

OFFICE OF THE UNDER SECRETARY OF DEFENSE (COMPTROLLER)/CHIEF FINANCIAL OFFICER

FEBRUARY 2020



Program Acquisition Cost By Weapon System

Irreversible Implementation of the National Defense Strategy

UNITED STATES DEPARTMENT OF DEFENSE
FISCAL YEAR 2021 BUDGET REQUEST

The estimated cost of this report or study for the Department of Defense is approximately \$27,000 for the 2020 Fiscal Year. This includes \$7,600 in expenses and \$20,000 in DoD labor.

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Major Weapon Systems

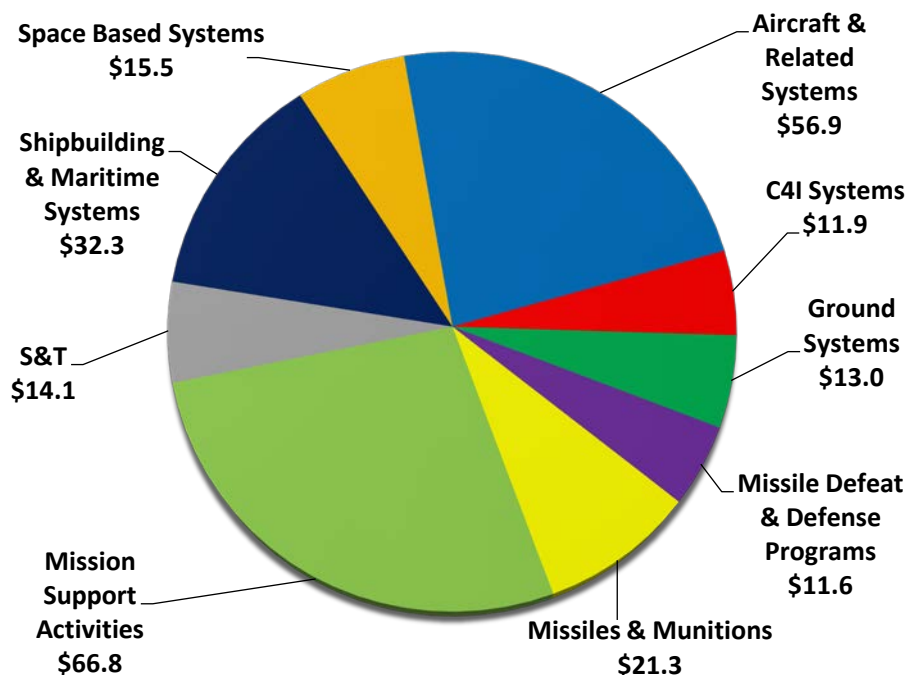
Overview

The performance of United States (U.S.) weapon systems are unmatched, ensuring that U.S. military forces have a tactical combat advantage over any adversary in any environmental situation. The Fiscal Year (FY) 2021 acquisition (Procurement and Research, Development, Test, and Evaluation (RDT&E)) funding requested by the Department of Defense (DoD) totals \$243.4 billion, which includes funding in the Base budget and the Overseas Contingency Operations (OCO) fund, totaling \$136.9 billion for Procurement and \$106.6 billion for RDT&E. The funding in the budget request represents a balanced portfolio approach to implement the National Defense Strategy. Of the \$243.4 billion in the request, \$88.9 billion finances Major Defense Acquisition Programs (MDAPs), which are acquisition programs that exceed a cost threshold established by the Under Secretary of Defense for Acquisition and Sustainment. To simplify the display of the various weapon systems, this book is organized by the following mission area categories:

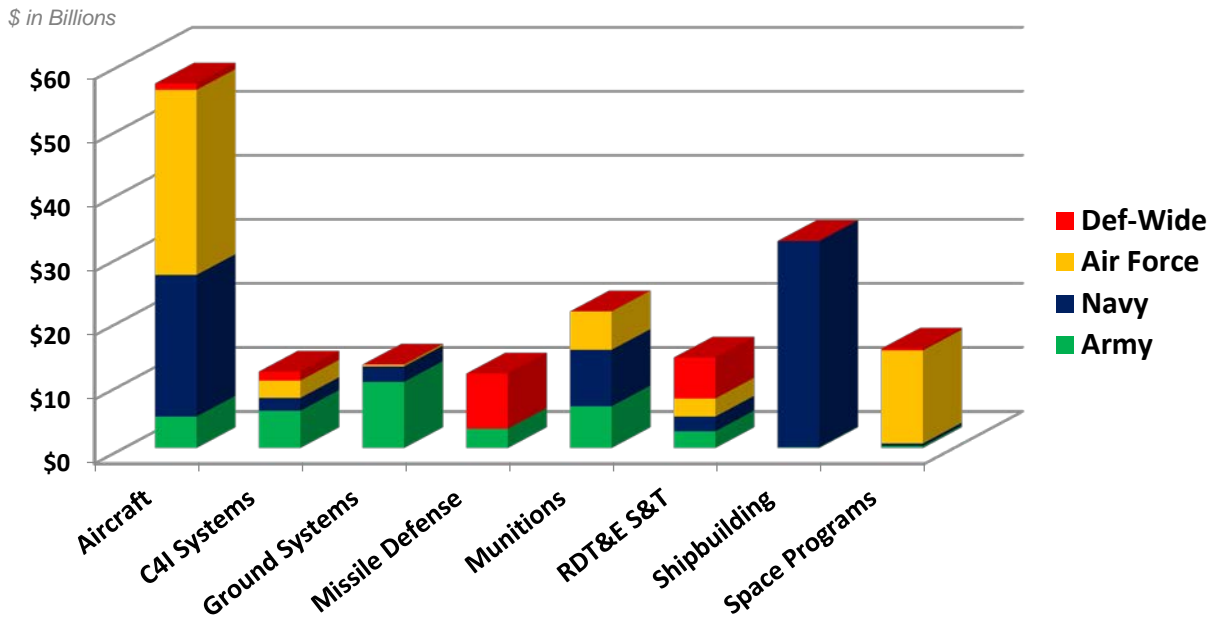
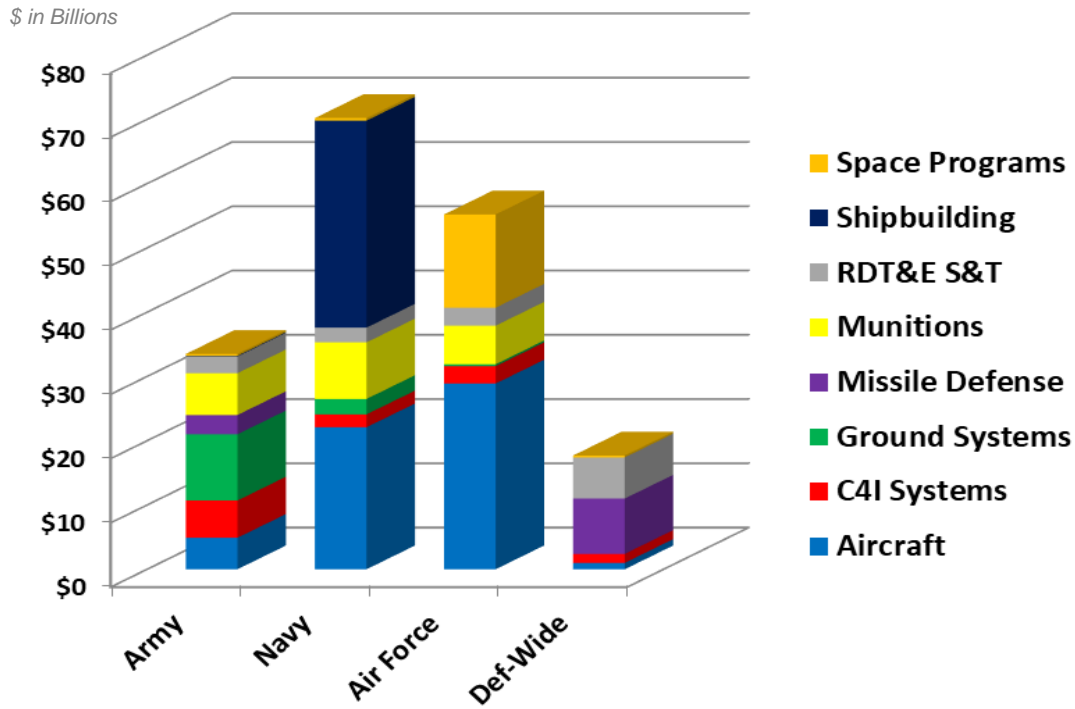
- Aircraft and Related Systems
- Command, Control, Communications, Computers, and Intelligence (C4I) Systems
- Ground Systems
- Missile Defeat and Defense Programs
- Missiles and Munitions
- Shipbuilding and Maritime Systems
- Space Based Systems
- Science and Technology
- Mission Support Activities

FY 2021 Investment Total: \$243.4 Billion

\$ in Billions



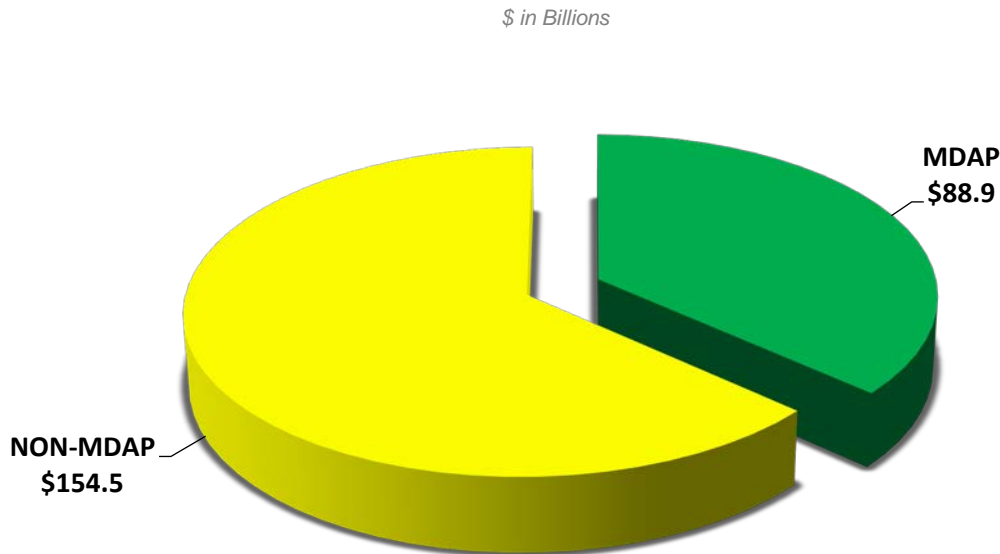
The Distribution of Funding in FY 2021 for Procurement and RDT&E by Component and Category*



* Funding in Mission Support activities are not represented in the above displays.

Numbers may not add due to rounding

Total Requested Procurement and RDT&E Funding During FY 2021, for MDAP* and Non-MDAP Programs



The FY 2021 President’s Budget request for modernization in the RDT&E and Procurement titles is comprised of 2,586 Program, Project, and Activity (PPA) line items. Within this amount, there are 88 Major Defense Acquisition Programs (MDAPs), of which 85 are under direct oversight by the Military Departments – 17 with the Army, 38 with the Navy, and 30 with the Air Force. The remaining 3 ACAT ID (F-35, Missile Defense, Chem Demil) programs are currently under the direct oversight of the Under Secretary of Defense (Acquisition and Sustainment).

Not all MDAPs (Acquisition Category (ACAT) I) are represented in this book because they fall below reporting criteria.

While non-MDAP individual programs are smaller in dollar value when compared to MDAPs, these ACAT II and ACAT III programs account for 63 percent of the total Investment accounts and are essential to development of future technologies and procuring a wide assortment of equipment, munitions, vehicles and weapons needed by combat forces. The MDAPs consume approximately \$88.9 billion, or 36 percent of the FY 2021 modernization funding (\$243.4 billion).

** A MDAP is an acquisition program that is designated by the Under Secretary of Defense for Acquisition and Sustainment (USD (A&S)); or is estimated to require an eventual total expenditure for Research, Development, Test, and Evaluation (RDT&E), including all planned increments, of more than \$480 million in Fiscal Year (FY) 2014 constant dollars or, for Procurement, including all planned increments, of more than \$2.79 billion in FY 2014 constant dollars.*

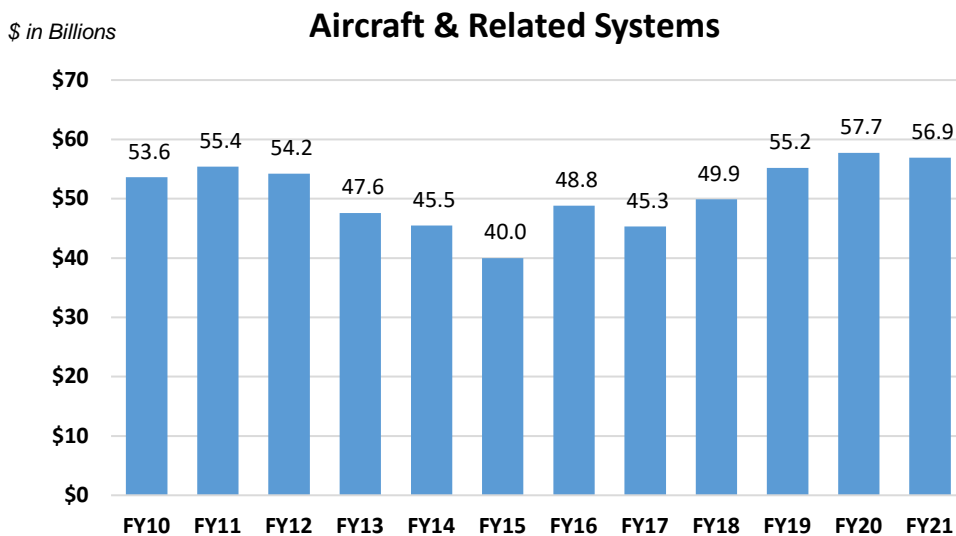
Mission Area Categories

This book shows the major weapon systems funded in the FY 2021 President’s Budget, organized by Mission Support Activities. Each Mission Area Category chapter heading further breaks out the funding allocation in FY 2021 by subgroups, and provides a summary programmatic and financial description of the major weapon systems within each portfolio. The bar charts in the respective mission area categorization sections, displays the relative change in funding requested for every fiscal year since FY 2010 for the mission area.

Aircraft and Related Systems

\$56.9 billion – 23 percent of the Investment budget request

Includes funding for aircraft research and development, aircraft procurement, initial spares, and aircraft support equipment. The single largest defense program, the 5th generation F-35 Joint Strike Fighter (FY 2021 request, \$11.4 billion; qty. 79; includes Modification program) resides in this category. Also in the FY 2021 request are 36 - 4th generation F/A-18E/F (24) and F-15EX (12) aircraft. This reflects the Department’s strategy to layer capability to address different threats. Against high-end threats, the Navy, Marine Corps and Air Force are procuring 5th generation F-35 jet fighters to address advance technology aircraft being deployed by Russia and China. To defeat lower technology platforms, the Department is procuring additional 4th generation F/A-18E/F and the F-15EX aircraft, which nominally have lower operating costs when compared to 5th generation combat jets such as the F-22 and the F-35. Also in this category is the funding for attack and utility helicopters; Unmanned Aircraft Systems (UAS); manned reconnaissance platforms and systems; the incremental cost for the VC-25B Presidential Aircraft Recapitalization (PAR) aircraft; the KC-46A Pegasus tanker; as well as future platforms such as the B-21 Long Range Strike Bomber and the Next Generation Air Dominance (6th generation fighter).



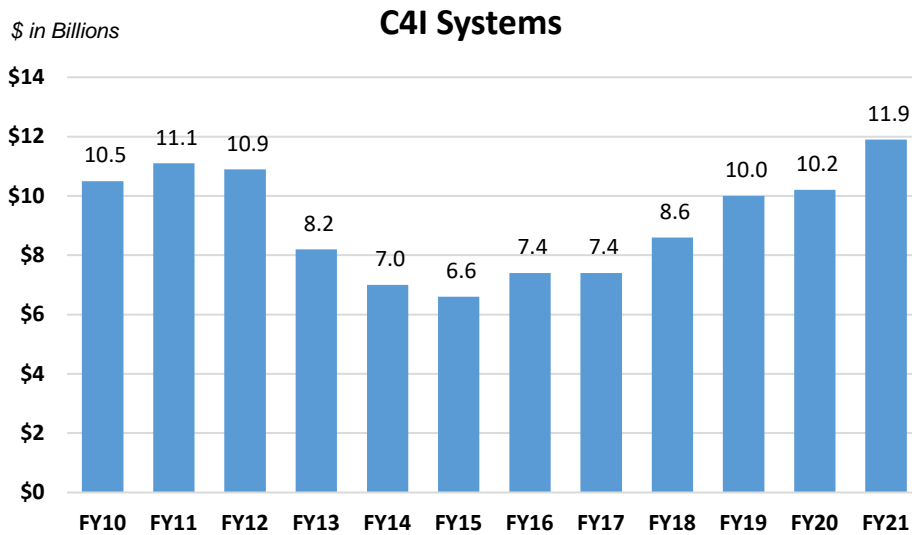
For display purposes, the aircraft and related systems category includes the following subgroups:

- Combat Aircraft
- Cargo Aircraft
- Support Aircraft
- Unmanned Aircraft System
- Aircraft Support
- Technology Development
- Aircraft Modifications
- Aircraft Support
- Technology Development
- Aircraft Modifications

Command, Control, Communications, Computers, and Intelligence (C4I) Systems

\$11.9 billion – 5 percent of the Investment budget request

Includes funding for various C4I systems, to include command centers; communications gear; air traffic control; night vision equipment; cyber space operations and requirements; data processing equipment; fire control systems; other information technology; and related systems. This category includes funding for a far-reaching number of programs such as Tactical Network Transport (TNT), Handheld Manpack Small Form Fit (HMS) radio, Joint Regional Security Stacks (JRSS), Information Systems Security Program (ISSP), the Air Force National Airborne Operations Center (NAOC) Recapitalization program, the Navy’s Consolidated Afloat Networks and Enterprise Services (CANES), and the Integrated Personnel and Pay System-Army (IPPS-A). The FY 2021 funding increases by 17 percent from the amount requested in FY 2020, emphasizing the increase awareness of Cyber, Spectrum, Artificial Intelligence (AI) and other emerging technologies.



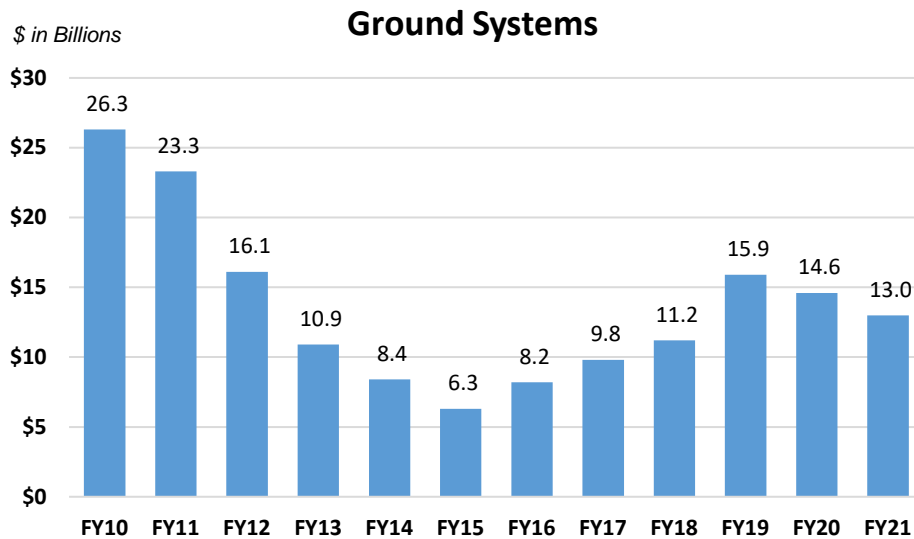
For display purposes, the C4I System category includes the following subgroups:

- Automation
- Base Communications
- Information Security & Assurance
- Technology Development
- Theater Combat Command, Control, Computers & Services

Ground Systems

\$13.0 billion – 5 percent of the Investment budget request

Includes funding for combat vehicles, artillery, infantry support weapons, tactical radar systems, tactical and non-tactical vehicles of all types, physical security equipment, logistics and engineering equipment, and research and development of various weapons equipment. This category includes funding for new and upgrades to tactical vehicles such as the Army’s new Armored Multi-Purpose Vehicle (AMPV) and the Marine Corps’ Amphibious Combat Vehicle (ACV). The category also includes funding for upgrades to the Abrams main battle tank to begin bringing the force up to the M1A2C (System Enhancement Package (SEP) V3) configuration and upgrades to the M109A7 155mm Paladin Integrated Management (PIM) self-propelled artillery vehicle for improved force protection, survivability, and mobility. In addition, the Army is modernizing the tactical wheeled vehicle fleet through new procurement Joint Light Tactical Vehicles (JLTV), engineering changes to Family of Medium Tactical Vehicles (FMTVs), and recapitalizing the Family of Heavy Tactical Vehicles (FHTVs) to continue affordability initiatives. The FY 2021 funding decreases compared to the FY 2020 requested level due to restructure of a combat vehicle program and adjustments within the Army’s budget.



