



Selected Space Programs in the 2005 Appropriations Process

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About the Author

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CDI Space Security Project

With the United States now contemplating space-based weapons as part of its high-priority missile defense architecture, the future of space is nearing a crossroads: will the 50-year tradition of international cooperation and space sanctuary prevail; or, will the fear of military and/or economic domination drive nations to compete aggressively for primacy in the ultimate “high ground”? CDI’s Space Security Project is designed to highlight the strategic, political, technical and economic questions surrounding the potential weaponization of space through analyses, news and useful data for policymakers, media and others interested in this critical international security issue. CDI’s Space Security Project is made possible by a generous grant from Carnegie Corporation of New York.

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The U.S. Department of Defense Appropriations Bill for fiscal year 2005 (FY 05) again contains substantial funding for a variety of programs in the fields of space control and space force projection, including anti-ballistic missile systems and conventional strike from space.

Overall, the 13 program elements considered in this monograph total about \$3 billion, less than one-third of the Defense Department total \$12.4 billion in FY 05 spending on military space programs.¹ Less than 10 percent of the more than \$3 billion was spent on anti-satellite weapons or space-based interceptors. The remaining funds were allocated for command, control and intelligence systems.

The heavy emphasis on communications and sensor programs is important for two reasons. First, the threat to space security stems more from the phenomenon of “creeping” weaponization, rather than a specific system that is likely to be deployed. Second, the communications and sensor programs are preconditions for the weaponization of outer space. To the extent that these programs experience delays and technological difficulties, proponents of space weaponization will be restricted to the symbolic violation of the norms against the weaponization of outer space.

Air Force RDT&E

<u>R1</u>	<u>Program</u>	<u>Total (Change)</u>
25	<i>Advanced Spacecraft Technology</i>	\$101.9 M (+\$41.8 M)

There were no changes to the Air Force request for \$18.6 M for the Experimental Spacecraft System (XSS) micro-satellite demonstration project in program element 0603401F *Advanced Spacecraft Technology*. XSS is an Air Force Research Laboratory (AFRL) project to demonstrate autonomous proximity operations such as “inspection; rendezvous and docking; repositioning; and techniques for close in proximity maneuvering around on orbit assets.”² The XSS program is a “technology pathfinder” to the notional *Payload Microsat Imager* and *Orbit Flexible Counterspace Microsat* proposed by Air Force Space Command.³

44	<i>Space Control Technology</i>	\$15.8 M (-)
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No changes were made to the MDA request for \$15.8 M for Space Control Technology. The Space Control Technology program element focuses on technology planning, development, demonstrations and prototyping, as well as modeling, simulations and exercises (See Table 9: PE 0603438F Space Control Technology).

48	<i>Transformational SATCOM</i>	\$474.8 M (-\$300)
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The appropriators reduced the Air Force request for the Transformational Satellite Communications System (Transformational SATCOM) by \$300 M, to \$474.8 M. The funding cut, which still left the program with an increase over FY 04 funding, was to focus on technology development and risk reduction activities. The Transformational SATCOM (formerly Advanced Wideband System) will replace the Wideband MILSATCOM and supplement the Advanced EHF system. It is expected to integrate a number of technologies, including laser communications that would dramatically improve the rate of data transmission.⁴

53	<i>Space-Based Radar (Dem/Val)</i>	\$75.0 M (-\$252.7)
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The appropriators reduced the Air Force request for \$327.7 M for Space-Based Radar to just \$75.0 M, as recommended by the House appropriators. House language, with which the Senate conferees concurred, directed that the remaining funds be spent on “development efforts towards technologies and concepts that would lead to program costs far lower than currently conceived. The focus should be on seeking breakthroughs that fundamentally change the cost-benefit equation for a space based radar system.” SBR was originally designed to providing persistent,

all-weather tracking, particularly of moving targets, and is considered a crucial component to the missile defense mission.⁵

60 *Common Aero Vehicle* \$16.6 M (-\$5.0)
See special topic, Common Aero Vehicle.

