and Titan IV (with no upper stage) for FEWS. Included in the launch costs for each satellite is $40 Million in contractor payload launch services. This is based on DSP experience.

(U) As is shown in the chart opposite and the table to the right, the cost of a DSP-II satellite on-orbit is approximately 40% less than the cost of a FEWS satellite on-orbit ($390 Mil versus $680 Mil). This is due to the reduced complexity of the DSP-II satellite compared with FEWS and the savings from the use of the Atlas IIAS versus the Titan IV.

(U) As is illustrated by the DSP cost and weight history graphs, the DSP-II cost estimates are consistent with past DSP experience. The estimates of FEWS satellite cost as shown in $K/Kg is also consistant with DSP history and the increased complexity of the FEWS satellite compared with DSP.

(U) Costs can also be evaluated in terms of dollars per Satellite-Year On-Orbit as show in the table to the right. Because of the improved Mean Mission Duration (MMD) of DSP-II and the reduced launch costs, DSP-II provides a 62% savings in life-cycle costs compared with DSP-I -- as measured in terms of the costs per satellite-year on-orbit ($46 Mil versus $120 Mil). DSP-II also provide a 42% savings compared with FEWS ($46 Mil versus $80 Mil).

	DSP-I	DSP-II	FEWS
Satellite MMD	5 Years	8.5 Years	8.5 Years
Dry Weight (Kgs)	2186 Kgs	1546 Kgs	2700 Kgs
Avg. Unit Cost (FY 93 $Mil)	290	220	420
Launch Cost (FY93 $Mil)	310	150	260
Avg. Unit Cost/Kg (FY93 $K/Kg)	133	142	156
Cost Per Sat On-Orbit (FY93 $Mil)	600	390	680
Cost Per Sat-Year On-Orbit (FY93 $Mil)	120	46	80

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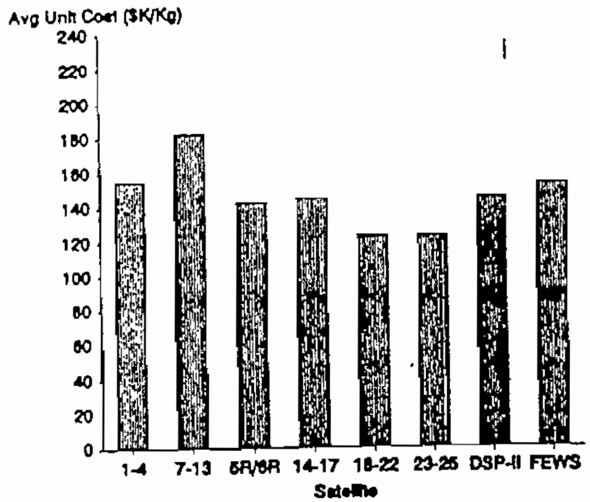
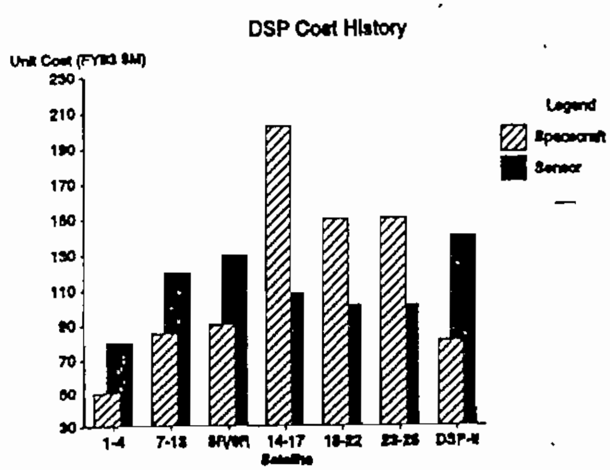
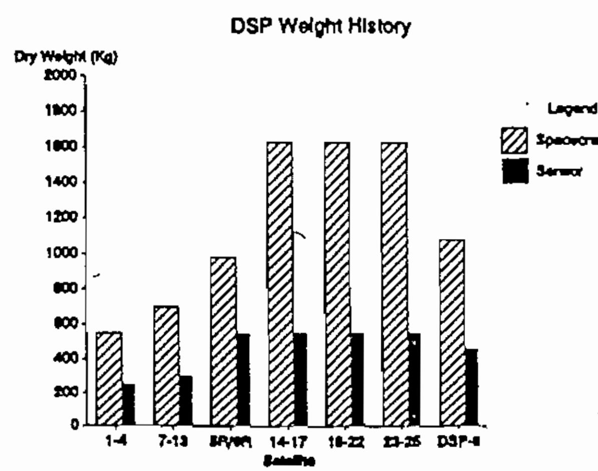
Defense Support Program