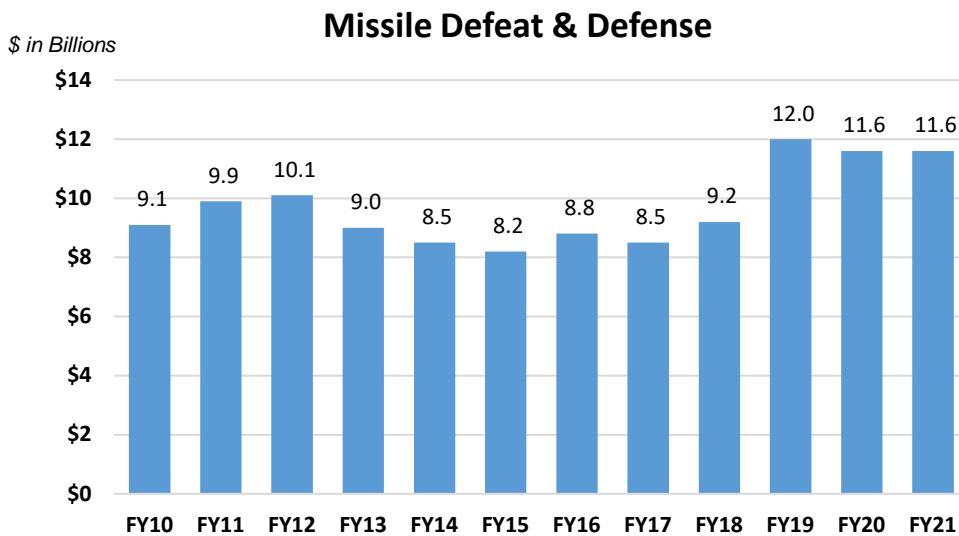
For display purposes, the Ground Systems category includes the following subgroups:

- Combat Vehicles
- Heavy Tactical Vehicles
- Light Tactical Vehicles
- Medium Tactical Vehicles
- Support Equipment
- Weapons

Missile Defeat and Defense Programs

\$11.6 billion – 5 percent of the Investment budget request

Includes funding for the development and procurement of tactical and strategic ballistic missile defense weapons and systems. This category includes a funding initiative to improve ballistic missile capabilities against existing and future threats. The FY 2021 budget request includes the procurement of additional Standard Missile Block 3 IB and IIA missiles, and the Terminal High Altitude Area Defense (THAAD) interceptors, as well as efforts to mature technologies and capabilities to address missile threats to the United States. In FY 2021 the Department is requesting a total of \$20.3 billion for Missile Defeat and Defense (MDD) activities, which includes funding for dual use technologies and programs that serve to mitigate the ballistic missile threat beyond those funded by the Missile Defense Agency (MDA). The \$11.6 billion represented in this display only counts those programs that are funded in the Procurement or RDT&E appropriations and are “purely” missile defense related. However, the Department is investing in other elements of overall (MDD) such as the U.S. Space Force’s Space Based Infrared System (SBIRS) and Overhead Persistent Infrared (OPIR) ballistic missile early warning satellite systems. This FY 2021 budget request continues the MDA longstanding support of U.S.-Israeli Cooperative BMD Programs, to include the co-development and co-production of the David’s Sling Weapon System and Upper Tier Interceptor, and improvements to the Arrow Weapon System and Iron Dome.



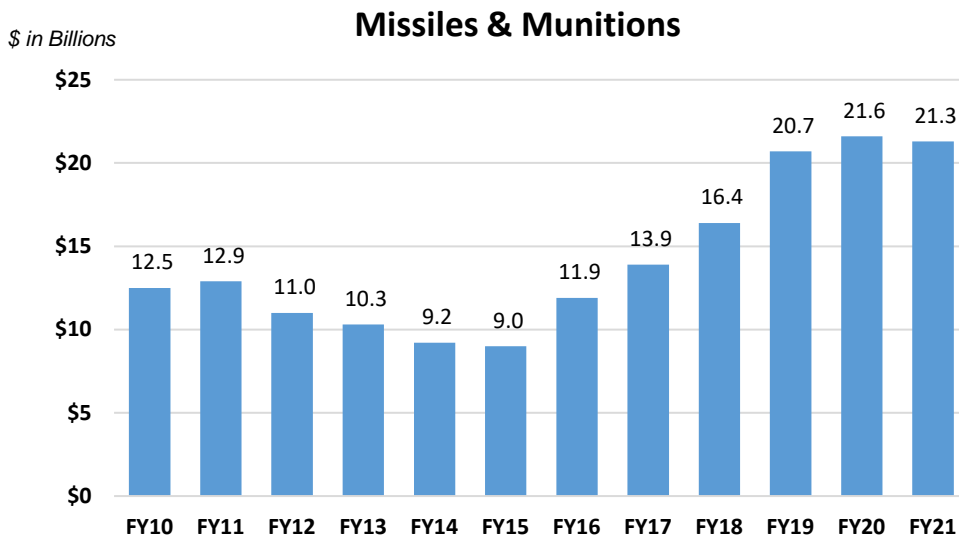
For display purposes, the Missile Defense Programs category includes the following subgroups:

- Ballistic Missile Defense System
- Tactical Ballistic Missile Defense
- Tactical Missile Defense

Missiles and Munitions

\$21.3 billion – 9 percent of the Investment budget request

This category includes funding for both conventional ammunition of all types and Precision Guided Munitions (PGM). The ammunition portfolio includes bullets, cartridges, mortars, explosives and artillery projectiles needed mostly by ground forces. The PGM portfolio includes weapons which have applicability in both a contested and permissive environment, and includes an assortment of air-to-air, air-to-ground, ground-to-ground, and ground-to-air weapons. The FY 2021 request furthermore reflects the Department’s objective to increase the overall lethality of the force by procuring at high rates of production, thus fully utilizing the available industrial capacity for high demand weapons that are essential for the high-end fight. The FY 2021 request includes procurement for the Joint Air-to-Surface Missile (JASSM), Long Range Anti-Ship Missile (LRASM), Standard Missile (SM)-6, Joint Direct Attack Munition (JDAM), Hellfire, and Small Diameter Bomb (SDB) I, SDB II, and Guided Multiple Launch Rocket System (GMLRS). Also included in this category is the modernization of the nuclear weapons, by investing in a new generation of delivery platforms and procurement of nuclear weapon delivery systems, such as the existing Trident II, the Ground Based Strategic Deterrent (GBSD) ballistic missiles, the B61-12 Tail Kit, and the Long Range Standoff (LRSO) weapon programs, which will replace the Air Launched Cruise Missile (ALCM) as it approaches the end of its service life. The FY 2021 funding of \$21.3 billion is slightly lower than the amount requested in FY 2020, but it still represents a 137 percent increase from the amount funded in FY 2015.



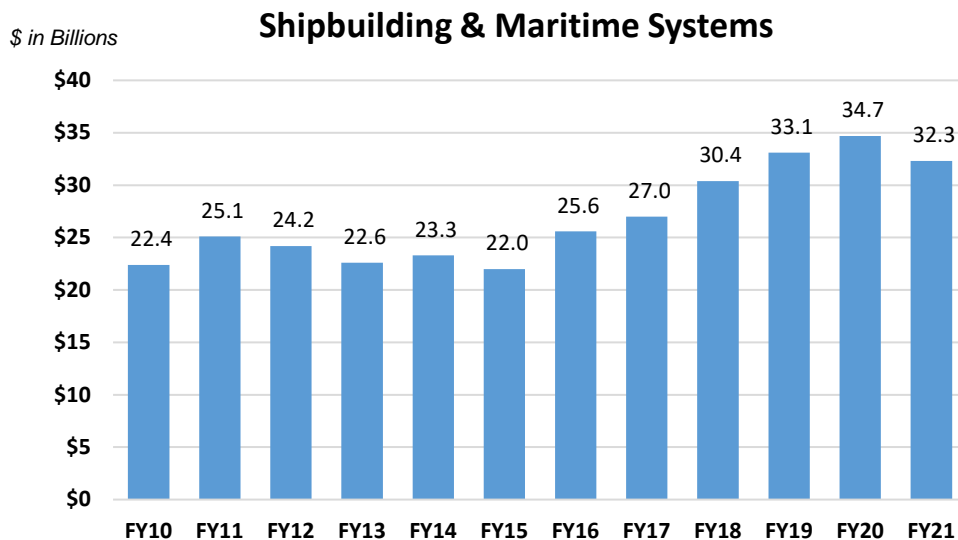
For display purposes, the Missiles and Munitions category includes the following subgroups:

- Conventional Ammunition
- Strategic Missiles
- Tactical Missiles

Shipbuilding and Maritime Systems

\$32.3 billion – 13 percent of the Investment budget request

Includes RDT&E and Procurement funding for shipbuilding and maritime systems. The FY 2021 budget request provides for the construction of eight battle force ships plus two unmanned surface vessels. The FY 2021 request includes incremental funding for two FORD class nuclear aircraft carriers: U.S.S. ENTERPRISE (CVN-80) and U.S.S. MILLER (CVN-81). The budget request also includes: three surface combatants (2 DDG-51 Flight III; 1 Frigate); one fast attack Virginia class submarine equipped with the Virginia Payload Module (VPM); one Flight II LPD (Amphibious Transport Dock ship); two rescue ships, and two unmanned surface vehicles. Also in this category are the development and construction of the first U.S.S. COLUMBIA class ballistic-missile submarine (SSBN), ongoing costs for the U.S.S. STENNIS Refueling and Complex Overhaul (RCOH) and funding for various requirements such as surface and shallow water mine countermeasures; surface training equipment; shipboard air traffic control systems, and diving and salvage equipment. The funding in FY 2021 decreases \$2.4 billion from the FY 2020 level requested mainly due to a reduction in the number of DDG-51 destroyers, VIRGINIA class fast attack submarines, and Fleet Oilers, which offsets increases in funding for the COLUMBIA class Fleet Ballistic Missile Submarine (SSBN), nuclear aircraft carrier new construction, and aircraft carrier Refueling Complex Overhaul.



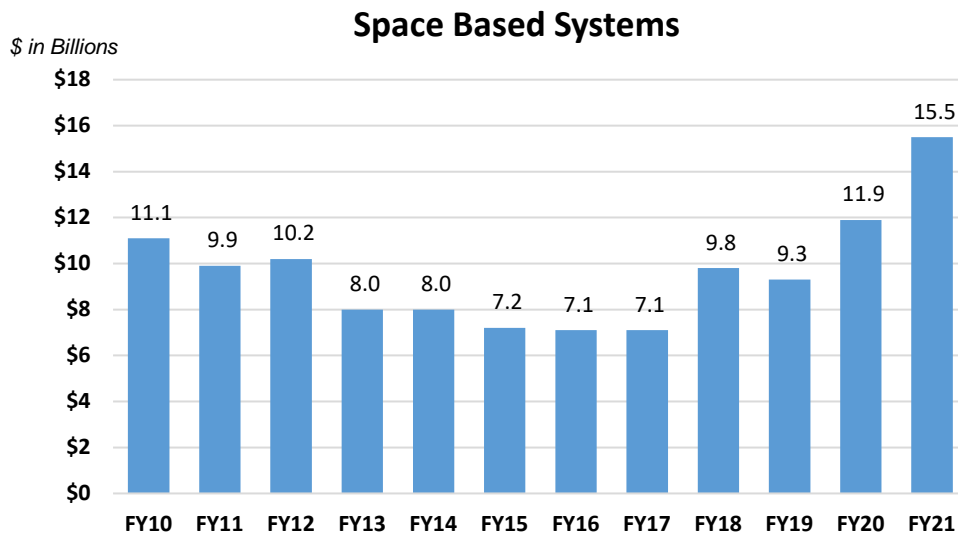
For display purposes, Shipbuilding and Maritime Systems is further categorized by the following subgroups:

- Surface Combatant
- Submarine Combatant
- Support Ships
- Support
- Outfitting & Post Delivery
- Technology Development

Space Based Systems

\$15.5 billion – 6 percent of the Investment budget request

This category funds development and procurement of space based spacecraft, launch vehicles, space command and control systems, and terrestrial satellite terminals and equipment. The FY 2021 funding for space programs has been restructured to reflect the startup of the U.S. Space Force, as such, funding has been realigned to new accounts. The FY 2021 request includes the development of a new generation of secure communication and tactical warning and attack assessment satellite constellations. Also included in this category are space situation awareness requirements, the space test program, and classified programs. The composition of Major Force Program – 12 (MFP-12) has undergone refinement and definition change.



For display purposes, Space Based Systems is further categorized by the following subgroups:

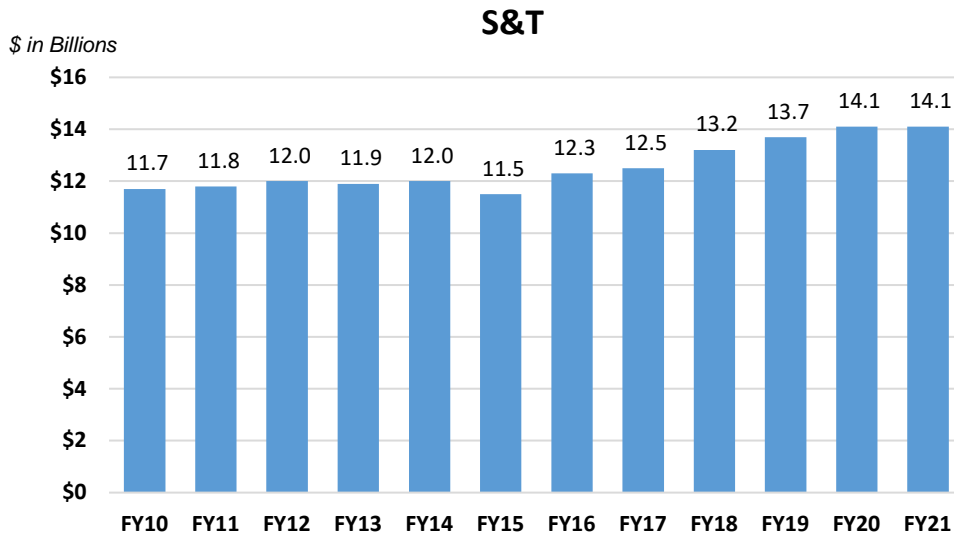
- Launch
- Satellites
- Support

Science and Technology

\$14.1 billion – 6 percent of the Investment budget request

Investing in Science and Technology (S&T), is investing in the future. Given today's globalized access to knowledge and the rapid pace of technology development, innovation and agility have taken on a greater importance. The FY 2021 funding in this category fosters innovation and develops cutting-edge state-of-the-art technology to protect the United States, its allies, and American forces worldwide. Crucial S&T efforts to maintain a critical edge against potential future adversaries include Artificial Intelligence (AI), Machine Learning applications, Hypersonics (offensive and defensive), Directed Energy (lasers, partial beams, etc.), Microelectronics, Bio Technology, Cyber, 5G, Autonomy, Space, and Quantum sciences. Transitioning these technologies to operational systems will bring critical new capabilities to the warfighter. The FY 2021 funding level for S&T remains unchanged from the amount requested

in FY 2020 (\$14.1 billion). Congressional increases in the FY 2020 Appropriations Act provided a total of \$16.1 billion for S&T, reflecting the strong congressional strong support for the development of advance technologies to maintain the U.S. technology edge.



For display purposes, RDT&E S&T, is further categorized by the following subgroups:

- Basic Research
- Applied Research
- Advanced Technology Development

Mission Support Activities

\$66.8 billion – 28 percent of the Investment budget request

This category includes RDT&E and Procurement funding for various miscellaneous equipment used by combat and non-combat forces, cross departmental capabilities such as live fire test and evaluation (such as testing ranges), chemical demilitarization, and the Defense Production Act (DPA) purchases. Also included in this category are classified programs and capabilities not reflected in the other categories previously identified.

Program Acquisition Cost By Weapon System Funding Tables Display Criteria of Weapon System Funding

The funding amount represents the direct program costs for the development and the acquisition of the Programs, Projects and Activities (PPA). Not included are the costs associated with initial and replenishment spare parts.

FY 2019 amounts reflect the actual amount as of September 30, 2019, does not include congressional rescissions, and combines both Base and Overseas Contingency Operations (OCO) funding.

FY 2020 amounts reflect congressionally enacted amount as of December 20, 2019, and combines both Base and OCO funding.

FY 2021 amounts reflect the funding requested in the FY 2021 President's Budget (PB) by the Department of Defense in both Base and OCO appropriations.