73 *Counterspace Systems* \$28.4 M (-\$49.5 M)

The appropriators cut the Air Force request for the Counterspace Systems by \$49.5 M, in effect canceling the Counter Surveillance Reconnaissance System (CSRS), funded at \$53.0 in the FY 05 request, and including a congressional add of \$3.5 M for the “Space Control Test Capabilities system.” *Counterspace systems* is the principle engineering and manufacturing development (0604) investment account for space control systems, including the Counter Satellite Communications System (CSC), a ground-based, mobile system “intended to disrupt satellite-based communications used by an enemy for military C3”, and Rapid Attack Identification Detection and Reporting System (RAIDRS), a *defensive counterspace* system designed to aid the detection, reporting, identification, location, and classification of attacks against valuable space assets.

Counter Surveillance Reconnaissance System \$0 M (-\$53.0 M)

The Counter Surveillance Reconnaissance System (CSRS) is a ground-based system designed to impair reconnaissance satellites with “reversible, non-damaging effects.” The appropriators noted that the Air Force decided to cancel the program, subsequent to the submission of the budget.⁶ Air Force officials have refused to confirm that claim, while the White House comment on the appropriations legislations urged the restoration of funding for CSRS.⁷

Space Control Test Capabilities system \$3.5 M (+\$3.5 M)

The appropriators added \$3.5 M for “continued test and development of command and control capabilities for ground-based space control assets.”

75 *SBIRS High* \$599.5 M (+ \$91.0 M)

The appropriators increased funds for the Space-based Infrared System (SBIRS High) by 91.0 M to \$599.5 M, following a request by the Air Force to address new cost growth. SBIRS High is being designed as a constellation of four satellites (plus one spare) in geosynchronous earth orbit (GEO) and two sensors on host satellites in highly elliptical orbit (HEO), which will provide missile warning information and support the Ballistic Missile Defense System (BMDS).

202 *SpaceTrack* \$140.2 M (-\$22 M)

The appropriators reduced funds for SpaceTrack by \$22 M, taking \$27.0 M from the Space Based Space Surveillance (SBSS) program and adding \$5.0 M for an “S-band upgrade,” which presumably refers to upgrades for the naval surveillance system recently transferred to Air Force control.

Space Based Space Surveillance \$75.0 M (-\$27.0 M)

The appropriators cut SBSS by \$27.0 M because the program is six months behind schedule, owing to what an official at the Air Force Space and Missile Systems Center (SMC) described as “launch risk.”⁸ The full SBSS constellation will include additional satellites up to a full constellation of four satellites to provide space-based surveillance of objects in orbit.

Defense Wide RDT&E

<u>R1</u>	<u>Program</u>	<u>Total (Change)</u>
29	<i>Ballistic Missile Defense Technology</i>	\$228.3 M (+\$24.0 M)

Multiple Kill Vehicle (MKV) Technology (0)

The appropriators increased funds for MDA's *Ballistic Missile Defense Technology* program element, turning back an effort by the House side to cut back the Multiple Kill Vehicle Technology program by \$25 M. *Ballistic Missile Defense Technology* funds component technologies for new or improved technologies for deployed systems and the initial demonstration of innovative new concepts. *Multiple Kill Vehicle (MKV) Technology* is an *Engagement Systems* technology program to develop multiple, lightweight, sophisticated, and lethal interceptors on a single-carrier vehicle compatible with existing launch systems.

32 B *Space Programs and Technology* \$ 235.0 (+\$12.8 M)

The appropriators created a new program element, *Space Programs and Technology*, to fund DARPA space-related research. *Space Programs and Technology* was originally part of PE 0603285E *Advanced Aerospace Systems*, which contained \$361.1 M worth of projects. The appropriators split *Advanced Aerospace Systems* in two programs "to increase budgetary transparency and clarify the amount of resources requested and ultimately executed on DARPA programs..."⁹

Common Aero Vehicle \$12.5 M (-\$12.5 M)

See special topic: Common Aero Vehicle

64 *Advanced Concepts, Evaluation & Systems (ACES)* \$ 231.2 M (-\$25.0 M)

The appropriators retained the House's \$25.0 M cut to *Advanced Concepts, Evaluation & Systems (ACES)*, the classified counterpart to Missile Defense Agency's *Ballistic Missile Defense Technology*.

70 *Ballistic Missile Defense System (BMDS) Sensors* \$ 605.8 M (+\$13.4 M)

The appropriators increased the funding for *Ballistic Missile Defense System (BMDS) Sensors* by \$13.5 M, adding funds for three programs including \$1 M for ground based studies of rocket plume signatures, apparently in response to concerns that MDA had not considered alternatives to NFIRE. *Ballistic Missile Defense System (BMDS) Sensors* funds the sensor-related elements of the Ballistic Missile Defense system including the Space Surveillance and Tracking System (STSS), the now canceled Russian-American Observation Satellites (RAMOS), Forward Deployable Radar, and related sensor initiatives.