Comparative Costs Of FEWS And DSP-II Satellites (U)



	DSP-I	DSP-II	FEWS
Dry Weight (Kgs)	2186	1546	2700
Avg. Unit Cost (FY 93 $Mil)	290	220	420
Launch Cost (FY93 $Mil)	310	150	260
Avg. Unit Cost/Kg (FY93 $K/Kg)	133	142	156
Cost Per Sat On-Orbit (FY93 $Mil)	600	390	680





Comparative Summary FEWS And DSP-II (U)

A comparative summary of FEWS and DSP-II is shown in the table on the opposite page. FEWS cost, risk, performance, and schedule are compared with various-sized constellations of DSP-II satellites, with and without The life-cycle cost data for DSP-II were derived from quasi-independent assessments by The Aerospace Corporation and Tecolote (some specific sensor retrofit and RDT&E costs were also independently estimated by Aerojet Electronic Systems Division). The cost analysis is discussed in Appendix C - DSP-II Cost And Schedule. The costs, $1.1 Billion LCC, were derived from the FEWS COEA. The FEWS costs are also obtained from the FEWS COEA (adjusted to FY93 dollars). It should be noted that DSP-II life-cycle costs are for operations through 2015; the FEWS costs are for operations through only 2010 as specified in the FEWS COEA. No effort was made herein to project these costs through 2015. However, it is obvious that substantial addition satellite procurement and O&M costs can be expected for FEWS to operate through 2015.

The 95-99 Five Year Defense Plan (FYDP) costs for DSP-II are based on the DSP-II schedule and cost previously described on pages EX-16 through EX-19 and as described in Appendix C - DSP-II Cost And Schedule. The FEWS 95-99 FYDP costs are from the FEWS program plan dated February 1993. The by-year 95-99 FYDP costs are shown in the table below along with the savings from DSP-II. This table assumes a four-satellite DSP constellation. For a five-satellite DSP-II constellation, $0.1 Billion must be added to the FYDP. Whether or not is to be included does not impact the 95 - 99 FYD. If 1994 costs are included, DSP-II will save an additional $ 225 Million compared with FEWS.

FEWS Versus Four-Satellite DSP-II Constellation 95-99 FYDP (U)

	FY 95	FY 96	FY 97	FY 98	FY 99	Total
FEWS ($ Million)	$ 365	$ 890	$ 1,042	$ 1,202	$ 1,370	$ 4,869
DSP-II ($ Million)	$ 80	$ 120	$ 180	$ 340	$ 280	$ 1,000
Savings ($ Million)	$ 285	$ 770	$ 862	$ 862	$ 1,090	$ 3,869

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(U) The overall risk of the DSP-II is assessed as low due to the evolutionary approach to the development of both the space and ground segments. Pre-Planned Product Improvements (P³I) and technology insertion are applied to phase-in improvements via retrofit to DSP-I Satellites 21 through 25. The DSP-II ground segment is an evolutionary development based on System 8 and Talon Shield. FEWS technical risks are from the COEA and are discussed in the main section of the report on pages 96 and 97.