Major Weapon Systems Summary

FY 2021

(\$ in Millions)		FY 2019	FY 2020	FY 2021			Page
				Base Budget	OCO Budget	Total Request	
Aircraft and Related Systems – Joint Service							
F-35	Joint Strike Fighter	11,743.0	12,612.0	11,400.4	-	11,400.4	1-2
V-22	Osprey	1,770.0	2,149.0	1,828.0	-	1,828.0	1-3
C-130J	Hercules	2,546.2	2,412.9	1,231.7	58.0	1,289.7	1-4
MQ-1B / MQ-1C	Predator/Gray Eagle	312.7	195.1	72.1	-	72.1	1-5
MQ-9	Reaper	784.8	989.8	468.2	231.6	699.8	1-6
MQ-4C / RQ-4	Triton/Global Hawk/NATO AGS	1,342.0	986.3	631.3	-	631.3	1-7
	Armed Overwatch / Targeting	-	-	106.0	-	106.0	1-8
Aircraft and Related Systems – US Army (USA)							
AH-64E	Apache: Remanufacture/New Build	1,566.1	1,073.7	1,157.0	69.2	1,226.2	1-9
CH-47	Chinook	307.0	411.0	241.1	50.5	291.6	1-10
UH-60	Black Hawk	1,447.0	1,690.5	1,014.4	-	1,014.4	1-11
Aircraft and Related Systems – US Navy (USN) / US Marine Corps (USMC)							
MQ-25	Stingray	518.9	649.1	267.0	-	267.0	1-12
F/A-18	Super Hornet	2,093.6	1,993.6	2,061.5	-	2,061.5	1-13
E-2D	Advanced Hawkeye	1,478.9	1,442.7	1,047.8	-	1,047.8	1-14
P-8A	Poseidon	2,065.7	1,809.6	269.0	-	269.0	1-15
VH-92A	Presidential Helicopter	906.3	826.2	738.3	-	738.3	1-16
CH-53K	Heavy Lift Replacement Helicopter	1,618.6	1,622.0	1,492.2	-	1,492.2	1-17
H-1	AH-1Z Viper/ UH-1Y Venom	880.0	219.0	254.0	-	254.0	1-18
Aircraft and Related Systems – US Air Force (USAF)							
B-21	Raider	2,189.9	2,982.5	2,848.4	-	2,848.4	1-19
B-1, B-2, B-52	Bombers	966.4	790.2	883.7	-	883.7	1-20
KC-46A	Tanker	2,377.3	2,204.5	2,980.6	-	2,980.6	1-21
PAR	Presidential Aircraft Recapitalization	713.6	757.9	800.9	-	800.9	1-22
F-22	Raptor	822.3	775.8	1,058.8	-	1,058.8	1-23
F-15	Eagle	985.2	1,952.2	2,414.0	-	2,414.0	1-24
CRH	Combat Rescue Helicopter	1,182.5	1,124.4	1,081.2	174.0	1,255.2	1-25
T-7A	Advanced Pilot Training	236.8	340.4	248.7	-	248.7	1-26
C4I Systems – USA							
WIN-T	Tactical Network Transport	632.9	530.1	423.8	-	423.8	2-2
C4I Systems – Joint Service							
HMS	Handheld, Manpack, and Small Form Fit Radios	317.2	496.4	579.0	-	579.0	2-3
Cyberspace	Cyberspace	2,624.4	3,093.9	2,985.4	0.1	2,985.5	2-4
Ground Systems – Joint Service							
JLTV	Joint Light Tactical Vehicle	1,901.8	1,621.2	1,364.0	8.0	1,372.0	3-2
Ground Systems – USA							
M-1	Abrams Tank Modification/Upgrades	2,646.0	2,218.9	1,508.8	-	1,508.8	3-3
AMPV	Armored Multi-Purpose Vehicle	787.8	528.6	289.6	-	289.6	3-4
NGSW	Next Generation Squad Weapon	-	51.3	111.2	-	111.2	3-5
PIM	Paladin Integrated Management	561.6	752.7	863.1	-	863.1	3-6
FMTV	Family of Medium Tactical Vehicles	127.2	140.3	122.1	-	122.1	3-7
FHTV	Family of Heavy Tactical Vehicles	324.1	386.3	184.1	21.7	205.8	3-8
GMV	Ground Mobility Vehicle	44.0	40.0	37.9	-	37.9	3-9
Stryker	Stryker	661.5	1,189.1	1,116.1	-	1,116.1	3-10
Ground Systems – USMC							
ACV	Amphibious Combat Vehicle	230.8	351.0	520.7	-	520.7	3-11
Missile Defeat and Defense Programs – Joint Service							
GMD	Ground-based Midcourse Defense	1,791.3	2,202.3	1,735.5	-	1,735.5	4-2
THAAD	Terminal High Altitude Area Defense	1,467.1	739.1	915.8	-	915.8	4-3
Aegis	Aegis Ballistic Missile Defense	1,614.4	1,703.4	1,709.4	-	1,709.4	4-4
Missile Defeat and Defense Programs – USA							
Patriot / PAC-3	Patriot Advanced Capability	481.2	745.9	842.3	-	842.3	4-5
PAC-3 / MSE	PAC-3/Missile Segment Enhancement Missile	1,131.3	702.4	603.2	176.6	779.8	4-6
Missiles and Munitions – Joint Service							
JDAM	Joint Direct Attack Munition	1,119.3	1,109.5	279.5	253.2	532.7	5-2
Hellfire	Hellfire Missiles	461.0	726.8	131.3	385.3	516.6	5-3
SDB I	Small Diameter Bomb I	209.3	273.3	45.5	50.4	95.9	5-4
SDB II	Small Diameter Bomb II	349.0	387.1	432.0	-	432.0	5-5
JASSM	Joint Air-to-Surface Standoff Missile	643.7	561.9	546.7	30.0	576.7	5-6
AIM-9X	Air Intercept Missile - 9X	305.2	334.3	316.6	-	316.6	5-7
AMRAAM	Advanced Medium Range Air-to-Air Missile	574.3	613.1	876.3	-	876.3	5-8
Chem-Demil	Chemical Demilitarization	742.8	985.5	889.5	-	889.5	5-9
JAGM	Joint Air-to-Ground Missile	309.0	310.0	284.4	-	284.4	5-10

Major Weapon Systems Summary

		FY 2021					
(\$ in Millions)		FY 2019	FY 2020	Base Budget	OCO Budget	Total Request	Page
LRASM	Long Range Anti-Ship Missile	315.6	187.9	224.4	-	224.4	5-11
Missiles and Munitions – USA							
GMLRS	Guided Multiple Launch Rocket System	1,118.5	1,338.4	1,059.5	144.5	1,204.0	5-12
Javelin	Javelin Advanced Anti-Tank Weapon	253.9	178.0	217.7	-	217.7	5-13
PrSM	Precision Strike Missile	152.6	156.7	172.6	-	172.6	5-14
Missiles and Munitions – USN							
Trident II	Trident II Ballistic Missile Modification	1,109.6	1,188.9	1,191.1	-	1,191.1	5-15
Standard	Standard Missile-6	743.6	655.7	816.3	-	816.3	5-16
RAM	Rolling Airframe Missile	121.5	128.8	96.7	-	96.7	5-17
Tomahawk	Tactical Tomahawk Cruise Missile	332.5	659.2	603.0	-	603.0	5-18
Missiles and Munitions – USAF							
GBSD	Ground Based Strategic Deterrent	401.2	557.5	1,524.8	-	1,524.8	5-19
B61	B61 Tail Kit Assembly	194.2	108.4	45.4	-	45.4	5-20
LRSO	Long Range Stand-Off Missile	646.8	712.5	474.4	-	474.4	5-21
Shipbuilding and Maritime Systems – USN							
CVN 78	<i>Gerald R. Ford</i> Class Nuclear Aircraft Carrier	1,824.5	2,483.1	3,023.7	-	3,023.7	6-2
SSBN 826	<i>Columbia</i> Class Submarine	3,891.6	2,362.0	4,411.9	-	4,411.9	6-3
SSN 774	<i>Virginia</i> Class Submarine	7,422.3	8,817.3	4,657.8	-	4,657.8	6-4
DDG 51	<i>Arleigh Burke</i> Class Destroyer	6,192.9	6,175.4	3,496.3	-	3,496.3	6-5
FFG(X)	Guided Missile Frigate	-	1,340.2	1,135.4	-	1,135.4	6-6
CVN	Refueling Complex Overhaul	425.9	651.5	2,093.8	-	2,093.8	6-7
T-AO 205	<i>John Lewis</i> Class Fleet Replenishment Oiler	1,073.4	1,078.6	94.9	-	94.9	6-8
T-ATS	Towing, Salvage, and Rescue Ship	80.5	150.3	168.2	-	168.2	6-9
USV	Unmanned Surface Vehicle	116.1	407.8	464.0	-	464.0	6-10
LPD	<i>San Antonio</i> class Amphibious Transport Dock ship	352.0	555.3	1,220.0	-	1,220.0	6-11
Space Based Systems – USSF							
NSSL	National Security Space Launch	1,831.2	1,669.6	1,604.1	-	1,604.1	7-2
GPS III	Global Positioning System III and Projects	1,384.6	1,713.2	1,813.5	-	1,813.5	7-3
OPIR	SBIRS and Next Gen OPIR	903.6	1,703.2	2,479.8	-	2,479.8	7-4
SATCOM	Satellite Communications Projects	1,021.1	1,073.4	857.7	-	857.7	7-5

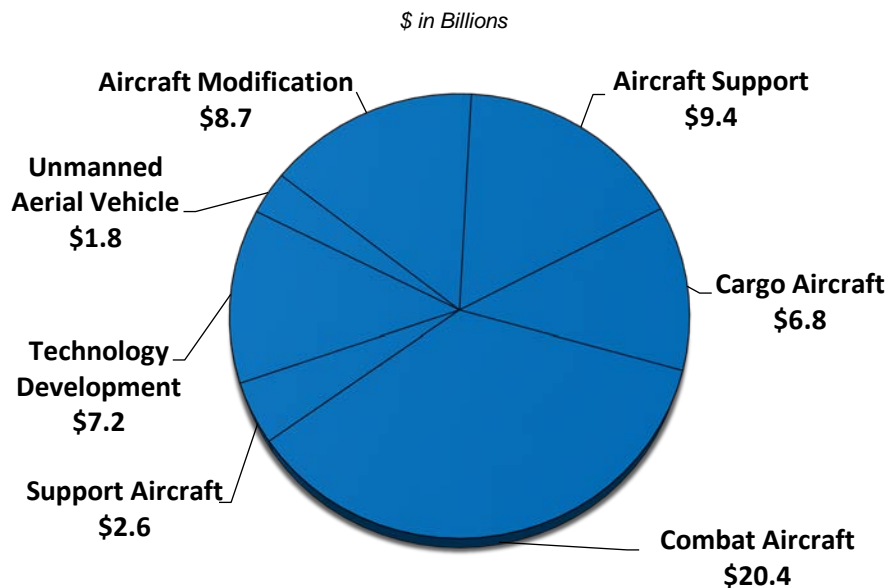
Aircraft and Related Systems

Aviation forces - including fighter/attack, bomber, mobility (cargo/tanker), specialized support aircraft, and Unmanned Aerial Vehicles/Unmanned Aircraft Systems (UAV/UAS) — provide a versatile strike force capable of rapid deployment worldwide. These forces can quickly gain and sustain air dominance over regional aggressors, permitting rapid attacks on enemy targets while providing security to exploit the air for logistics, command and control, intelligence, and other functions. Fighter/attack aircraft operate from both land bases and aircraft carriers to provide air superiority to combat enemy fighters and attack ground and ship targets. Bombers provide an intercontinental capability to rapidly strike surface targets. The specialized aircraft supporting conventional operations perform functions such as intelligence, surveillance, and reconnaissance; airborne warning and control; air battle management; suppression of enemy air defenses; and combat search and rescue. In addition to these forces, the U.S. military operates a variety of air mobility forces including cargo, aerial-refueling aircraft, helicopters, and support aircraft.

Continued in the FY 2021 request, is the Department’s Tactical Air (TACAIR) strategy to supplement 5th generation fighters like the F-22 and F-35 with 4th generation capability, to more economically address threats that do not require state-of-the-art 5th generation combat jets.

The FY 2021 Base and OCO funding provides for the procurement of 79 F-35A/B/C, 24 F/A-18E/F, 12 F-15EX, 320 logistics and support aircraft, 167 rotary wing aircraft, and 703 UAV/UAS. In addition, the funding in this category provides for the development of aircraft related technology, the procurement of aerospace equipment and systems, various modifications to existing aircraft, and the procurement of initial spares.

FY 2021 Aircraft and Related Systems Total: \$56.9 Billion



Numbers may not add due to rounding

F-35 Joint Strike Fighter

DOD - JOINT

The F-35 Joint Strike Fighter (JSF) is a fifth-generation strike fighter for the Navy, Marine Corps, Air Force, and U.S. Allies. The F-35 consists of three variants: the F-35A Conventional Take-Off and Landing (CTOL), the F-35B Short Take-Off and Vertical Landing (STOVL), and the F-35C Carrier variant (CV). The F-35A CTOL replaces the Air Force F-16 and A-10 aircraft and complements the F-22 aircraft; the F-35B STOVL aircraft replaces the Marine Corps AV-8B aircraft and F/A-18A/C/D aircraft; the F-35C CV aircraft complements the F/A-18E/F aircraft for the Navy, and will also be flown by the Marine Corps. The F-35 program is a joint, multi-national program among the United States and seven cooperative international partners, as well as four Foreign Military Sales (FMS) countries. The Marine Corps, Air Force, and Navy have all declared Initial Operational Capability (IOC) in July 2015, August 2016, and February 2019, respectively.



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Mission: Provides all-weather, precision, stealthy, air-to-air, and ground strike capability, including direct attack on the most lethal surface-to-air missiles and air defenses.

FY 2021 Program: Continues systems engineering, development and operational testing, and supports Continuous Capability Development and Delivery (C2D2) to provide incremental warfighting capability improvements to maintain joint air dominance against evolving threats. Procures 79 aircraft in FY 2021: 48 CTOL for the Air Force, 10 STOVL for the Marine Corps, and 21 CV for the Department of the Navy (11 Navy and 10 Marine Corps). Continues laying down the ground and squadron support and site stand-up infrastructure required to support U.S. Services F-35 air systems. Accelerates an organic depot maintenance capability to reduce depot repair cycle times to improve air vehicle availability rates.

Prime Contractor(s): Lockheed Martin Corporation; Fort Worth, TX (airframe)
Pratt & Whitney; Hartford, CT (engine)

F-35 Joint Strike Fighter										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
USN	566.0	-	749.0	-	794.0	-	-	-	794.0	-
USAF	558.0	-	750.0	-	923.0	-	-	-	923.0	-
Subtotal	1,124.0	-	1,499.0	-	1,717.0	-	-	-	1,717.0	-
Procurement										
USN	5,048.0	37	4,642.0	36	3,924.6	31	-	-	3,924.6	31
USAF	5,267.0	56	6,060.0	62	5,177.8	48	-	-	5,177.8	48
Subtotal	10,315.0	93	10,702.0	98	9,102.4	79	-	-	9,102.4	79
Mods	304.0	-	411.0	-	581.0	-	-	-	581.0	-
Total	11,743.0	93	12,612.0	98	11,400.4	79	-	-	11,400.4	79

Note: Includes Modification Program

Numbers may not add due to rounding

Aircraft & Related Systems

V-22 Osprey

DOD - JOINT

The V-22 Osprey is a tilt-rotor, vertical takeoff and landing aircraft designed to meet the amphibious/vertical assault needs of the Marine Corps, the strike rescue and Carrier Onboard Delivery (COD) needs of the Navy, and the long range special operations forces (SOF) missions for U.S. Special Operations Command (SOCOM). The aircraft is designed to fly 2,100 miles with one in-flight refueling, giving the Services the advantage of a vertical and/or short takeoff and landing aircraft that can rapidly self-deploy to any location in the world.



Mission: Conducts airborne assault, vertical lift, combat search and rescue, and special operations missions. The new CMV-22 variant replaces the Navy’s C-2A Greyhound for the COD mission.

FY 2021 Program: Funds the fourth year of a follow-on multiyear procurement (MYP) contract (FY 2018 to 2024), procuring 3 MV-22 aircraft and 6 CMV-22 aircraft for the Navy. The budget also funds aircraft modifications.

Prime Contractor(s): Bell Helicopter Textron, Incorporated; Fort Worth, TX, The Boeing Company; Philadelphia, PA.

V-22 Osprey										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
USN	131.0	-	191.0	-	133.0	-	-	-	133.0	-
USAF	184.0	-	286.0	-	249.0	-	-	-	249.0	-
Subtotal	315.0	-	477.0	-	382.0	-	-	-	382.0	-
Procurement										
USN	1,361.0	13	1,589.0	14	1,309.0	9	-	-	1,309.0	9
USAF	94.0	-	83.0	-	137.0	-	-	-	137.0	-
Subtotal	1,455.0	13	1,672.0	14	1,446.0	9	-	-	1,446.0	9
USN Subtotal	1,492.0	13	1,780.0	10	1,442.0	9	-	-	1,442.0	9
USAF Subtotal	278.0	-	369.0	-	386.0	-	-	-	386.0	-
Total	1,770.0	13	2,149.0	14	1,828.0	9	-	-	1,828.0	9

Note: Includes Modification Program

Numbers may not add due to rounding

C-130J Hercules

DOD - JOINT

The C-130J Hercules is a medium-sized tactical transport airlift aircraft that is modernizing the U.S. tactical airlift capability. It is capable of performing a variety of combat delivery (tactical airlift) operations across a broad range of mission environments including deployment and redeployment of troops and/or supplies within/between command areas in a theater of operation, aeromedical evacuation, air logistics support, and augmentation of strategic airlift forces. The C-130J aircraft, with its extended fuselage, provides additional cargo carrying capacity for the Air Force combat delivery mission compared to the legacy C-130E/H and the C-130J (short) aircraft. Special mission variants of the C-130J conduct airborne Military Information Support operations (EC-130J), weather reconnaissance (WC-130J), search and rescue (HC-130J), and special operations (MC-130J and AC-130J). The KC-130J provides the Marine Corps with air-to-air refueling/tactical transport capability; airborne radio relay; intelligence, surveillance, and reconnaissance; and close air support to replace the KC-130 F/R/T aircraft.



USAF Photo

Mission: Provides responsive air movement and delivery of combat troops/supplies directly into objective areas through air landing, extraction, and airdrop, and the air logistic support of theater forces.

FY 2021 Program: Continues the multiyear procurement (MYP) C-130J contract (FY 2019 to FY 2023).

Prime Contractor(s): Lockheed Martin Corporation; Marietta, GA

C-130J Hercules										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
HC/MC-130J	15.6	-	17.2	-	24.7	-	-	-	24.7	-
C-130J	9.9	-	8.6	-	10.7	-	-	-	10.7	-
Subtotal	25.57	-	25.9	-	35.4	-	-	-	35.4	-
Procurement										
C-130J	674.1	8	742.2	8	37.1	-	-	-	37.1	-
HC-130J	183.8	2	-	-	-	-	-	-	-	-
MC-130	935.9	6	897.6	9	402.8	4	-	-	402.8	4
KC-130J	252.4	2	306.9	3	448.0	5	-	-	448.0	5
Subtotal	2,046.3	18	1,946.6	20	887.9	9	-	-	887.9	9
Mods	474.4	-	440.4	-	308.4	-	58.0	-	366.4	-
Total	2,546.2	18	2,412.9	20	1,231.7	9	58.0	-	1,289.7	9

Note: Includes Modification Program

Numbers may not add due to rounding

MQ-1B Predator / MQ-1C Gray Eagle



The U.S. Air Force (USAF) MQ-1B Predator and the Army MQ-1C Gray Eagle Unmanned Aircraft Systems (UAS) are comprised of aircraft configured with multi-spectral targeting systems (electro-optical, infrared (IR), laser designator, and IR illuminator) providing real-time full motion video, weapons, data links; and ground control stations with communications equipment providing line-of-sight and beyond-line-of-sight control. Both systems include single-engine, propeller-driven unmanned aircraft. The Air Force is in the process of divesting of the MQ-1 and replacing all aircraft with MQ-9 Reapers. The MQ-1C Gray Eagle also includes the Gray Eagle Extended Range Engineering Change Proposal, which extends the aircraft's range and endurance.



US Army Photo

Mission: Operates over-the-horizon at medium altitude for long endurance and provides real-time intelligence, surveillance, reconnaissance (ISR), target acquisition, and strike capability to aggressively prosecute time-sensitive targets. The Army MQ-1C Gray Eagle also adds a Synthetic Aperture Radar (SAR) Ground Moving Target Indicator (GMTI), a communications relay capability, a heavy fuel engine, encrypted tactical common data link, and greater weapons capability.

FY 2021 Program: Continues development of advanced MQ-1 Payload sensors and investments in propulsion reliability. Funds also resource efforts in improved navigation and datalink modernization; Special Operations Forces (SOF) peculiar kits and payloads, persistent close air support integration, Ground Control Stations, and training systems.

Prime Contractor(s): General Atomics–Aeronautical Systems Incorporated; San Diego, CA

MQ-1B Predator / MQ-1C Gray Eagle										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
Gray Eagle USA	19.6	-	31.4	-	49.8	-	-	-	49.8	-
Procurement										
Gray Eagle USA	293.1	10	163.7	9	22.3	-	-	-	22.3	-
Total	312.7	10	195.1	9	72.1	-	-	-	72.1	-

Note: Includes Modification Program

Numbers may not add due to rounding

MQ-9 Reaper



The U.S. Air Force MQ-9 Reaper Unmanned Aircraft System (UAS) program is comprised of an aircraft segment configured with an array of sensors to include day/night Full Motion Video (FMV), Signals Intelligence (SIGINT), and Synthetic Aperture Radar (SAR) sensor payloads, avionics, data links and weapons; a Ground control segment consisting of a Launch and Recovery Element, and a Mission Control Element with embedded Line-of-Sight and Beyond-Line-of-Sight communications equipment. The Reaper is a single-engine, turbo-prop, remotely piloted armed reconnaissance aircraft designed to operate over-the-horizon at medium altitude for long endurance. Funding for U.S. Special Operations Command (USSOCOM) procures Special Operations Force (SOF) peculiar kits, payloads and modifications.