71 *Ballistic Missile Defense System (BMDS) Interceptor* \$ 348.3 M (-\$163.0 M)

Space Based Interceptors Test Bed \$ 10.6 M (-)

The appropriators made no changes to MDA's request for \$ 10.6 M to begin work on a space-based interceptors test bed. The space-based interceptor test bed is a program to develop of miniaturized, lightweight interceptor components, "with the initial emphasis on developing a liquid axial stage." MDA will decide in 2008 whether to begin development of satellites to conduct on orbit experiments, with the first space-based experiments scheduled in 2010-2011. By 2012, the space based test bed would comprise a "thin constellation of three to six spacecraft" on orbit "to test the functionality of a space based BMDS."¹⁰

Near Field Infrared Experiment (NFIRE) [\$68.0 M] (-)

The appropriators fully funded MDA's request for \$68.0M for the NFIRE satellite in program element 0603886C *Ballistic Missile Defense System Interceptor*. House appropriators had zeroed out funding, but the Senate position prevailed in conference. NFIRE will collect data on the characteristics of missile plumes and hardbodies outside the atmosphere, as well space and earth horizon backgrounds. In addition to collecting plume phenomenology, NFIRE is a "risk

reduction effort” for space-based, boost-phase intercept efforts and will “provide additional data needed for the development of a space test bed.”

Special topic, Common Aero Vehicle (CAV)

<u>R1</u>	<u>Program (Program Element)</u>	<u>Total (Change)</u>
60	<i>Common Aero Vehicle (PE 0604856F)</i>	\$16.6 M (-\$5.0 M)
32 B	<i>Space Programs and Technology (PE 0603285E)</i>	\$235.0 M(+\$12.8 M)
	<i>Common Aero Vehicle</i>	\$12.5 M (-\$12.5 M)

The appropriators agreed to \$29.1 M for two programs supporting the development of CAV (in bold). CAV is part of a joint Air Force/Defense Advanced Research Projects Agency (DARPA) program to develop a hypersonic weapons system capable of delivering a “substantial” payload from the continental United States to anywhere on Earth in two hours. CAV is a maneuverable re-entry vehicle (RV) that can deliver a variety of submunition packages including:

- One Rigid Penetrator for Hard & Deeply Buried Targets
- Six Wide Area Autonomous Search Munitions (WAASM)
- Four Small Smart Bomb System for facility destruction
- Six Unmanned Aerial Vehicles (UAV) for intelligence gathering

The appropriators also expressed concern that Russia or China might misinterpret the intent or use of the FALCON/CAV program. The bill restricted use of the funds for “non-weapons related research, such as micro-satellite or other satellite launch requirements and other purposes as listed under the conferees recommendations.”

Endnotes

- ¹ Amy Butler, "Military Space Topline Request Up \$1 Billion in FY '05, Continuing Recent Trend," *Defense Daily*, Feb. 2, 2004.
- ² AFRL, *Experimental Spacecraft Series Fact Sheet*.
- ³ Air Force Space Command, *Strategic Master Plan for FY 02 and Beyond* (February 2000).
- ⁴ Kerry Gildea, "Transformational Satellite Communications Architecture Almost in Place, Lord Says," C4I NEWS, Jan. 23, 2003.
- ⁵ *Defense Acquisitions: Space-Based Radar Effort Needs Additional Knowledge Before Starting Development* (Washington, D.C.: Government Accounting Office, July 2004).
- ⁶ H Report 108–284 (2004) 169.
- ⁷ Amy Butler, "Fate of Space Control Program Uncertain as Air Force's Advocacy Wavers," *Defense Daily*, (July 7, 2004).
- ⁸ Amy Butler, "SBSS Delay Prompts Cuts in FY 05 Budget," *Defense Daily*, July 8, 2004.
- ⁹ H. Report, 179.
- ¹⁰ Project: R113 Ballistic Missile Defense Interceptor Block 2012 MDA Exhibit R-4A (PE 0603886C) 24.