The performance assessment for DSP-II is based on the analysis described in detail in Appendix D - DSP-II Performance Assessment. The FEWS performance assessment of 99% of the ORD requirements is based on the inability of the competing designs to meet the following ORD-specified requirements:

Comparative Summary FEWS And DSP-II (U)

Constellation / Characteristic	[redacted] 5 DSP-II + other	[redacted] 4 DSP-II + other	5 DSP-II	4 DSP-II	FEWS
Life Cycle Cost (FY 93 Dollars)	\$ 12.4 (Bil) (To 2015)	\$ 10.7 (Bil) (To 2015)	\$ 11.3 (Bil) (To 2015)	\$ 9.6 (Bil) (To 2015)	\$ 18.4 (Bil)[1] (To 2010)
95 - 99 FYDP[2] (FY 93 Dollars)	\$1.1 (Bil)	\$1.0 (Bil)	\$1.1 (Bil)	\$1.0 (Bil)	\$4.9 (Bil)
Technical Risk	Low	Low	Low	Low	Med-High
≈ % Of The Draft FEWS ORD Satisfied	98%	95%	88%	85%	99%
Schedule For FOC	2004	2003	2004	2003	

[1]FEWS Cost (LCC To 2010) FEWS COEA Dated 17 September 1991 (Adjusted For FY 93 Dollars)
[2]The 1995 to 1999 Five Year Defense Plan (FYDP) costs are the required deltas to the existing DSP budget-line

Conclusions (U)

(U) As is illustrated throughout this report, significant value can be received from the investment in DSP technology insertion and Pre-Planned Product Improvement (P^3I) regardless of the destiny of FEWS. The implementation of evolutionary retrofits to the DSP-I satellites will provide significant return on investment. Retrofits to DSP-I Satellites 21 through 25 will provide 14.5 years of DSP MMD extension to provide a cushion for technical or fiscal delays in FEWS. The retrofits will also provide near-term performance improvements, especially for the tactical mission. Furthermore, the retrofits may provide risk reduction for FEWS by providing empirical data on low-intensity MWIR events and Earth background, for example.

(U) Upgrades to the DSP System 8 and Talon Shield ground processing systems also provide near-term performance improvements and cost savings. Continuing Talon Shield to its logical conclusion -- an operational system -- will provide significant capabilities to support the theater users. Centralization of DSP ground processing within the CONUS will result in substantial savings in O&M costs by enabling the closure of overseas ground stations.

(U) The implementation of Pre-Planned Product Improvements (P^3I) and technology insertion to provide enhanced capabilities while controlling cost and risk is the type of continuous process and product improvement envisioned by Integrated Weapon System Management (IWSM) and Total Quality Management (TQM). The DSP program has suffered for almost a decade from the overriding principle that it is to be replaced "soon": in the early-1980s it was the Advanced Warning System (AWS), in the mid-1980s it was the Boost Surveillance and Tracking System (BSTS), in the late-1980s the Advance Warning System (AWS) reemerged as the replacement, and today the DSP replacement is the Follow-on Early Warning System (FEWS). During this time, the successful evolutionary upgrade approach which had been followed since the DSP's beginnings in late 1960s was abandoned. DSP still has a significant future regardless of the destiny of FEWS - DSP will remain the nation's principal early warning system for a minimum of ten to fifteen years. If the potential for technical and fiscal problems with FEWS is considered, a viable DSP program will be required for many more years. In this light, beginning the process of implementing P^3I and technology insertion to DSP seems prudent and within the national interest.

(U) While the Follow-on Early Warning System offers the potential for greater performance than possible with the proposed DSP-II program, particularly with respect to mass-attack survivability provided by the use of crosslinks and on-board mission processing, DSP-II is a feasible alternative to FEWS. DSP-II reflects the budget realities dictated by the changing national priorities and policies established by the President and Congress. It also reflects the post-Cold War New World Order which is no longer dominated by the prospect of a protracted nuclear war with the non-existent Soviet Union. If the world order again changes, DSP-II offers growth alternatives to provide additional capabilities (such as increased survivability to support a protracted nuclear war) without requiring any significant investment at this time.