USAF Photo

Mission: Provides reconnaissance and embedded strike capability against time-critical targets.

FY 2021 Program: Funds the continued development, testing, and integration of SOF-peculiar emerging technology mission kits, weapons, and modifications on platforms, Ground Control Stations, and training systems. Request also funds support equipment, primary satellite link equipment, and production shutdown.

Prime Contractor(s): General Atomics–Aeronautical Systems Incorporated; San Diego, CA

MQ-9 Reaper										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
USAF	105.1	-	127.3	-	162.1	-	-	-	162.1	-
SOCOM	17.7	-	20.7	-	21.3	-	-	-	21.3	-
Subtotal	122.8	-	148.0	-	183.4	-	-	-	183.4	-
Procurement										
USAF	637.4	24	781.5	24	278.1	-	231.6	-	509.7	-
USN	-	-	53.1	2	-	-	-	-	-	-
SOCOM	24.6	-	7.2	-	6.7	-	-	-	6.7	-
Subtotal	662.0	24	841.8	26	284.8	-	231.6	-	516.4	-
Total	784.8	24	989.8	26	468.2	-	231.6	-	699.8	-

Note: Includes Modification Program

Numbers may not add due to rounding

MQ-4C Triton/RQ-4 Global Hawk/NATO AGS

DOD - JOINT

The Navy MQ-4C Triton, U.S. Air Force (USAF) RQ-4 Global Hawk, and NATO Alliance Ground Surveillance (AGS) Unmanned Aircraft Systems (UAS) provide high altitude long endurance Intelligence, Surveillance, and Reconnaissance (ISR) capabilities. The MQ-4C provides the Navy with a persistent maritime ISR capability. Mission systems include inverse Synthetic Aperture Radar (SAR), Electro-optical/Infra-red Full Motion Video (FMV), maritime moving target detection, Electronic Support Measures (ESM), Automatic Identification System (AIS), a basic communications relay capability, and Link-16. The RQ-4 Block 30 includes a multi-intelligence suite for imagery and signals intelligence collection, and the Block 40 includes multi-platform radar technology for synthetic aperture radar (SAR) imaging and moving target detection. All RQ-4 aircraft have been delivered. Five NATO AGS aircraft are being procured with development funding and deliveries will complete in FY 2020.



US Navy Photo

Mission: The Navy MQ-4C provides persistent maritime ISR, while the USAF and NATO AGS RQ-4 systems perform high-altitude, near-real-time, high-resolution ISR collection. Both systems support Combatant Commander requirements while the MQ-4C also supports the numbered Fleet commanders from five worldwide sites.

FY 2021 Program: MQ-4C: The FY 2021 request strategically pauses FY 2021 and FY 2022 procurement to focus on development of the Multi-INT configuration. RQ-4: Funds support the divestiture of Block 20/30 aircraft and resource modernization efforts, including the MS-177 multi-spectral sensor, ground segment modernization program, communications system modernization program and additional efforts; and the U.S. contribution to the NATO AGS.

Prime Contractor(s): Northrop Grumman; Rancho Bernardo, CA

MQ-4C Triton / RQ-4 Global Hawk / NATO AGS											
	FY 2019		FY 2020		FY 2021						
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request		
					\$M	Qty	\$M	Qty	\$M	Qty	
RDT&E											
RQ-4, USAF	221.7	-	191.7	-	134.6	-	-	-	-	134.6	-
RQ-4, NATO	51.5	-	32.6	-	36.7	-	-	-	-	36.7	-
MQ-4, USN	231.8	3	197.2	2	189.9	-	-	-	-	189.9	-
Subtotal	505.0	3	421.5	2	361.2	-	-	-	-	361.2	-
Procurement											
RQ-4, USAF	186.2	-	81.0	-	106.5	-	-	-	-	106.5	-
MQ-4, USN	650.8	3	483.8	2	163.6	-	-	-	-	163.6	-
Subtotal	837.0	3	564.8	2	270.1	-	-	-	-	270.1	-
Total	1,342.0	6	986.3	4	631.3	-	-	-	-	631.3	-

Note: Includes Modification Program

Numbers may not add due to rounding

Armed Overwatch / Targeting

DOD - JOINT

Armed Overwatch provides Special Operations Forces (SOF) deployable and sustainable aircraft systems fulfilling Close Air Support, Precision Strike, and SOF Intelligence, Surveillance & Reconnaissance (ISR) requirements in austere and permissive environments for the Countering-Violent Extremist Organizations.



Mission: Missions include: Armed Reconnaissance, Strike Coordination & Reconnaissance, and Airborne Forward Air Control.

FY 2021 Program: Supports prototype demonstrations and the testing of Special Operation Forces-unique capabilities and Air Worthiness release efforts. Supports the procurement of aircraft, mission kits, and associated support equipment.

Prime Contractor(s): TBD

Armed Overwatch / Targeting										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	5.0	-	-	-	5.0	-
Procurement	-	-	-	-	101.0	5	-	-	101.0	5
Total	-	-	-	-	106.0	5	-	-	106.0	5

Numbers may not add due to rounding

AH-64E Apache

USA

The AH-64E Apache program is a parallel new build and remanufacture effort (Apache Block IIIB New Build and Apache Block IIIA Remanufacture or Reman), which integrates a mast-mounted fire control radar into an upgraded and enhanced AH-64 airframe. The remanufacture effort results in a zero-time Longbow Apache, which restarts its service life and modernizes the aircraft with updated



US Army Photo

technologies and performance enhancements to keep the Apache viable throughout its lifecycle. The AH-64E program incorporates a new power train system that restores the aircraft to its previous flight performance capabilities that have been reduced over years due to added weight. The AH-64E has all new open architecture computer systems, including an all-digital cockpit flight control. The aircraft also has manned/unmanned teaming capability with the Army's Unmanned Aerial Systems giving the system far greater targeting distances. Additionally, the AH-64E has the ability to share targeting data with Joint Forces via its onboard Link 16 system. FY 2021 is the fifth and final year of the AH-64E Apache's 5-year Multi-Year Procurement (MYP) contract.

Mission: Conducts armed reconnaissance, close combat, mobile strike, and vertical maneuver missions in day, night, obscured battlefield, and adverse weather conditions.

FY 2021 Program: Funds technologies and material solutions to address known capability gaps that were identified during real-world combat missions and associated with current, emerging threats. These technologies and solutions will be integrated and implemented in the AH-64E fleet to increase combat capability. Program funds 50 Reman aircraft in the base request and 2 New Build aircraft to replace combat losses in the Overseas Contingency Operations (OCO) request.

Prime Contractor(s): Apache: The Boeing Company; Mesa, AZ, Integration: Northrop Grumman Corporation; Baltimore, MD, Lockheed Martin Corporation; Oswego, NY

AH-64E Apache										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	22.9	-	5.4	-	77.2	-	-	-	77.2	-
Procurement										
AH-64E New Build	510.4	18	-	-	-	-	69.2	2	69.2	2
AH-64E Reman	927.8	48	1,010.1	49	961.5	50	-	-	961.5	50
Modifications	105.0	-	58.2	-	118.3	-	-	-	118.3	-
Total	1,566.1	66	1,073.7	49	1,157.0	50	69.2	2	1,226.2	52

Numbers may not add due to rounding

CH-47 Chinook

USA

The CH-47F Improved Cargo Helicopter program procures new and remanufactured Service Life Extension Program (SLEP) CH-47F helicopters. The aircraft includes an upgraded digital cockpit and modifications to the airframe to reduce vibration. The upgraded cockpit includes a digital data bus that permits installation of enhanced communications and navigation equipment for improved situational awareness, mission performance, and survivability. The new aircraft uses more powerful T55-GA-714A engines that improve fuel efficiency and enhance lift performance. These aircraft are fielded to heavy helicopter companies (CH-47F) and Special Operations Aviation (MH-47G). The CH-47F is expected to remain the Army's heavy lift helicopter until the late 2030s. The recapitalization of the MH-47G airframes is required to extend the useful life of legacy aircraft. The CH-47F Block II development effort is in Engineering and Manufacturing Development (EMD). Improvements include increased lift, improved engine control, upgraded drive train components and advanced flight controls. New Build CH-47Fs will continue at a low rate until production of the CH-47F Block II in FY 2021.



US Army Photo

Mission: Transports ground forces, supplies, ammunition, and other battle-critical cargo in support of worldwide combat and contingency operations.

FY 2021 Program: Funds the continued modernization of the Army's only heavy lift helicopter, including integration and improvements through the program of record; support of airworthiness and flight testing; and completion of most scheduled Non-Recurring Engineering (NRE) and ground and flight testing. Funds also procure 6 MH-47G variants in the base request and 1 CH-47F War Replacement Aircraft (combat loss) in the Overseas Contingency Operations (OCO) request.

Prime Contractor(s): The Boeing Company; Philadelphia, PA

CH-47 Chinook										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	139.0	-	172.0	-	46.1	-	-	-	46.1	-
Procurement	168.0	7	239.0	9	195.0	6	50.5	1	245.5	7
Total	307.0	7	411.0	9	241.1	6	50.5	1	291.6	7

Numbers may not add due to rounding

UH-60 Black Hawk

USA

The UH-60 Black Hawk is a twin engine, single-rotor, four bladed utility Helicopter that is designed to carry a crew of 4 and a combat equipped squad of 11 or an external load up to 9,000 lbs. The UH-60 comes in many variants and with many different modifications and capabilities to fulfill different roles. The Army variants can be fitted with stub wings to carry additional fuel tanks or weapons. The UH-60M Black Hawk is a digital



US Army Photo

networked platform with greater range and lift to support operational Commanders through air assault, general support command and control, and aeromedical evacuation. A HH-60M is a UH-60M Black Hawk integrated with the Medical Evacuation (MEDEVAC) Mission Equipment Package (MEP) kit, which provides day/night and adverse weather emergency evacuation of casualties. FY 2018 was the first year of production upgrades for the UH-60L to UH-60V. This conversion provides an integrated digital map, integrated performance planning, common functionality, and commonality of training with the UH-60M.

Mission: Provides a highly maneuverable, air transportable, troop carrying helicopter for all intensities of conflict, without regard to geographical location or environmental conditions. It moves troops, equipment, and supplies into combat and performs aeromedical evacuation and multiple functions in support of the Army’s air mobility doctrine for employment of ground forces.

FY 2021 Program: Funds closeout of UH-60V development activities; hardware and software design activities; transition to test and evaluation; and System Engineering Program Management (SEPM). Funds also procure 60 aircraft (21 UH-60M, 15 HH-60M, and 24 UH-60V), Government Furnished Equipment (GFE), and related installations.

Prime Contractor(s): Sikorsky, A Lockheed Martin Company; Stratford, CT (UH-60M), Redstone Defense Systems, Huntsville, AL (UH-60V)

UH-60 Black Hawk										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	33.9	-	23.0	-	11.2	-	-	-	11.2	-
Procurement										
UH-60M	1,265.0	58	1,498.2	74	830.4	36	-	-	830.4	36
UH-60V	148.1	18	169.3	25	172.8	24	-	-	172.8	24
Total	1,447.0	76	1,690.5	99	1,014.4	60	-	-	1,014.4	60

Numbers may not add due to rounding

MQ-25 Stingray



The U.S. Navy MQ-25 Stingray Unmanned Carrier Aviation (UCA) program is rapidly developing an unmanned capability to embark as part of the Carrier Air Wing (CVW) to conduct aerial refueling and provide Intelligence, Surveillance, and Reconnaissance (ISR) capability. The MQ-25 will extend CVW mission effectiveness range and partially mitigate the current Carrier Strike Group (CSG) organic ISR shortfall. As the first carrier-based Group 5 Unmanned Aircraft System (UAS), the MQ-25 will pioneer the integration of manned and unmanned operations, demonstrate complex sea-based UAS technologies and pave the way for future multi-mission UAS to pace emerging threats. The MQ-25 was previously funded under the Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) program. The program entered into Engineering and Manufacturing Development (EMD) in the fourth quarter of FY 2018 and is expected to provide an Initial Operational Capability (IOC) to the fleet by FY 2024.



Mission: Conducts aerial refueling as a primary mission and provides ISR as a secondary mission.

FY 2021 Program: Funds continuation of product development and integration and interface development activities, including EMD studies and analysis and build of three System Demonstration Test Articles (SDTAs); first flight preparations such as test and evaluation investments supporting the development and implementation of test facilities, range, and lab test requirements; and procurement of Initial Operational Test and Evaluation (IOT&E) hardware.

Prime Contractor(s): Boeing; St. Louis, MO

MQ-25 Stingray										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	504.0	-	649.1	-	267.0	-	-	-	267.0	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	518.9	-	649.1	-	267.0	-	-	-	267.0	-

Numbers may not add due to rounding

F/A-18 E/F Super Hornet



The F/A-18 E/F Super Hornet is a carrier-based multi-role tactical fighter and attack aircraft. Two versions are in production: the single-seat E model and the two-seat F model. The Super Hornet is an attack aircraft as well as a fighter through selected use of external equipment and advanced networking capabilities to accomplish specific missions. This “force multiplier” capability gives the operational commander more flexibility in employing tactical aircraft in a rapidly changing battle scenario. In its fighter mode, the aircraft serves as escort and fleet air defense. In its attack mode, the aircraft provides force projection, interdiction, and close and deep air support.



US Navy Photo

Mission: Provides multi-role attack and strike fighter capability, which includes the traditional applications, such as fighter escort and fleet air defense, combined with the attack applications, such as interdiction and close air support.

FY 2021 Program: Procures 24 E/F model aircraft as part of multiyear procurement (MYP) contract (FY 2019 - FY 2021), spares and repair parts, and continued development of aircraft systems.

Prime Contractor(s): Airframe: Boeing; St. Louis, MO
 Engine: General Electric Company; Lynn, MA

F/A-18 E/F Super Hornet										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	104.5	-	112.4	-	84.2	-	-	-	84.2	-
Procurement	1,989.1	24	1,881.2	24	1,977.3	24	-	-	1,977.3	24
Total	2,093.6	24	1,993.6	24	2,061.5	24	-	-	2,061.5	24

Numbers may not add due to rounding

E-2D Advanced Hawkeye



The E-2D Advanced Hawkeye is an airborne early warning, all weather, twin-engine, carrier-based aircraft designed to extend task force defense perimeters. The Advanced Hawkeye provides improved battlespace target detection and situational awareness, especially in the littorals; supports the Theater Air and Missile Defense operations; and improves operational availability for the radar system. Relative to the E-2C aircraft, the E-2D aircraft provides increased electrical power, a strengthened fuselage, and upgraded radar system, communications suite, and mission computer.



Mission: Provides theater air and missile sensing and early warning; battlefield management command and control; acquisition tracking and targeting of surface warfare contacts; surveillance of littoral area objectives and targets; and tracking of strike warfare assets.

FY 2021 Program: Funds four E-2D aircraft as part of a multiyear procurement (MYP) contract (FY 2019 – FY 2023), associated support, continued development of systems, and advance procurement for additional aircraft in FY 2022.

Prime Contractor(s): Airframe: Northrop Grumman Corporation; Bethpage, NY
 (Engineering) and St. Augustine, FL (Manufacturing)
 Engine: Rolls-Royce Corporation; Indianapolis, IN
 Radar: Lockheed Martin Corporation; Syracuse, NY

E-2D Advanced Hawkeye										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	205.6	-	226.6	-	309.4	-	-	-	309.4	-
Procurement	1,273.3	6	1,216.1	6	738.4	4	-	-	738.4	4
Total	1,478.9	6	1,442.7	6	1,047.8	4	-	-	1,047.8	4

Numbers may not add due to rounding

P-8A Poseidon



The P-8A Poseidon is a multi-mission platform designed to replace the P-3C Orion propeller driven aircraft. This derivative of the Boeing 737 aircraft is an all-weather, twin engine, maritime patrol aircraft designed to sustain and improve armed maritime and littoral capabilities in traditional, joint, and combined roles to counter changing and emerging threats. All sensors onboard contribute to a single fused tactical situation display, which is shared over both military standard and internet protocol data links, allowing for seamless delivery of information between U.S. and allied forces. The P-8A carries a new radar array, which is a modernized version of the Raytheon APS-149 Littoral Surveillance Radar System.



Mission: Provides Maritime Patrol Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASuW), and Intelligence, Surveillance and Reconnaissance (ISR) capabilities in maritime and littoral areas above, on, and below the surface of the ocean.

FY 2021 Program: Procures support equipment, spares and repair parts. Continues research and development on aircraft systems. FY 2020 was the last year of production for this aircraft.

Prime Contractor(s): Airframe: Boeing; Seattle, WA
 Engine: CFM International; Cincinnati, OH

P-8A Poseidon										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	166.8	-	141.5	-	188.9	-	-	-	188.9	-
Procurement	1,898.9	10	1,668.1	9	80.1	-	-	-	80.1	-
Total	2,065.7	10	1,809.6	9	269.0	-	-	-	269.0	-

Numbers may not add due to rounding

VH-92A Presidential Helicopter



The VH-92A replaces the legacy Presidential Helicopter fleet, the VH-3D and the VH-60N, which were fielded in 1974 and 1989. The VH-92A is based on Sikorsky’s commercial S-92A helicopter. The VH-92A’s acquisition strategy involves the integration of mature government-defined mission systems and an executive interior into an existing air vehicle. The program entered the Engineering and Manufacturing Development (EMD) phase in FY 2014, which is expected to conclude in FY 2021, and received Milestone C approval in the third quarter of FY 2019. A total of 21 operational aircraft will be procured. Two EDM and four System Demonstration Test Article (SDTA) aircraft have been delivered in EMD.



Mission: Provide safe, reliable and timely transportation for the President, Vice President, Foreign Heads of State, and other official parties as directed by the Director of the White House Military Office. Mission tasking includes administrative lift and contingency operations.

FY 2021 Program: Funds the conclusion of the EMD effort and preparation for Initial Operating Capability (IOC) in the first quarter of FY 2021. The program also funds Lot II (5 aircraft) of the VH-92’s Low Rate Initial Production (LRIP).

Prime Contractor(s): Sikorsky Aircraft Corporation; Stratford, CT

VH-92A Presidential Helicopter										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	237.3	-	176.2	-	99.3	-	-	-	99.3	-
Procurement	669.0	6	650.0	6	639.0	5	-	-	639.0	5
Total	906.3	6	826.2	6	738.3	5	-	-	738.3	5

Numbers may not add due to rounding

CH-53K Heavy Lift Replacement Helicopter



The CH-53K King Stallion is the only marinated heavy-lift helicopter and replaces the U.S. Marine Corps CH-53E Super Stallion, which was introduced in 1980. The CH-53K provides improved lift and range capabilities, payload, performance, cargo handling, reliability and maintainability, interoperability,



survivability, ship integration, and force protection. The CH-53K is designed to support Marine Air-Ground Task Force (MAGTF) heavy-lift requirements in the 21st century joint environment, and is the only heavy-lift platform that can lift the MAGTF ashore. The CH-53K provides an unparalleled high-altitude lift capability with nearly three times the external lift capacity of the CH-53E. Total CH-53K program of record quantity is 200 aircraft with 4 System Demonstration Test Articles (SDTAs) and 196 to be funded with Aircraft Procurement, Navy. The program is currently in Low Rate Initial Production (LRIP). First flight occurred in October 2015 and Initial Operational Capability (IOC) is scheduled for FY 2021.

Mission: Conducts expeditionary heavy-lift assault transport of armored vehicles, equipment, and personnel to support distributed operations deep inland from a sea-based center of operations.

FY 2021 Program: Funds continuing development, including System Development and Demonstration (SDD) activities, such as additional ground and flight testing of 1 Ground Test Vehicle, 4 Engineering Development Models (EDMs), 4 System Demonstration Test Articles (SDTAs), and related subsystems and components. The program also funds the procurement of LRIP Lot 5 (7 aircraft) and advance procurement long-lead materials supporting LRIP Lot 6 (11 aircraft).