Appendix: Relevant Programs Organized by Mission

Space Control

R1	PE	Name
25	PE 0603401F	Advanced Spacecraft Technology Experimental Spacecraft System (XSS-11)
44	PE 0603438F	Space Control Technologies
73	PE 0604421F	Counterspace Systems Counter Surveillance Reconnaissance System Counter Satellite Communications System Rapid Attack Identification and Threat Reporting System
202	PE 0305910F	Space Track Space Based Surveillance System

Force Projection: Non-nuclear strike

R1	PE	Name
32 B	PE 0603285E	Space Programs and Technology FALCON/Common Aero Vehicle
48	PE 0603845F	Transformational SATCOM*
53	PE 0603858F	Space Based Radar*
60	PE 0604856F	Common Aero Vehicle (CAV)

Force Projection: ABM

R1	PE	Name
29	PE 0603175C	Ballistic Missile Defense Technology Multiple Kill Vehicle (MKV) Technology
64	PE 0603879C	Advanced Concepts, Evaluation & Systems (ACES)
70	PE 0603884C	Ballistic Missile Defense System (BMDS) Sensors
71	PE 0603886C	Ballistic Missile Defense System (BMDS) Interceptor Space Based Interceptors Test Bed Near Field Infrared Experiment (NFIRE)
75	PE 0604441F	Space-Based Infrared System (SBIRS)

* Relevant Space Force Enhancement programs relevant to non-nuclear strike.

Summary Chart
Selected Space Programs in the 2005 Appropriations Process

	R1	Program	Service	Re-quest	House	Senate	Conf.	Final
0603401F	25	Advanced Spacecraft Technology Experimental Spacecraft System (XSS-11) ¹	USAF	60.1 18.6	+23.5	+41.5	+41.8	101.9
0603438F	44	Space Control Technologies	USAF	15.8				
0603845F	48	Transformational SATCOM	USAF	774.8	-100.0	-400.0	-300.0	474.8
0603858F	53	Space Based Radar	USAF	327.7	-252.7	-100.0	252.7	75.0
0604856F	60	Common Aero Vehicle (CAV)	USAF	21.6	+10.0	-21.6	-5.0	16.6
0604421F	73	Counterspace Systems	USAF	75.9	-53.0	-48.0	-49.5	26.4
		Counter Surveillance Reconnaissance System (CSRS)		53.0	-53.0	-53.0	-53.0	0.0
		Counter Satellite Communications System (CSCS)		6.3				
		Rapid Attack Identification and Threat Reporting System (RAIDRS)		16.4				
		Space Control Test Capabilities system		-		+5.0	+3.5	3.5
0604441F	75	Space-Based Infrared System (SBIRS)	USAF	508.4	+91.0		+91.0	599.5
0305910F	202	Space Track	USAF	161.8	-37.0	+6.7	-22.0	140.2
		Space Based Surveillance System		102.0	-37.0	-4.0	-27.0	75.0
0603175 C	29	Ballistic Missile Defense Technology	MDA	204.3	-8	+27.8	+24.0	228.3
		Multiple Kill Vehicle (MKV) Technology ³		85.4	-25.0		0	85.4
0603285E *	32 B	Space Programs and Technology	DARP A	249.2	+3.0	-27.0	+12.8	235.0
		FALCON/Common Aero Vehicle		25.0		-25.0	-12.5	12.5
0603879 C	64	Advanced Concepts, Evaluation & Systems (ACES)	MDA	256.0	-25.0		-25.0	231.2
0603884 C	70	Ballistic Missile Defense System (BMDS) Sensors	MDA	592.0	+3.0	+21.5	+13.4	605.8
0603886 C	71	Ballistic Missile Defense System (BMDS) Interceptor	MDA	511.3	-113.0	-252.0	-163.0	348.3
		Space Based Interceptors Test Bed		10.6				
		Near Field Infrared Experiment (NFIRE) ²		68.0	-68.0	[68.0]	[68.0]	68.0

Note: Programs in gray are command, control and intelligence (C2I) programs.

*Transferred into a new PE

¹ *Experimental Spacecraft System* is funded as “3834 Integrated Space Technology Demonstrations”

² *Near Field Infrared Experiment* is funded as “0013 Ballistic Missile Defense Interceptor Block 2010, Experimentation and Test”

³ *Multiple Kill Vehicle (MKV) Technology* is funded as *0502 Advanced Technology Development, Engagement Systems Technology*, along with the *Advanced Discrimination Initiative*.