Defense Support Program

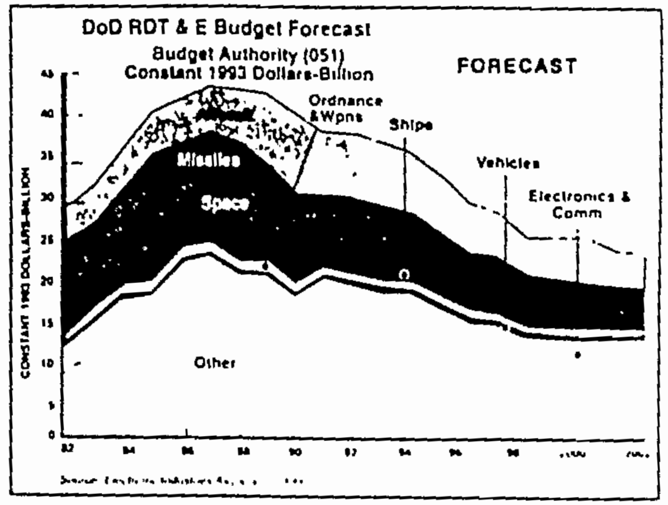
Conclusions (U)

- Significant Value In DSP Technology Insertion And P^{3}I Investment Regardless Of FEWS Destiny
  - $180 Million Investment Returns 14.5 Years Of DSP MMD Extension By Sat 25
    - Provides Continuation Of Early Warning Capabilities If FEWS Delayed
    - Provides Near-Term Enhancements For Global And Theater Missions
  - Provides Low-Cost Program For Satellites 26+ If FEWS Is Significantly Delayed
    - Technical Problems
    - Program Stretch-Out Due To Budget Priorities

- DSP-II Is A Feasible Alternative To FEWS
  - Near-Term Savings Of ≈ $4 Billion In 95-99 FYDP
  - Potential For > $10 Billion Savings In Life-Cycle Costs Through 2015
  - Low-Risk Solution To Meet Global And Theater Requirements
  - Consistent With Budget Realities And Post-Cold War New World Requirements
  - Growth Paths Available To Address Future Threats

DSP-II Reflects The Changing Acquisition Environment (U)

(U) As is discussed in "DoD Space Investment Strategy - A Report To The SAF/AQ", the Cold War procurement rationale no longer applies. Performance is no longer paramount - cost and risk are now the principal factors. The continued evolution of the Defense Support Program and the DSP-II concept reflect this principal tenet. The evolutionary approach for upgrading the DSP system provides for a cost-conscious, low-risk program to simultaneously achieve significant budget savings and performance improvements in-line with the post-Cold War world. If the world again changes, DSP-II provides growth alternatives to support additional capabilities (such as increased survivability to support a protracted nuclear war) without requiring any significant investment at this time.



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(U) As illustrated in the figure on the right, the DoD RDT&E budget planned by the Bush Administration had a steady decrease to provide a total DoD budget reduction of approximately $50 billion through 1998. The Clinton Administration, however, is calling for significantly larger reductions as shown in the table below. When the recent pay freeze and alternative inflation adjustments are considered, the Administration projects an $88 to $100 billion cut through 1998. The Air Force share can be assumed to be on the order of $20 to $30 billion. The cost difference between DSP-II and FEWS represents approximately 15% of the total required Air Force reductions.

Proposed DoD Budget Reductions And FEWS Versus Four-Satellite DSP-II Constellation (U)

	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	Total
Proposed DoD Budget Reduction ($ Billion)	$ 11.6	$ 16.1	$ 24. 8	36.8	39.8	?	$ 129.1
FEWS ($ Million)	$ 225	$ 365	$ 890	$ 1,042	$ 1,202	$ 1,370	$ 5,094
DSP-II ($ Million)	$ 0	$ 80	$ 120	$ 180	$ 340	$ 280	$ 1,000
Savings ($ Million)	$ 225	$ 285	$ 770	$ 862	$ 862	$ 1,090	$ 4,094

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Defense
Support
Program

DSP-II Reflects The Changing Acquisition Environment (U)

Cold War

- Performance
- Schedule
- Risk
- Cost

⇨

New World

- Cost
- Risk
- Performance
- Schedule

- **Potential For > $10 Billion Savings**
- **Low Technical Risk**
- **85% To 98% Solution**
- **Low-Risk Schedule**