Prime Contractor(s): Sikorsky Aircraft Corporation; Stratford, CT

CH-53K Heavy Lift Replacement Helicopter										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	383.6	-	507.0	-	406.0	-	-	-	406.0	-
Procurement	1,235.0	7	1,115.0	6	1,086.2	7	-	-	1,086.2	7
Total	1,618.6	7	1,622.0	6	1,492.2	7	-	-	1,492.2	7

Numbers may not add due to rounding

H-1 Program: AH-1Z Viper/UH-1Y Venom



The H-1 program replaces the AH-1W Super Cobra and the UH-1N Huey helicopters with the AH-1Z Viper and UH-1Y Venom, the next generation of Marine Corps Attack and Utility aircraft. Speed, range, and payload have been increased significantly while supportability demands, training timelines, and total ownership cost have decreased. The advanced cockpit is common to both aircraft, reduces operator workload, improves situational awareness, and provides growth potential for future weapons and joint digital interoperability enhancements. The cockpit systems integrate onboard planning, communications, digital fire control, all weather navigation, day/night targeting, and weapons systems in mirror-imaged crew stations. The procurement strategy converts 37 AH-1W helicopters into AH-1Zs (complete), builds 152 new AH-1Zs, remanufacture 10 H-1N helicopters into UH-1Ys (complete), and builds 150 new UH-1Y models. The UH-1Y production completed in FY 2016 and AH-1Z completed full rate production in FY 2019.



Mission: AH-1Z: Provides close air support, air interdiction, armed reconnaissance, strike coordination and reconnaissance, forward air control (airborne), and aerial escort during day/night operations in support of naval expeditionary operations or joint and combined operations. UH-1Y: Provides combat assault transport, close air support, armed reconnaissance, strike coordination and reconnaissance, forward air control (airborne), air delivery, airborne command and control, aerial escort and air evacuation during day/night and reduced weather conditions.

FY 2021 Program: Research and Development funds developmental efforts to support follow-on improvements to sensors and weapons integration, avionics, and air vehicle components that will address deficiencies, systems safety, obsolescence, and reliability issues for both the AH-1Z and UH-1Y helicopters. Procurement funds production line; oversight of Engineering Change Proposals (ECPs) and other technical changes; and AH-1Z aircraft production engineering support until the last delivery in February 2022.

Prime Contractor(s): Airframe - Bell Helicopter Textron, Incorporated; Fort Worth, TX; and Engines - General Electric Company; Lynn, MA.

H-1 Program: AH-1Z Viper / UH-1Y Venom										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	53.0	-	61.0	-	62.0	-	-	-	62.0	-
Procurement	827.0	25	158.0	-	192.0	-	-	-	192.0	-
Total	880.0	25	219.0	-	254.0	-	-	-	254.0	-

Numbers may not add due to rounding

B-21 Raider

The B-21 Raider, previously referred to as the Long Range Strike-Bomber (LRS-B), is a new, high-tech long range bomber that will eventually replace a portion of the Air Force’s bomber fleet. The B-21 will be a key component of the joint portfolio of conventional and nuclear capable deep-strike capabilities. The B-21 conventional initial operational capability (IOC) will be fielded in the mid-2020’s and the aircraft will be dual capable –with a projected nuclear capability within 2 years of IOC. Highly survivable, the B-21 Raider will have the ability to penetrate modern air defenses. The Air Force plans to procure a minimum of 100 aircraft. Manufacturing of the initial test aircraft is underway at Northrop Grumman’s Palmdale California facility. The 420th Flight Test Squadron at Edwards Air Force Base (AFB) was reactivated on October 4, 2019 to prepare for B-21 flight test. Additionally, on March 27, 2019, the Secretary of the Air Force announced that Ellsworth AFB, South Dakota, Whiteman AFB, Missouri and Dyess AFB, Texas are the preferred Main Operating Base locations. The final basing decision is expected in 2020, following compliance with the National Environmental Policy Act (NEPA) and other regulatory and planning processes.



Mission: Flies into enemy territory to destroy strategic targets to debilitate an adversary’s capacity to wage war. The B-21 will maintain the capability to operate in contested environments, counter emerging threats, and support the nuclear triad by providing a visible and flexible nuclear deterrent capability. Additional details of the B-21 are currently classified.

FY 2021 Program: Continues Engineering and Manufacturing Development of the B-21.

Prime Contractor(s): Northrop Grumman Corporation; Falls Church, VA

B-21 Raider										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	2,189.9	-	2,982.5	-	2,848.4	-	-	-	2,848.4	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	2,189.9	-	2,982.5	-	2,848.4	-	-	-	2,848.4	-

Numbers may not add due to rounding

Bombers



Bombers provide an intercontinental capability to rapidly strike surface targets. The Air Force legacy bomber fleet includes the B-1B, B-2, and B-52H aircraft. The B-1B Lancer is a swing-wing, supersonic, long-range conventional bomber and carries the largest payload of both guided and unguided weapons in the Air Force inventory. The multi-mission B-1B is the backbone of the U.S. long-range conventional bomber force and can rapidly deliver massive quantities of precision (and non-precision) weapons against any adversary, any place in the world, at any time. The B-2 Spirit is a multi-engine, long range conventional and nuclear bomber incorporating low-observable technology that enables the B-2 to penetrate enemy air defenses and strike high-value targets. The B-52H Stratofortress is a long range, subsonic, strategic bomber that maintains nuclear and conventional missions.



Mission: Flies into enemy territory to destroy strategic targets such as major military installations, factories and ports to debilitate an adversary’s capacity to wage war. The B-1B bomber can perform a variety of missions, including that of conventional carrier for theater operations and can rapidly deliver massive quantities of precision and non-precision weapons against any adversary, worldwide, at any time. The B-2 aircraft delivers both conventional and nuclear munitions, capable of massive firepower in short time anywhere, is the only aircraft capable of penetrating enemy defenses to bomb heavily defended targets, and is the only aircraft to carry the 30,000 pound GBU-57 Massive Ordnance Penetrator. The B-52H aircraft maintains nuclear or conventional missions and carries the widest variety of weapons of all the bombers, including the only aircraft to carry the AGM-86 Air Launched Cruise Missile (ALCM) nuclear cruise missile.

FY 2021 Program: Continues upgrades to modernize legacy bombers.

Prime Contractor(s): Northrop Grumman Aerospace Systems; Palmdale, CA (B-2)
Boeing Defense; Oklahoma City, OK (B-1B, B-52H)

Bombers										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	694.7	-	667.8	-	723.2	-	-	-	723.2	-
Procurement	271.7	-	122.4	-	160.5	-	-	-	160.5	-
Total	966.4	-	790.2	-	883.7	-	-	-	883.7	-

Note: Includes Modification Program

Numbers may not add due to rounding

KC-46A Tanker



The KC-46, an aerial refueling tanker, will provide aerial refueling support to the Air Force, Navy, and Marine Corps aircraft. The aircraft provides increased refueling capacity, improved efficiency, and increased cargo and aeromedical evacuation capability over the current KC-135 Stratotanker, which is more than 50 years old. The first phase of aerial refueling tanker recapitalization will procure 179 aircraft, approximately one-third of the current legacy tanker fleet. Follow on programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The KC-46 aircraft is assembled on the existing commercial 767 production line and militarized in the Everett Modification Center, both of which are located in Everett, Washington.



USAF Photo

Mission: Provides the capability to refuel joint and coalition receivers via a boom or drogue system and will augment the airlift fleet with cargo, passenger and aeromedical evacuation capabilities. Tanker aircraft are used to support these missions at the strategic, operational, and tactical level across the entire spectrum of military operations. The KC-46 aircraft will operate in day/night and adverse weather to enable deployment, employment, and redeployment of U.S. and Coalition forces.

FY 2021 Program: Procures 15 aircraft and continues the Air Force’s development efforts of a militarized variant of the Boeing 767-2C aircraft, the building and integration of military capabilities into four development aircraft, and developmental and operational testing. Supports the development of technical manuals, continued Type I training, and collection of simulator and maintenance data.

Prime Contractor(s): The Boeing Company; Seattle, WA

KC-46A Tanker										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	77.9	-	59.6	-	106.3	-	-	-	106.3	-
Procurement	2,290.9	15	2,139.7	12	2,850.2	15	-	-	2,850.2	15
Mods	8.5	-	5.2	-	24.1	-	-	-	24.1	-
Total	2,377.3	15	2,204.5	12	2,980.6	15	-	-	2,980.6	15

Note: Includes Modification Program

Numbers may not add due to rounding

VC-25B Presidential Aircraft Recapitalization



The VC-25B Presidential Aircraft Recapitalization program will replace the current VC-25A (Boeing 747-200) “Air Force One” aircraft with a new, modified 747-8. The VC-25B will provide the President, staff, and guests with safe and reliable air transportation at the same level of security and communications capability available in the White House.



Due to advancing age, the VC-25A is experiencing increasing out of service times – currently well over a year for heavy maintenance to maintain compliance with Federal Aeronautics Administration air worthiness standards.

Mission: Provides safe, secure, worldwide transport to ensure the President can execute the constitutional roles of Commander-in-Chief, Head of State, and Chief Executive.

FY 2021 Program: Continues Engineering and Manufacturing Development acquisition phase and modifications to the commercial aircraft to field the capability by 2024.

Prime Contractor(s): The Boeing Company; Seattle, WA

VC-25B Presidential Aircraft Recapitalization										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	713.6	-	757.9	-	800.9	-	-	-	800.9	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	713.6	-	757.9	-	800.9	-	-	-	800.9	-

Numbers may not add due to rounding

F-22 Raptor



The F-22 Raptor is a fifth-generation air superiority aircraft fighter. The Raptor is designed to penetrate enemy airspace and achieve first-look, first-kill capability against multiple targets. It has unprecedented survivability and lethality, ensuring the Joint Forces have freedom from attack, freedom to maneuver, and freedom to attack.



Mission: Provides the U.S. enhanced air superiority/global strike capability to counter and defeat air-air and air-ground threats in a highly contested environment by conducting counter air, Destruction of Enemy Air Defenses (DEAD) and cruise missile defense missions.

FY 2021 Program: Continues critical planned modernization for F-22 aircraft via incremental capability upgrades and key reliability and maintainability improvements. Continues the evolutionary modernization effort through incremental development phases that enhance the F-22 Air Superiority and Global Strike capabilities in a contested environment. Continues Increment 3.2B modernization, to include integration of AIM-120D and AIM-9X, additional electronic protection, and improved geolocation. Continues critical Sensor Enhancement development upgrade efforts initiated in FY 2019, in support of a fielding decision planned in FY 2020 to meet advanced threats in 2025 and beyond.

Prime Contractor(s): Lockheed Martin; Marietta, GA and Fort Worth, TX (airframe)
Pratt & Whitney; Hartford, CT (engine)

F-22 Raptor										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	563.6	-	546.3	-	665.0	-	-	-	665.0	-
Procurement	258.6	-	229.5	-	393.8	-	-	-	393.8	-
Total	822.3	-	775.8	-	1,058.8	-	-	-	1,058.8	-

Note: Includes Modification Program

Numbers may not add due to rounding

F-15 Eagle



The F-15C/D is a twin engine (F-15C single seat; F-15D dual seat), supersonic, all-weather, day/night, air superiority fourth-generation fighter aircraft. The F-15E is a twin engine, dual seat, supersonic dual-role, day/night, all-weather, deep interdiction fighter with multi-role air-to-air/air-to-ground capabilities.



Mission: Supports the fifth-generation fighter fleet to gain and maintain air superiority and provide global precision attack over the battlefield.

FY 2021 Program: Continues procurement of the F-15EX, which will initially refresh the F-15C/D fleet with a planned buy of 144 aircraft, with the potential to refresh the remainder of the F-15C/D fleet and the F-15E fleet. Continues the F-15E Radar Modernization Program (RMP) to replace the legacy radar using existing technology from other aviation platforms and solve parts obsolescence problems to provide improved reliability and performance (increased synthetic aperture radar range and resolution), including air-to-air and air-to-ground modes. Continues engineering and manufacturing development efforts for the Eagle Passive/Active Warning Survivability System (EPAWSS) to improve F-15E survivability by enhancing the ability to detect, deny, or defeat air and ground threats. Ends F-15C/D modernization efforts, except the safety-of-flight longeron upgrade program, in anticipation of F-15C/D fleet retirement by the end of FY 2026.

Prime Contractor(s): Boeing; St. Louis, MO

F-15EX / F-15 Eagle Mod										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
F-15EX										
RDT&E	-	-	431.8	2	159.8	-	-	-	159.8	-
Procurement	-	-	621.1	6	1,403.3	12	-	-	1,403.3	12
Subtotal	-	-	1,052.9	8	1,563.1	12	-	-	1,563.1	12
F-15 Mods										
RDT&E	329.4	-	299.8	-	469.6	-	-	-	469.6	-
Procurement	655.7	-	599.6	-	381.3	-	-	-	381.3	-
Subtotal	985.2	-	899.3	-	850.9	-	-	-	850.9	-
Total	985.2	-	1,952.2	8	2,414.0	12	-	-	2,414.0	12

Note: Includes Modification Program

Numbers may not add due to rounding

Combat Rescue Helicopter (CRH)



The Combat Rescue Helicopter (CRH) Program, formerly referred to as HH-60 Recapitalization, replaces the aging HH-60G Pave Hawk helicopter. The HH-60 Pave Hawk is the U.S. Air Force version of the U.S. Army's UH-60 Black Hawk, modified for Combat Search and Rescue (CSAR) in all-weather situations. The CRH program leverages in-service production air



USAF Photo

vehicles and training systems and integrate existing technologies and missions systems to build and acquire a new system. Onboard defensive capabilities will permit the CRH to operate in an increased threat environment. An in-flight refueling capability will provide an airborne ready alert capability and extend its combat mission range. The CRH program plans to procure 112 aircraft.

Mission: Conduct day and night marginal weather CSAR in order to recover downed aircrew and isolated personnel in hostile environments. The CRH will perform a wide array of collateral missions, including casualty evacuation (CASEVAC), medical evacuation (MEDEVAC), non-combat evacuation operations, civil search and rescue, international aid, disaster humanitarian relief, and insertion/extraction of combat forces.

FY 2021 Program: The program is projected to complete prime Engineering, Manufacturing, and Development (EMD) effort; ramp down developmental test and evaluation (DT&E) activities; and transition to Initial Operational Test and Evaluation (IOT&E). Funding also procures 16 aircraft in the base request and 3 aircraft in the Overseas Contingency Operations (OCO) request.

Prime Contractor(s): Sikorsky Aircraft Corporation; Stratford, CT

Combat Rescue Helicopter										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	430.5	-	247.0	-	63.2		-		63.2	-
Procurement	752.0	10	877.4	12	1,018.0	16	174.0	3	1,192.0	19
Total	1,182.5	10	1,124.4	12	1,081.2	16	174.0	3	1,255.2	19

Numbers may not add due to rounding

Advanced Pilot Training (T-7A)



The Advanced Pilot Training (APT) System, 'T-7A', will replace the Air Education and Training Command's fleet of T-38C aircraft, currently based in Mississippi, Oklahoma, and Texas. The APT program will provide aircraft, simulators, and advanced training capabilities needed to train future Air Force pilots to fly fourth and fifth-generation fighter aircraft.



The aircraft, with modern simulators, will enable a pilot training process that produces pilots at a rate that meets the needs of the Air Force for the next several decades.

Mission: The T-7A aircraft and simulators will provide student pilots, in the Specialized Undergraduate Pilot Training advanced phase and Introduction to Fighter Fundamentals, the skills and competencies required to more effectively transition into fourth and fifth-generation fighter and bomber aircraft. The aircraft and maintenance simulators will encompass a full range of physical devices and instructional techniques (e.g., traditional classroom, online training, and virtual training).

FY 2021 Program: Continues developmental test and evaluation and accept delivery of two engineering and manufacturing test aircraft and multiple ground training devices.

Prime Contractor(s): The Boeing Company; St. Louis, MO

Advanced Pilot Training (T-7A)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	236.8	-	340.4	-	248.7	-	-	-	248.7	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	236.8	-	340.4	-	248.7	-	-	-	248.7	-

Numbers may not add due to rounding

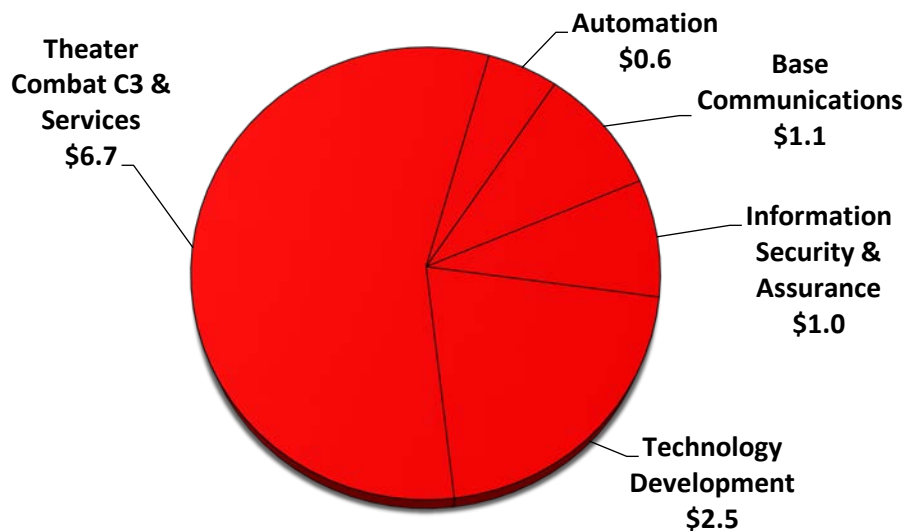
Command, Control, Communications, Computers, and Intelligence (C4I) Systems

Consistent with the National Defense Strategy's (NDS) line of effort, "Build a More Lethal Force", the Department is well underway in transforming and developing new concepts for the conduct of future joint military operations to achieve full spectrum dominance. This overarching goal to defeat any adversary or control any situation across the full range of military operations is achieved through a broad array of capabilities enabled by an interconnected network of sensors, shooters, command, control, and intelligence. Net-centricity transformed the way information is managed to accelerate decision making, improve joint warfighting, and create intelligence advantages. U.S. forces are heavily-networked and require reliable, secure, and trusted access to information and depend upon network-based interconnectivity for increased operational effectiveness. By enhancing information sharing, dispersed forces are able to communicate, maneuver, share a common user-defined operating picture, and successfully complete assigned missions more efficiently.

The FY 2021 budget request supports the net-centricity service-based architecture pattern for information sharing. It is being implemented by the C4I community via building joint architectures and roadmaps for integrating joint airborne networking capabilities with the evolving ground, maritime, and space networks. It encompasses the development of technologies like gateways, waveforms, network management, and information assurance.

FY 2021 C4I Systems Total: \$11.9 Billion

\$ in Billions



Numbers may not add due to rounding

Tactical Network Transport **USA**

Tactical Network Transport (TNT) Modernization in Service (MIS) provides the Army’s operational formations with modernized At-the-Halt (ATH) and On-the-Move (OTM) satellite and line of sight network connectivity through technological improvement of the Warfighter Information Network-Tactical (WIN-T) system. This ATH and OTM TNT capability keeps highly mobile and dispersed forces connected to one another from theater down to select company roles. The TNT backbone allows forces to leverage Army and Joint resources through the Department of Defense Information Network (DoDIN), providing tactical formations with reliable, secure, and seamless video, data, imagery, and voice services which enable Multi Domain Operations (MDO).



TNT MIS supports the near-term objectives of the Army Network Modernization Strategy by replacing over time, non-sustainable/end of life equipment (switches, routers, servers, etc.) with technology that meets cyber and electronic warfare resiliency requirements of the expeditionary Army. This modernization reduces life cycle costs by reducing size, weight, and power; consolidating capabilities that previously resided on individual hardware components; and by leveraging common commercial information technology solutions across various programs.

Mission: TNT MIS and Situational Information Transport (SIT) modernize the Army’s Tactical Network and finalize fielding of the tactical network OTM capability.

FY 2021 Program: TNT MIS addresses Expeditionary Signal Battalion-Enhanced units, operational formations across the Army, Army Reserve and Army National Guard units, by modernizing their network transport systems and Regional Hub Nodes. The SIT effort completes fielding of networking OTM to the last two Stryker Brigade Combat teams (BCTs) out of a program total of 33 Infantry and Stryker BCTs. SIT funds the procurement of initial spares and repair parts for these BCTs.

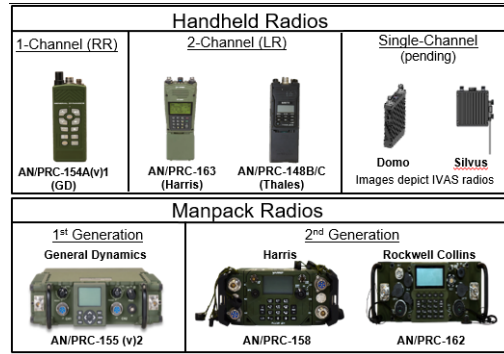
Prime Contractor(s): General Dynamics Mission Systems, Taunton, MA
 Envistacom, Atlanta, GA
 L3Harris, Rochester, NY

Tactical Network Transport										
	FY 2019		FY 2020		FY 2021					
	FY 2019	Qty	FY 2020	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	-	-	-	-	-	-
Procurement	632.9	-	530.1	-	423.8	-	-	-	423.8	-
Total	632.9	-	530.1	-	423.8	-	-	-	423.8	-

Numbers may not add due to rounding

Handheld, Manpack, and Small Form Fit Radio **DOD - JOINT**

The Handheld, Manpack, and Small Form Fit (HMS) radio program is a single Acquisition Category IC program encompassing: handheld radios (one-channel Rifleman Radio (RR), two-channel Leader Radio (LR), and single-channel data radio in support of the Integrated Visual Augmentation System (IVAS)) and Manpack (MP) radio (Generation 1 and Generation 2 radios). HMS provides voice and data communication to the expeditionary Warfighter with an On-the-Move (OTM), At-the-Halt (ATH), and stationary line of sight/beyond line of sight capability for both dismounted personnel and platforms. HMS radio systems are software reprogrammable, networkable, multi-mode systems capable of simultaneous voice and data communication. HMS radios will support a variety of other platforms, including tactical end user device voice and data needs.



Mission: Provide voice and data communications to the tactical edge and the expeditionary Warfighter with an OTM, ATH, and stationary line of sight/beyond line of sight capability for both dismounted personnel and mounted platforms.

FY 2021 Program: Funds the full and open competition contract strategy for the LR and MP radios. Provides for testing of the LR and MP candidate products to demonstrate compliance with program requirements to assess effectiveness, suitability, and survivability and to obtain material release for the Full Rate Production. Supports safety, spectrum supportability, and certifications necessary to prepare the products for fielding. Procures up to five Brigade Combat Team (BCT) LR and MP radios, support equipment, fielding, non-recurring engineering, and platform vehicle integration.

Prime Contractor(s): Harris Radio Corporation; Rochester, NY
 Thales Communications Incorporated; Clarksburg, MD
 Collins Aerospace; Cedar Rapids, IA

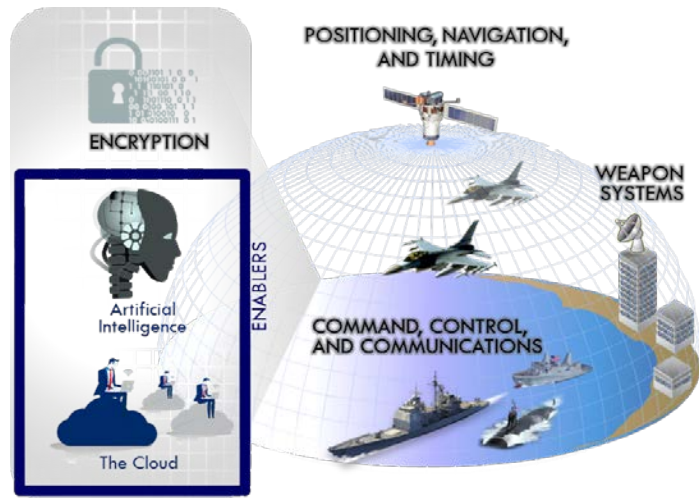
Handheld, Manpack, and Small Form Fit Radio										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	18.8	-	28.4	-	28.2	-	-	-	28.2	-
Procurement	298.5	-	468.0	-	550.8	-	-	-	550.8	-
Total	317.2	-	496.4	-	579.0	-	-	-	579.0	-

Numbers may not add due to rounding

Cyberspace

DOD - JOINT

The Department of Defense (DoD) released a DoD Cyber Strategy in September 2018 that articulates how the Department will implement priorities of the National Defense Strategy in and through cyberspace. The central challenge identified in the Strategy acknowledges that the U.S. prosperity and security depend on open and reliable access to information. Some nations that are deterred from directly confronting U.S. military strength are using cyberspace operations in day-to-day competition to exploit a perceived advantage and harm our interests. China and Russia are engaging in great power competition, which includes persistent, aggressive cyberspace campaigns that pose strategic, long-term risks to the Nation, our allies, and partners. In response to the growing cybersecurity threats, the Department established Cyberspace Planning Priorities to guide the development of DoD’s cyber forces and strengthen cybersecurity and cyber deterrence postures.



Mission: Ensure the Joint Force can achieve its missions in a contested cyberspace domain; enhance Joint Force military advantages through the integration of cyber capabilities into planning and operations; detect, deter, preempt, or defeat malicious cyber activity targeting U.S. critical infrastructure; secure DoD information and systems; expand DoD cyber cooperation with allies, partners, and private sector entities.

FY 2021 Program: Funds cybersecurity capabilities in the following focus areas: end point management; identity, credential, and access management (ICAM); enterprise secure application development (DEVSECOPS); cyber workforce and culture; insider threat security; cross domain solutions to include mission partner networks; supply chain risk management; encryption; warfighter and command, control, and communications (C3) systems; and other DoD critical infrastructure. Increases cyberspace warfighting capabilities and continues development of the Unified Platform.

Cyberspace										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	1,905.3	-	2,300.8	-	2,174.9	-	-	-	2,174.9	-
Procurement	719.1	-	793.1	-	810.5	-	0.1	-	810.6	-
Total	2,624.4	-	3,093.9	-	2,985.4	-	0.1	-	2,985.5	-

Numbers may not add due to rounding

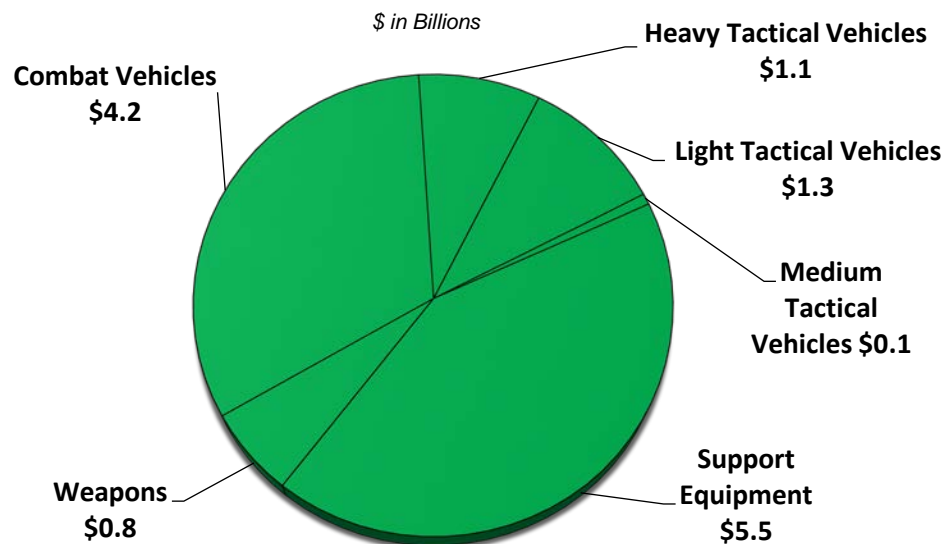
Ground Systems

The Department is modernizing its ground force capabilities to ensure the United States remains a dominant force capable of operating in all environments across the full spectrum of conflict. The Army and Marine Corps equip each soldier and Marine with the best equipment available to succeed in both today’s and tomorrow’s operations. Ongoing technology research and concept exploration will benefit future Army and Marine Corps combat portfolios.

The ground forces modernization plan addresses the challenges of the future operational environment and directly supports the National Defense Strategy's (NDS) line of effort, "Build a More Lethal Force." In addition to upgrades to legacy equipment, the overall strategy embraces new capability, like the Armored Multi-Purpose Vehicle (AMPV) and the Amphibious Combat Vehicle (ACV), as well as development of the Optionally Manned Fighting Vehicle (OMFV). The OMFV will comprise of a fleet of vehicles with enhanced capabilities and a greater commonality of parts and components to simplify logistics and maintenance.

The Army continues to modernize and upgrade select Major Defense Acquisition Programs in its FY 2021 request, including Stryker vehicles, upgrading the Abrams Main Battle Tank to the M1A2C System Enhancement Package (SEP) V3 configuration, the M2 Bradley Fighting Vehicles, the M109A7 Paladin 155mm howitzers, and the Armored Multi-Purpose Vehicle (AMPV). The Marine’s ground force focus in FY 2021 is on the Amphibious Combat Vehicle (ACV). The ACV will deliver shore and sea-based infantry to the battlefield in vehicles designed for future operational environments. All the Services will procure the Joint Light Tactical Vehicle (JLTV) as part of the Low Rate Initial Production (LRIP).

FY 2021 Ground Systems Total: \$13.0 Billion



Numbers may not add due to rounding

Joint Light Tactical Vehicle

DOD - JOINT

The Joint Light Tactical Vehicle (JLTV) is a joint program currently in development for the Army and Marine Corps with procurements for the Navy and Air Force. The JLTV replaces the High Mobility Multipurpose Wheeled Vehicle (HMMWV), which is the current light tactical vehicle. The JLTV concept includes a 3.5 ton Combat Support Vehicle and a 5.1 ton Combat Tactical Vehicle and is based on a family of vehicles focused on scalable armor protection, vehicle agility, and mobility required of the light tactical vehicle fleet. The JLTV provides defensive measures to protect troops in transport, increase payload capability, and achieve commonality of parts and components to reduce the vehicle's overall life cycle costs. The JLTV program optimizes performance, payload, and protection of the crew and vehicle while ensuring a design that is transportable by CH-47, CH-53, and C-130 aircraft. The program completed Low Rate Initial Production (LRIP) and began Full Rate Production (FRP) as of May 30, 2019.



Mission: Provide a light tactical vehicle capable of performing multiple mission roles, and providing protected, sustained, networked mobility for personnel and payloads across the full range of military operations.

FY 2021 Program: Procure more than 4,200 JLTV vehicles and trailers of various configurations across the Department for the Army, Navy, Marine Corps, and Air Force to fulfill multiple mission roles and requirements and minimize ownership costs for the light tactical vehicle fleet.

Prime Contractor(s): Oshkosh Defense, LLC; Oshkosh, WI

Joint Light Tactical Vehicle										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E USA	-	-	7.2	-	1.7	-	-	-	1.7	-
RDT&E USMC	-	-	2.1	-	2.5	-	-	-	2.5	-
Procurement USA	1,279.4	3,569	972.4	3,452	894.4	3,254	-	-	894.4	3,254
Procurement Navy	3.4	8	9.6	19	11.1	25	-	-	11.1	25
Procurement USMC	572.8	1,642	555.6	1,398	381.7	752	-	-	381.7	752
Procurement USAF	46.2	103	74.3	140	72.6	201	8.0	15	80.6	216
Total	1,901.8	5,322	1,621.2	5,009	1,364.0	4,232	8.0	15	1,372.0	4,247

Numbers may not add due to rounding

M-1 Abrams Tank Modification/Upgrades

USA

The M1A2 Abrams is the Army's main battle tank, which first entered service in 1980. Since ending production in 1994, the Army has modernized the Abrams with a series of capabilities upgrades collectively known as the System Enhancement Package (SEP) and Engineering Change Proposals (ECPs). Current modifications to the M1 Abrams include an updated Armor suite; Ammunition



US Army Photo

Data Link; Commander's Remote Operated Weapon Station - Low Profile, Under Armor Auxiliary Power Unit; Electronics Upgrades; Power Train Improvement & Integration Optimization, which provide more reliability, durability and fuel efficiency; and survivability enhancements such as Active Protection System upgrades.

Mission: Provide mobility, protected firepower, and shock effect for battlefield superiority against heavy armor forces.

FY 2021 Program: Funds the continuation of M1A2C SEPv3 ECP 1A efforts; fields two brigades of the M1A2C SEPv3 tanks; continues SEPv4 ECP IB lethality improvements leading to a Test Readiness Review (TRR); and of multiple field modifications to include the Ammunition Data Link (ADL) to fire programmable ammunition, Common Remote Operated Weapon Station Low Profile (CROWS-LP), continued support of the Total Integrated Engine Revitalization (TIGER) and Transmission programs, Direct Support Electrical System Test Sets (DSESTS), upgrades to Training Aids, Devices, Simulators and Simulations (TADSS), and logistics support.

Prime Contractor(s): General Dynamics Corporation; Lima, OH

M-1 Abrams Tank Modification/Upgrades										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	159.7	-	119.6	-	83.5	-	-	-	83.5	-
Procurement	2,486.3	168	2,099.3	165	1,425.3	89	-	-	1,425.3	89
Total	2,646.0	168	2,218.9	165	1,508.8	89	-	-	1,508.8	89

Numbers may not add due to rounding

Armored Multi-Purpose Vehicle

USA

The Armored Multi-Purpose Vehicle (AMPV) will replace the M113 Armored Personnel Carrier program that was terminated in 2007. The AMPV has five mission roles: General Purpose, Medical Treatment, Medical Evacuation, Mortar Carrier, and Mission Command. The current M113 Armored Personnel Carrier Mission Equipment Packages (MEPs) will be integrated with a new hull structure based on the Bradley Fighting Vehicle design to give the Army its required capability at an affordable cost. The program is in the Production and Deployment (PD) phase with current efforts including the procurement of Live Fire Assets, Low Rate Initial Production (LRIP), and Product Qualification Testing.



Mission: Enables the Armored Brigade Combat Team (ABCT) commander to control a relentless Optempo that overwhelms the threat with synchronized and integrated assaults that transition rapidly to the next engagement.

FY 2021 Program: Funds Engineering and Manufacturing Development (EMD) phase efforts, including Production Qualification Testing (PQT), Initial Operational Test & Evaluation (IOT&E), and Live Fire Test and Evaluation (LFT&E). Funds also resource 32 vehicles and associated efforts with recurring production, training, and fielding.

Prime Contractor(s): BAE Systems; York, PA

Armored Multi-Purpose Vehicle (AMPV)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	115.1	-	83.8	-	96.6	-	-	-	96.6	-
Procurement	672.7	205	444.8	121	193.0	32	-	-	193.0	32
Total	787.8	205	528.6	121	289.6	32	-	-	289.6	32

Numbers may not add due to rounding

Next Generation Squad Weapon

The Next Generation Squad Weapon (NGSW) Middle Tier Acquisition (MTA) Rapid Prototyping effort is developing a new rifle (NGSW-R) and automatic rifle (NGSW-AR) with a common 6.8mm cartridge in a variety of ammunition types (General Purpose (GP), Special Purpose (SP), Reduced Range (RR), and blank) intended to replace the M16, M4A1 Carbines and the M249 Squad Automatic Weapon in the Close Combat Force. This MTA Rapid Prototyping initiative supports Army Modernization priorities (Build a More Lethal Force) through enhancement of Joint Lethality in contested environments like Multi-Domain Operations (MDO) by eliminating erosion of close combat capability relative to peer competitors in complex terrain as outlined in the National Defense Strategy (NDS).



Mission: The new more lethal carbine and Squad Automatic Weapon (SAW) provides Brigade Combat Teams with additional capability when engaging an adversaries ground forces.

FY 2021 Program: Other Transaction Agreements (OTAs) contracts were awarded in August 2019 to Textron, General Dynamics and Sig Sauer to submit their prototype candidate rifle, automatic rifle and 6.8mm common cartridge. In FY 2021, funding will be used to: 1) complete rapid prototyping efforts for the rifle, automatic rifle and General Purpose (GP) ammunition; 2) deliver test hardware; 3) execute prototype testing including technical testing and Soldier Touch Points; 4) develop a request for production proposals; and 5) review proposals leading to a down-select from three vendors to one for production. Additionally, FY 2021 funding supports the continuing development and fabrication of the GP, RR, SP, and tracer projectiles ammunition variants. The down-selected vendor will integrate the Army provided RR, SP, and tracer projectiles into their 6.8mm cartridge, and develop a blank cartridge with associated weapon adaption kit. These cartridge types are required to support the fielding and training of the rifle and automatic rifle weapons to the close combat force.

Prime Contractor(s): To be determined during evaluations.

Next Generation Squad Weapon										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	51.3	-	75.4	-	-	-	75.4	-
Procurement	-	-	-	-	35.8	-	-	-	35.8	-
Total	-	-	51.3	-	111.2	-	-	-	111.2	-

Numbers may not add due to rounding

Paladin Integrated Management (PIM)

USA

The Paladin Integrated Management (PIM) replaces the current fleet of M109 Family of Vehicles (FOV), the M109A6 Paladin 155mm Howitzer and the Field M992A2 Artillery Ammunition Support Vehicle (FAASV), with more robust platforms: the M109A7 Self Propelled Howitzer (SPH) and the M992A3 Carrier Ammunition Tracked (CAT). The Army is using a two increment approach to upgrade and modernize the existing M109 fleet to fill the capability gap left by the 2009 cancellation of the Non-Line of Sight Cannon (NLOS-C): mobility improvements and later lethality, range, and reliability improvements. The Army plans to procure 689 PIM sets and sustain them through 2050. The PIM Low Rate Initial Production (LRIP) was extended in FY 2018 with a successful Full Rate Production (FRP) decision anticipated for the second quarter of FY 2020.



Mission: Provide the primary indirect fire support for Armored Brigade Combat Teams, armored and mechanized infantry divisions, and the full spectrum of operations.

FY 2021 Program: Funds the continuation of LRIP with the procurement of 30 sets with the FRP decision anticipated for the second quarter of FY 2020.

Prime Contractor(s): BAE Systems; York, PA

Paladin Integrated Management (PIM)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	35.7	-	199.3	-	427.3	-	-	-	427.3	-
Procurement	525.9	51	553.4	48	435.8	30	-	-	435.8	30
Total	561.6	51	752.7	48	863.1	30	-	-	863.1	30

Numbers may not add due to rounding

Family of Medium Tactical Vehicles

USA

The FMTV is a complete series or family of vehicles based on a common chassis with automatic transmission and that vary based on different payload and mission requirements. The FMTV operate throughout the theater as multipurpose transportation and unit mobility vehicles by Combat, Combat Support, and Sustainment Units. The FMTV variants consist of: the Light Medium Tactical Vehicle 2.5 ton Cargo, Van, and Low Velocity Air Drop (LVAD) models; Medium Tactical Vehicle 5 ton Cargo Standard Wheelbase; Long Wheelbase, Tractor, LVAD Cargo, Expansible Van; 5 ton Dump; 5 ton LVAD Dump; Wrecker; 10 ton Dump; 8.8 ton Load Handling System (LHS); and three types of companion trailers. Eighty percent of the FMTV's parts are common with similar engines, transmissions, drivelines, power trains, tires, and cabs.



Mission: Provides unit mobility and resupply of equipment and personnel for rapidly deployable worldwide operations on primary and secondary roads, trails, cross-country terrain, and all climatic conditions.

FY 2021 Program: Funds the procurement of 186 Armor Capable Medium Tactical Vehicle Trucks and Trailers. The various Medium Tactical Vehicles fill the 8-ton truck requirement, fulfill Army modularity requirements and modernize the medium fleet, reduce operating and support costs, resolve potential operational deficiencies, and operate throughout the theater as a multi-purpose transportation vehicle used by combat, combat support, and combat support units.

Prime Contractor(s): Oshkosh Defense, LLC; Oshkosh, WI

Family of Medium Tactical Vehicles (FMTV)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	3.7	-	2.2	-	8.5	-	-	-	8.5	-
Procurement	123.5	382	138.1	341	113.6	186	-	-	113.6	186
Total	127.2	382	140.3	341	122.1	186	-	-	122.1	186

Numbers may not add due to rounding

Family of Heavy Tactical Vehicles

USA

The Family of Heavy Tactical Vehicles (FHTV) consists of the Palletized Load System (PLS), the Heavy Expanded Mobility Tactical Truck (HEMTT), the Modular Catastrophic Recovery System (MCRS), the Heavy Equipment Transporter System (HETS), and the Medium Equipment Transporter System (METS). The PLS is a 16.5 ton, 10 wheel tactical truck with self-load/unload capability. The PLS carries its payload on flat rack cargo bed, trailer, or International Standards Organization (ISO) containers. The HEMTT is a 10 ton, 8 wheel (8x8) truck that comes in several configurations: Tanker to refuel tactical vehicles and helicopters, Tractor to tow the Patriot missile system and the Multi-Launch Rocket System (MLRS), Wrecker to recover vehicles, and Cargo truck with a material handling crane. The MCRS is comprised of the Prime Mover (M983A4 LET), Fifth Wheel Towing Recovery Device (FWTRD), and the Tilt Deck Recovery Trailer (TDRT). Coupled with the Prime Mover, the MCRS is capable of recovering all Stryker variants and an estimated 95 percent of Mine Resistant Ambush Protected (MRAP) vehicles currently in theater. The HETS is comprised of the M1070A1 Tractor and M1000 Trailer.



Army photo of a PLS

Mission: Provide transportation of heavy cargo to supply and re-supply combat vehicles and weapons systems. The PLS is fielded to transportation units, ammunition units, and forward support battalions with the capability to self-load and transport a 20 foot container. The upgraded HEMTT A4 transports logistics behind quick-moving forces such as the M-1 Abrams and Stryker. The HEMTT family carries all types of cargo, especially ammunition and fuel, for line haul, local haul, unit resupply, and other missions in the tactical environment to support modern, highly mobile combat units. The MCRS recovers large wheeled vehicle platforms in severe off-road conditions either in lift/toe or transport mode. The HETS is used to transport, recover, and evacuate a combat loaded M1 Series main battle tank, an M88, or similar heavy loads.

FY 2021 Program: Funds the procurement of 478 vehicles to modernize the heavy tactical vehicle fleet for Active, National Guard, and Reserve units and to fill urgent theater requirements. Funds also resource European Defense Initiative (EDI) contractor logistics support (CLS), functional area support, and logistics product development.

Prime Contractor(s): Oshkosh Corporation; Oshkosh, WI

Family of Heavy Tactical Vehicles										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	11.1	-	13.1	-	14.2	-	-	-	14.2	-
Procurement	313.0	1,425	373.2	1,635	169.9	452	21.7	26	191.6	478
Total	324.1	1,425	386.3	1,635	184.1	452	21.7	26	205.8	478

Numbers may not add due to rounding

Ground Mobility Vehicle

USA

The Army Ground Mobility Vehicle (GMV) provides enhanced tactical mobility for an Infantry Brigade Combat Team (IBCT) 9-Soldier infantry squad with their associated equipment to move quickly around the battlefield. This capability is required across the range of military operations facing IBCT units conducting crisis response, initial entry, and selected decisive action missions. The GMV deploys worldwide by sea, air, and land modes to support strategic deployment and operational maneuver in accordance with Army and Joint doctrine. This capability provides flexibility for entry operations (permissive and non-permissive) to counter threat anti-access strategies by using multiple austere entry points to bring in combined arms configured units.



A-GMV 1.1

Mission: The GMV enables entry forces to envelop, infiltrate, and penetrate in and/or across multiple domains at select points of entry to place the enemy at an operational disadvantage. This maneuver capability in multiple domains presents many threats to the adversary, overloading his decision cycle and allowing the Joint Force to seize and retain the initiative.

FY 2021 Program: Procures 167 GMVs to support production of the USASOC Version of the GMV1.1 SOCOM Vehicle, and the procurement of 15 Infantry Squad Vehicle (ISV). Ground Mobility Vehicle variants directly support the National Defense Strategy's intent to increase "Forward force maneuver and posture resilience" by providing increased capability for the Soldier to "deploy, survive, operate, maneuver, and regenerate in all domains while under attack". A-GMV 1.1, and ISV provide the necessary flexibility for entry operations (permissive and non-permissive) to counter threat anti-access strategies by using multiple austere entry points by sea, air, and land, and provide increased capability for the Infantry Brigade Combat Team to conduct decisive action missions as well as crisis response.

Prime Contractor(s): A-GMV1.1: General Dynamics-Ordnance and Tactical Systems; St. Petersburg, FL, Infantry Squad Vehicle (ISV): TBD

Ground Mobility Vehicle										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	1.3	-	3.0	-	-	-	-	-	-	-
Procurement	42.7	106	37.0	94	37.9	167	-	-	37.9	167
Total	44.0	106	40.0	94	37.9	167	-	-	37.9	167

Numbers may not add due to rounding

Stryker Family of Armored Vehicles

USA

The Stryker is a 19 ton wheeled armored vehicle that provides the Army with a family of 24 different platforms (10 flat bottom, 7 Double V-Hull, 7 Double V-Hull A1). The Stryker family provides a lethal, versatile, tactically agile joint force capable of operational maneuver in a dynamic, asymmetric threat, and operational environment. The Stryker is deployable by C-130 (flat bottom only), C-17, and C-5 aircraft and can be combat-capable upon



US Army Photo

arrival in any contingency area. There are two basic versions: the Infantry Carrier Vehicle (ICV) and the Mobile Gun System (MGS); and eight different configurations: the Reconnaissance Vehicle (RV); Anti-Tank Guided Missile (ATGM); Nuclear, Biological, Chemical, and Radiological Vehicle (NBCRV); Medical Evacuation Vehicle (MEV); Commander's Vehicle (CV); Fire Support Vehicle (FSV); Mortar Carrier (MC); and Engineer Squad Vehicle (ESV).

Mission: The Stryker provides rapid protected transport to the Infantry and Scouts of the Stryker Brigade Combat Team (SBCT) allowing them to maneuver in open and urban terrain across the full spectrum of operations. Achieves the Army's goal to equip a strategically deployable brigade using a C-17 or C-5 aircraft and an operationally deployable brigade using a C-130 that is capable of global, rapid movement, enabling the Army to respond immediately to urgent operational requirements.

FY 2021 Program: Continues Stryker lethality ECPs development to include integration of the 30mm cannon ECP testing; procurement of the Common Remote Operated Weapon System (CROW-J); systems engineering; integration efforts for the Fire Direction Center Variant; modification of the Anti-Tank Guided Missile (ATGM) vehicle with the upgraded Modified Improved Target Acquisition System (MITAS); and application of multiple fleet-wide modifications and procurement of Training Aids, Devices, Simulators, and Simulations (TADSS).

Prime Contractor(s): General Dynamics Corporation; Sterling Heights, MI

Stryker Family of Armored Vehicles										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	268.9	-	277.6	-	268.9	-	-	-	268.9	-
Procurement	392.6	82	911.5	143	847.2	154	-	-	847.2	154
Total	661.5	82	1,189.1	143	1,116.1	154	-	-	1,116.1	154

Numbers may not add due to rounding

Amphibious Combat Vehicle (ACV)



The Amphibious Combat Vehicle (ACV) is an armored personnel carrier that replaces the aging Amphibious Assault Vehicle. The Marine Corps has refined its ACV strategy based on several factors including: knowledge gained through multiyear analysis and ongoing development of its Ground Combat Tactical Vehicle Strategy. The ACV acquisition strategy competitively awarded two vendors with Engineering, Manufacturing, and Development (EMD) contracts to build 16 test vehicles each (32 total) in November 2015. The ACV 1.1 completed Milestone C in June 2018 and down selected to one vendor, BAE Systems, and awarded that vendor with the Low Rate Initial Production (LRIP) contract. In a third quarter FY 2019 acquisition decision memorandum (ADM), the Navy departed from the program’s PB 20 acquisition strategy to authorize a third LRIP Lot consisting of 56 vehicles. The program plans to begin Full Rate Production (FRP) in FY 2021 with the procurement of 72 vehicles.



Mission: Provide an armored personnel carrier with a swim capability that is balanced in performance, protection, and payload and employable with the Ground Combat Element across the range of military operations. The program provides a phased, incremental capability with Increment 1.1 delivering combat ready Marines from ship-to-shore connector craft to mass forces at littoral penetration points and continue to maneuver to inland objectives. The ACV Increment 1.2 delivers additional ACV 1.1 Personnel Variants (currently in production) as well as Command and Control (ACV-C), Recovery (ACV-R), and 30-mm (ACV-30) Mission Role Variants (MRVs).

FY 2021 Program: Funds Research and Development efforts, including the procurement of ACV 1.2 MRV test articles, associated GFE, and initiation of a Vehicle Protective System trade study and integration efforts. Request also funds Lot 4, the first Full Rate Production (FRP) Lot, of 72 vehicles and procurement of related items such as production support, systems engineering, program management, Engineering Change Orders (ECOs), and integrated logistics support.

Prime Contractor(s): BAE Systems; York, PA

Amphibious Combat Vehicle (ACV)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	64.3	-	50.1	-	41.8	-	-	-	41.8	-
Procurement	166.5	30	300.9	56	478.9	72	-	-	478.9	72
Total	230.8	30	351.0	56	520.7	72	-	-	520.7	72

Numbers may not add due to rounding



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Missile Defeat and Defense Programs

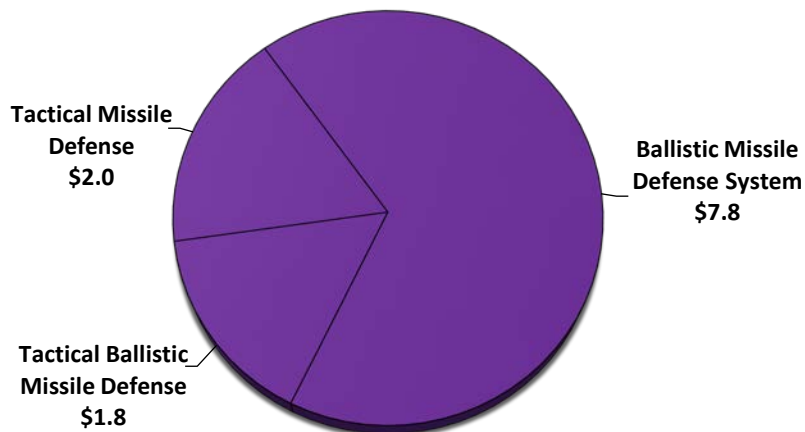
This category includes development and procurement of weapon systems to counter adversary’s offensive cruise missiles and ballistic missile systems. The Missile Defense Agency (MDA) is specifically tasked to lead the Department’s missile defense mission, however, all three Military Departments have acquisition and operational roles in missile defeat and defense. A missile defense system includes interceptor missiles, as well as the associated sensors and command, control, battle management, and communications. Other significant investments include construction, targets and countermeasures, and the RDT&E activities. Encompassed in this category are all programs that are either critical to the functionality of missile defense or support missile defense as a primary mission. The Aegis BMD is the naval element of the Missile Defense System (MDS) and provides an enduring, operationally effective and supportable Ballistic Missile Defense (BMD) capability on Aegis cruisers, destroyers, and Ashore.

The funded program is consistent with the National Defense Strategy's (NDS) line of effort, "Build a More Lethal Force" and the Missile Defense Review (MDR), which calls for the development and fielding of a multi-layered defense of the homeland and forward-deployed forces.

The FY 2021 budget request continues funding for projects started in 2017 for the Missile Defeat and Defense Enhancements (MDDE) initiative to increase the capability and capacity of the United States to detect, disrupt/defeat (left-of-launch), and defend against any North Korean use of ballistic missiles against the United States, its deployed forces, allies, and partners, to include current and projected threats to the U.S. Homeland, Guam, South Korea, and Japan. The FY 2021 budget request also increases tactical air and missile defense interceptor inventories for the Patriot Advanced Capability-3 (PAC-3) Missile Segment Enhancement (MSE), Standard Missile-3 (SM-3), and Terminal High Altitude Area Defense (THAAD) programs. In addition, the FY 2021 request includes funding for studies into the implementation of a space layer consisting of sensors, interceptors and it invests in development efforts for future non-traditional missile defense capabilities.

FY 2021 Missile Defeat and Defense Programs: \$11.6 Billion

\$ in Billions



Note: Total FY 2021 Missile Defeat and Defense (MDD) request is \$20.3 billion. The MDD total shown does not include \$3.2 billion in Non-Traditional Missile Defeat programs. The \$11.6 billion includes the MDA FY 2021 request, and tactical BMD programs funded by the Services, but does not include the Missile Defense Agency's (MDA) Science and Technology (\$45 million), Military Construction (\$53 million), and Operation and Maintenance (\$506 million) funding.

Numbers may not add due to rounding

Ground-based Midcourse Defense

DOD - JOINT

The Ground Based Midcourse Defense (GMD) element is a Missile Defense Agency program and a key component of the Missile Defense System (MDS), providing Combatant Commanders with the capability to engage missiles in the midcourse phase of flight. This phase, compared to boost or terminal, allows significant time for sensor viewing from multiple platforms and, thus, provides multiple engagement opportunities for hit-to-kill interceptors. The Ground Based Interceptor (GBI) is made up of a three-stage, solid fuel booster and an exoatmospheric kill vehicle. When launched, the multi-stage, solid fuel booster missile carries the kill vehicle toward the target’s predicted location in space. Once released from the booster, the kill vehicle uses data received in-flight from ground-based radars and its own on-board sensors to defeat the incoming missile by ramming the warhead with a closing speed of approximately 15,000 miles per hour. Interceptors are currently emplaced at Fort Greely, Alaska (AK), and Vandenberg Air Force Base (AFB), California (CA). The GMD fire control centers are established in Colorado and Alaska.



Mission: Provides the Combatant Commanders with the capability to defend the United States, including Hawaii and Alaska, against long-range ballistic missiles during the midcourse phase of flight.

FY 2021 Program: Strengthens Homeland Missile Defense by developing and delivering a new Next Generation Interceptor (NGI). NGI acquisition covers the development, integration and testing of an All Up Round (AUR) boost vehicle/ kill vehicle system capable of surviving both the natural and hostile environments while countering the evolving threats to the Homeland. Upgrades and replaces ground system infrastructure and fire control/kill vehicle (KV) software to improve the reliability, capability, and cybersecurity resiliency of the GMD weapon system.

Prime Contractor: Boeing Defense and Space; St. Louis, MO

Competitive Prime Contractors for NGI: TBD

Ground-based Midcourse Defense										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	1,270.8	-	1,916.9	-	1,735.5	-	-	-	1,735.5	-
Procurement	520.5	13	285.5	69	-	-	-	-	-	-
Total	1,791.3	13	2,202.3	69	1,735.5	-	-	-	1,735.5	-

Numbers may not add due to rounding

THAAD Missile Defense

DOD - JOINT

The Terminal High Altitude Area Defense (THAAD) is a key element of the Missile Defense System. The THAAD Battery will provide transportable interceptors, using “Hit-To-Kill” technology to destroy missiles inside and outside the atmosphere. A Battery nominally consists of 6 truck-mounted launchers, 48 interceptors (8 per launcher), 1 AN/TPY-2 radar, and a Tactical Fire Control/Communications component. New THAAD Layered Homeland Defense efforts plan to provide greater depth of defense to the homeland consistent with the approach of fielding a layered Missile Defense System. MDA will pursue the development and demonstration of a new THAAD interceptor prototype to support homeland defense.



Mission: Provides Combatant Commanders with a globally-transportable, rapidly-deployable capability against short-range, medium-range, and limited intermediate-range ballistic missile threats inside or outside the atmosphere during terminal phase of flight.

FY 2021 Program: Procures 41 THAAD interceptors, obsolescence mitigation, production and training support, the THAAD stockpile reliability program, and the initial procurement of required THAAD Battery Ground Component enhancement modifications to meet growing cyber threats. Completes USINDOPACOM Joint Emergent Operational Need (JEON) development requirements. Provides THAAD software upgrades to address the evolving threat, defense planning, and improved capability to engage Short Range Ballistic Missile, Medium Range Ballistic Missile, and limited Intermediate Range Ballistic Missile threats. Funds the initiation of the development for the THAAD Layered Homeland Defense Prototype.

Prime Contractor: Lockheed Martin Corporation; Dallas, TX and Sunnyvale, CA

Terminal High Altitude Area Defense (THAAD)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	441.3	-	331.9	-	420.4	-	-	-	420.4	-
Procurement	1,025.8	110	407.2	39	495.4	41	-	-	495.4	41
Total	1,467.1	110	739.1	39	915.8	41	-	-	915.8	41

Numbers may not add due to rounding

Aegis Ballistic Missile Defense

DOD - JOINT

Aegis Sea-Based Weapon Systems is the naval element of the Missile Defense System (MDS) and provides an enduring, operationally effective and supportable missile defense capability on Aegis cruisers, destroyers, and Ashore to defend U.S. deployed forces and our allies. Aegis Sea-Based Weapon Systems build upon the existing Navy Aegis Weapons System (AWS) and Standard Missile-3 (SM-3) design. Upgrades are being made to the weapon system and SM-3 designs which expand capability through a series of incremental, evolutionary improvements to counter ever more sophisticated and longer range threats. New Aegis Layered Homeland Defense efforts plan to provide greater depth of defense to the homeland consistent with the approach of fielding a layered Missile Defense System. MDA plans to assess the Aegis Weapon System to determine whether it can be upgraded to augment homeland defenses by supplementing the GMD system to defeat Intercontinental ballistic missile (ICBM) threats. Aegis Missile Defense will also begin activities required to evolve the MDS to address hypersonic threats



Mission: Provide a forward-deployable, mobile and Ashore capability to detect and track missiles of all ranges in all phases of flight with the ability to destroy missiles in the midcourse and terminal phases.

FY 2021 Program: Procures 34 SM-3 Block IB's and 6 SM-3 Block IIA's. Integrates SM-3 Block IIA into the AWS. Funds capability upgrades of the Aegis Baseline 9 (BMD 5.x) Weapon Systems and the development of Aegis BL 10 (BMD 6). Supports procurement of 9 BMD 4.x/5.x shipsets, 12 weapon system software upgrades, 12 BMD Diminishing Manufacturing Sources (DMS) procurements and 16 installations of BMD 4.x/5.x equipment. Funds the development for the Aegis Layered Homeland Defense. Funds Ground and Flight testing in support of the Integrated Master Test Plan (IMTP) requirements.

Prime Contractors: Aegis Weapon System: Lockheed Martin Corporation; Moorestown, NJ
SM-3 Interceptor: Raytheon Company; Tucson, AZ and Huntsville, AL

Aegis Ballistic Missile Defense										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	816.9	-	907.1	-	985.8	-	-	-	985.8	-
Procurement (Missiles)	706.4	44	671.4	37	619.4	40	-	-	619.4	40
Procurement (HW/SW Installs)	91.2	26	125.0	36	104.2	49	-	-	104.2	49
Total	1,614.4	70	1,703.4	73	1,709.4	89	-	-	1,709.4	89

Numbers may not add due to rounding

Patriot/PAC-3



The Army's Patriot system is an extremely capable, long-range air defense guided missile system, which provides protection of ground combat forces and high-value assets. The Patriot air and missile defense system, which includes the Advanced Capability (PAC-3) missile, provides defense against tactical ballistic missiles, cruise missiles, and air-breathing threats worldwide. The Patriot system is deployed by Fire Unit organized within a Battalion. Each Fire Unit consists of the Engagement Control Station, a Radar Set, an Electric Power Plant, Launching Stations, and the Battery Command Post, including ancillary support equipment. The Patriot Battalion is organized by a Headquarters and Headquarters Battery, exercising command and control through the Information and Coordination Central shelter, with communications support enabled through the Communications Relay Group and Antenna Mast Group. Both the Fire Unit and the Battalion have dedicated support, communications, and maintenance vehicles, with limited missile reload and transport capability via the Guided Missile Transporter. The PAC-3 units are the Combatant Commanders' most capable asset to protect forward deployed forces.



Mission: Contributes to the Ballistic Missile Defense System overall situational awareness for short-range terminal ballistic missile threats. It can cue other systems while protecting Joint assets. The Patriot force is 15 battalions, and many remain forward stationed in multiple theaters of operation.

FY 2021 Program: Continues improvements in software for improved combat identification, improved communications, interoperability, supportability, electronic warfare capabilities; and supports transition to the Integrated Air and Missile Defense architecture.

Prime Contractor(s): Raytheon Integrated Defense Systems; Tewksbury, MA
Lockheed Martin Missiles and Fire Control; Dallas, TX

Patriot/PAC-3										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	158.0	-	467.2	-	564.2	-	-	-	564.2	-
Procurement	323.2	-	278.7	-	278.1	-	-	-	278.1	-
Total	481.2	-	745.9	-	842.3	-	-	-	842.3	-

Numbers may not add due to rounding

PAC-3/MSE Missile



The Missile Segment Enhancement (MSE) is a performance Improvement to the existing Patriot Advanced Capability (PAC-3) missile. The MSE’s improved capability is achieved through a higher performance solid rocket motor, modified lethality enhancer, more responsive control surfaces, upgraded guidance software, and insensitive munitions improvements. The PAC-3 MSE employs kinetic energy to destroy targets through a hit-to-kill capability and provides the range, accuracy, and lethality to effectively intercept and destroy tactical ballistic missiles, air-breathing threats, cruise missiles, and unmanned aerial systems. This missile engages maneuvering and advanced threats earlier, expanding operational battlespace performance against complex threats. These improvements result in a more agile, lethal interceptor missile with enhanced Insensitive Munitions (IM) compliance. The PAC-3 MSE is the latest generation interceptor fired from the Patriot system.



Mission: Provide the Combatant Commanders with a hit-to-kill, surface-to-air missile that can intercept tactical ballistic missiles, cruise missiles, and air-breathing threats that have chemical, biological, radiological, nuclear, and conventional high explosive warheads. The MSE extends the PAC-3 range, filling a critical performance gap, and affords greater protection for deployed U.S. and allied forces.

FY 2021 Program: Funds the production of 168 Missile Segment Enhancement (MSE) missiles, as well as 32 Launcher Mod Kits (LMK), Field Surveillance Program (FSP), PAC-3 Missile Support Center (P3MSC), Obsolescence, System Engineering/Program Management (SE/PM), and Government/Software Engineering.

Prime Contractor(s): Lockheed Martin Missiles and Fire Control; Dallas, TX

PAC-3/MSE										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	-	-	-	-	-	-
Procurement	1,131.3	240	702.4	147	603.2	122	176.6	46	779.8	168
Total	1,131.3	280	702.4	147	603.2	122	176.6	46	779.8	168

Numbers may not add due to rounding

Missiles and Munitions

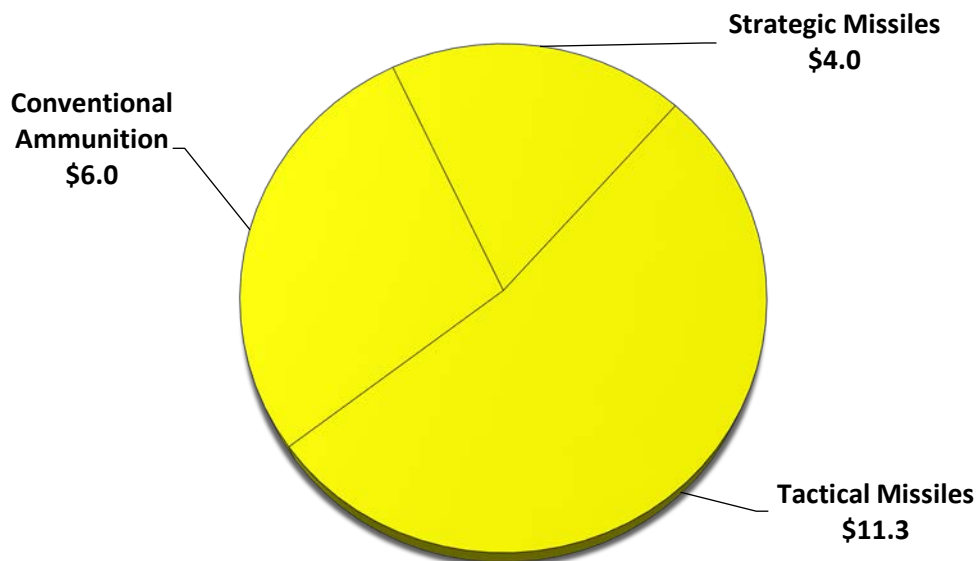
Munitions is a general term for ammunition and missiles. Ammunition consists of bombs, grenades, rockets, mines, projectiles, and other similar devices. There are conventional and nuclear missiles used for both tactical and strategic purposes. Most missiles are precision guided, with the technical sophistication to allow guidance corrections during flight-to-target. Some programs include non-explosive articles that enhance the performance of other munitions. For example, the Joint Direct Attack Munitions (JDAM) adds guidance capability when attached to a gravity bomb, making it a “smart” precision-guided bomb.

In FY 2021, the Department focused on critical high performance, standoff and precision strike weapons to increase the lethality of the Department of Defense. Improvements to these weapons increase range and precision effects in contested environments against high-value land attack targets. This requires munitions with farther standoff, multi-mode seekers, robust guidance systems, and less time for target selection. The Long Range Anti-Ship Missile (LRASM) is the next generation of anti-ship cruise missile with the ability to engage heavily defended maritime targets at standoff ranges and increased survivability.

The Department has made investments to expand production capacity, procure munitions at favorable economic rates, and strengthen the industrial base. For example, the Joint Air-to-Surface Standoff Missile (JASSM), Standard Missile-6 (SM-6), and the Advanced Medium Range Air to Air Missile (AMRAAM) are funded at the maximum industrial capacity to more rapidly build stockpiles. Most other precision guided munitions are manufactured on fully utilized production lines, so pricing economies are secured at economically feasible rates.

FY 2021 Missiles and Munitions Total: \$21.3 Billion

\$ in Billions

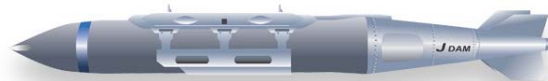


*Numbers may not add due to rounding
Numbers do not include Operation and Maintenance (O&M)*

Joint Direct Attack Munition

DOD - JOINT

The Joint Direct Attack Munition (JDAM) is a joint Air Force and Navy program led by the Air Force. The JDAM improves the existing inventory of general purpose gravity bombs by integrating a Global Positioning System (GPS)/inertial navigation guidance capability



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that improves accuracy and adverse weather capability. A Laser JDAM (LJDAM) variant increases operational flexibility for an expanded target set. The laser sensor kit added to the JDAM weapon kit provides the ability to attack targets of opportunity, including land-moving and maritime targets, when designated by an airborne or ground laser. JDAM tail kit procurement has transitioned to use the Strategic Anti-jam Beam-forming Receiver (SABR) GPS receiver and antenna, which provide enhanced resistance to GPS jamming over earlier production variants.

Mission: Enhances DoD conventional strike system capabilities by providing the ability to precisely attack time-critical, high value fixed or maritime targets under adverse environmental conditions and from all altitudes.

FY 2021 Program: JDAM to continue in production of JDAM tail kits with SABR jam-resistant GPS receivers and antennas.

Prime Contractor(s): The Boeing Company; St. Charles, MO

Joint Direct Attack Munition										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	15.8	-	-	-	7.9	-	-	-	7.9	-
Procurement										
Air Force	922.6	30,872	1,034.2	25,000	207.0	10,000	237.7	6,800	444.7	16,800
Navy	180.9	8,742	75.3	3,388	64.6	2,865	15.5	673	80.1	3,538
Subtotal	1,103.5	39,614	1,109.5	28,388	271.6	12,865	253.2	7,473	524.8	20,338
Total	1,119.3	39,614	1,109.5	28,388	279.5	12,865	253.2	7,473	532.7	20,338

Numbers may not add due to rounding

Hellfire Missiles

DOD - JOINT

The HELLFIRE II AGM-114R is a precision strike, Semi-Active Laser (SAL)-guided missile and is the principal air-to-ground weapon for the Army AH-64 Apache, Army MQ-1C Gray Eagle Unmanned Aircraft System (UAS), Special Operations aircraft, Marine Corps AH-1 Super Cobra, and Air Force Predator and Reaper UAS. The HELLFIRE II AGM-114R employs a multipurpose warhead variant allowing selection of warhead effects corresponding to a specific target/engagement type and replacing all previous HELLFIRE II variants (K/N/M/P). The AGM-114R is approximately 7 inches in diameter, weighs 107 pounds, and is 69 inches in length. The weapon range is up to 8 kilometers from rotary-wing and 12+ kilometers from UAS.



Mission: HELLFIRE provides the warfighter with an air-to-ground, point-target precision strike capability to defeat advanced armor and an array of traditional and non-traditional targets.

FY 2021 Program: HELLFIRE to continue in Production.

Prime Contractor(s): Lockheed Martin; Orlando, FL

Hellfire Missiles										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
Procurement										
Army	193.7	2,034	425.6	4,902	91.2	428	236.3	3,090	327.5	3,518
Air Force	265.8	3,104	299.7	3,859	40.1	548	143.4	3,969	183.5	4,517
Navy	1.5	23	1.5	29	-	-	5.6	115	5.6	115
Total	461.0	5,161	726.8	8,790	131.3	976	385.3	7,174	516.6	8,150

Numbers may not add due to rounding

Small Diameter Bomb (SDB) I



The Small Diameter Bomb Increment I (SDB I) is an Air Force program providing increased kills per sortie on current and future aircraft platforms. The SDB I is a conventional 250 lb. small sized, precision guided air-to-ground weapon that can be delivered from both fighter and bomber aircraft from standoff or Close Air Support. The SDB I is a fixed and stationary target attack weapon.



Mission: Destroys targets from a medium-range Standoff Close Air Support position deliverable by both fighter and bomber aircraft, with higher load-out and less collateral damage compared to other weapons.

FY 2021 Program: SDB I to continue in production.

Prime Contractor(s): Boeing Company; St. Charles, MO

Small Diameter Bomb I										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	-	-	-	-	-	-
Procurement	209.3	5,743	273.3	7,078	45.5	1,179	50.4	1,283	95.9	2,462
Total	209.3	5,743	273.3	7,078	45.5	1,179	50.4	1,283	95.9	2,462

Numbers may not add due to rounding

Small Diameter Bomb (SDB) II

DOD - JOINT

The Small Diameter Bomb (SDB) II is a joint Air Force and Navy program led by the Air Force to provide a conventional small sized, precision guided air-to-ground weapon that can be delivered from both fighter and bomber aircraft to attack mobile and fixed targets through adverse weather from standoff. The SDB II incorporates a tri-mode seeker and data link, which expands the use to moving targets.



USAF Image

Mission: Destroys targets from a medium-range standoff position deliverable by both fighter and bomber aircraft, with higher load-out and less collateral damage compared to other weapons.

FY 2021 Program: SDB II to continue in production and completes fielding of SDB II on the F-15E and continues integration on the F/A-18E/F and F-35B/C. Continues development and integration of a military code GPS receiver and an enhanced cryptographic datalink.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ

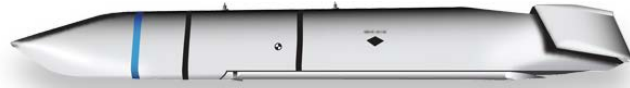
Small Diameter Bomb II										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
Air Force	75.3	-	45.2	-	17.3	-	-	-	17.3	-
Navy	84.0	-	50.1	-	62.5	-	-	-	62.5	-
Subtotal	159.3	-	95.3	-	79.8	-	-	-	79.8	-
Procurement										
Air Force	100.9	510	183.3	1,175	273.3	1,133	-	-	273.3	1,133
Navy	88.8	750	108.5	512	78.9	357	-	-	78.9	357
Subtotal	189.7	1,260	291.8	1,687	352.2	1,490	-	-	352.2	1,490
Total	349.0	1,260	387.1	1,687	432.0	1,490	-	-	432.0	1,490

Numbers may not add due to rounding

Joint Air-to-Surface Standoff Missile

DOD - JOINT

The Joint Air-to-Surface Standoff Missile (JASSM) provides a survivable, precision cruise missile to kill hard, medium, and soft targets. It is a 2,000-pound class weapon with a multi-purpose, hardened blast frag penetrator warhead. The JASSM can cruise



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autonomously in adverse weather, day or night, to defeat high value targets even when protected by next generation defenses. The JASSM navigates to a pre-planned target using a Global Positioning System-aided Inertial Navigation System and transitions to automatic target correlation using an imaging infrared seeker in the terminal phase of flight. The range for the JASSM-Baseline (BL) variant (AGM-158A) is greater than 200 nautical miles. The JASSM-BL is integrated on the F-15E, F-16, B-52, B-1, and B-2 aircraft and concluded procurement in FY 2016.

The JASSM-Extended Range (ER) variant has two configurations, AGM-158B and AGM-158D, which have a more fuel-efficient engine, greater fuel capacity, and adds 2.5 times the standoff range at greater than 500nm. The JASSM-ER maintains the same outer mold line and low-observable properties as JASSM-BL, but replaces the turbojet engine with a higher thrust, more fuel efficient turbofan engine. The AGM-158B is currently integrated on the F-15E, B-1 and B-52 aircraft with integration on the F-16 by the end of FY 2020 and B-2 by FY 2021. The AGM-158D is in development with the goal of enhancing performance and incorporating multiple initiatives via a single system level update including new wing and chine designs and software updates for increased range and survivability. The threshold aircraft for AGM-158D is the B-1.

Mission: Destroys high value targets from a long-range standoff position deliverable by fighter and bomber aircraft.

FY 2021 Program: Continues full-rate production of the AGM-158B and procures low rate initial production of the AGM-158D. The factory will operate at the maximum rate of production on the same production line as the Long Range Anti-Ship Missile.

Prime Contractor(s): Lockheed Martin Corporation; Troy, AL

Joint Air-to-Surface Standoff Missile										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	40.9	-	78.5	-	70.8	-	-	-	70.8	-
Procurement	602.8	360	483.4	390	475.9	376	30.0	24	505.9	400
Total	643.7	360	561.9	390	546.7	376	30.0	24	576.7	400

Numbers may not add due to rounding

Air Intercept Missile – 9X

DOD - JOINT

The Air Intercept Missile-9X (AIM-9X), also known as SIDEWINDER, is a short range air-to-air missile that provides launch-and-leave warfighting capability. The AIM-9X Block II is an infrared missile



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with a staring focal plane array imaging infrared (IR) seeker and high-angle off-boresight capability. It is mounted on a highly maneuverable (thrust vectored) airframe, along with digital guidance and IR signal processing that results in enhanced acquisition ranges, improved IR counter-countermeasures capability, and robust engagement zones for first shot/first kill air-to-air performance. The AIM-9X is a joint Navy/Air Force program led by the Navy.

Mission: Destroys low and high altitude, high-speed enemy targets in an electronic countermeasures environment.

FY 2021 Program: AIM-9X Block II to continue in production while addressing component parts obsolescence and future warfighting improvements.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ

Air Intercept Missile – 9X										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
Air Force	29.0	-	10.3	-	19.4	-	-	-	19.4	-
Navy	36.4	-	19.5	-	5.9	-	-	-	5.9	-
Subtotal	65.4	-	29.8	-	25.3	-	-	-	25.3	-
Procurement										
Air Force	118.3	257	155.3	355	164.8	331	-	-	164.8	331
Navy	121.5	311	149.2	365	126.5	270	-	-	126.5	270
Subtotal	239.8	568	304.5	720	291.3	601	-	-	291.3	601
Total	305.2	568	334.3	720	316.6	601	-	-	316.6	601

Numbers may not add due to rounding

Advanced Medium Range Air-to-Air Missile

DOD - JOINT

The Advanced Medium Range Air-to-Air Missile (AMRAAM) is an all-weather, all-environment radar guided missile developed to improve capabilities against very low-altitude and high-altitude, high-speed targets in an electronic countermeasures environment. The AMRAAM is a joint Navy/Air Force program led by the Air Force.



USAF Image

Mission: Destroys low and high altitude, high-speed enemy targets in an electronic countermeasures environment. The AMRAAM is a fire-and-forget air-to-air missile and has replaced the AIM-7 Sparrow as the U.S. military's standard beyond visual range intercept missile. The missile has undergone various service life improvements. The current generation, AIM-120D, has a two-way data link, Global Position System-enhanced Inertial Measurement Unit, an expanded no-escape envelope, improved high-angle off-boresight capability, and increased range over previous variants.

FY 2021 Program: AMRAAM to continue in production as well as addressing component parts obsolescence and future warfighting improvements. The factory will operate at the maximum rate of production.

Prime Contractor(s): Raytheon Company; Tucson, AZ

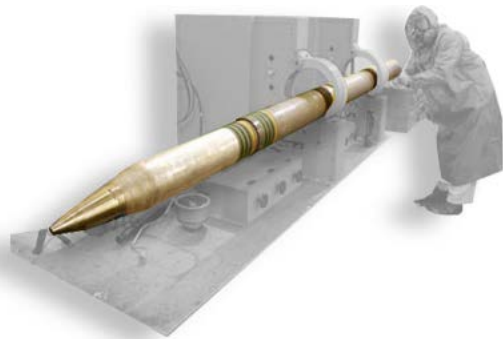
Advanced Medium Range Air-to-Air Missile										
	FY 2019		FY 2020		FY 2021					
	FY 2019 \$M	Qty	FY 2020 \$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
Air Force	50.7	-	55.4	-	51.8	-	-	-	51.8	-
Navy	27.7	-	34.2	-	44.3	-	-	-	44.3	-
Subtotal	78.4	-	89.6	-	96.1	-	-	-	96.1	-
Procurement										
Air Force	307.5	187	311.7	220	453.2	414	-	-	453.2	414
Navy	188.4	126	211.8	192	327.0	325	-	-	327.0	325
Subtotal	495.9	313	523.5	412	780.2	739	-	-	780.2	739
Total	574.3	313	613.1	389	876.3	739	-	-	876.3	739

Numbers may not add due to rounding

Chemical Demilitarization

DOD - JOINT

The Chemical Demilitarization Program (CDP) is composed of two Major Defense Acquisition Programs, which are the Assembled Chemical Weapons Alternatives (ACWA) Program and the U.S. Army Chemical Materials Activity, both with the goal of destroying a variety of United States chemical agents and weapons, including the destruction of former chemical weapon production facilities. The CDP is designed to eliminate the existing U.S. chemical weapons stockpile in compliance with the Chemical Weapons Convention signed in 1997 and the congressionally mandated destruction deadline of December 31, 2023 - while ensuring the safety and security of the workers, the public, and the environment.



US Army Photo

Mission: There are three mission areas within the Chemical Demilitarization Program:

1. Destroy the remaining 6.2 percent of the U.S. chemical weapons stockpile at the ACWA Program sites (Colorado and Kentucky).
2. Support the Chemical Stockpile Emergency Preparedness Project (CSEPP) to include emergency response planning and capabilities for communities surrounding chemical weapons stockpile storage sites.
3. Support the Recovered Chemical Warfare Material (RCWM) Program within the United States, which includes technical expertise, project management, maintaining crews and equipment required to assess and destroy of RCWM. For explosives and munitions emergencies.

FY 2021 Program: Continue destruction operations at Colorado and Kentucky. Continue the CSEPP efforts for emergency response planning and capabilities at Colorado and Kentucky. Sustain the crews, equipment, and provide the technical expertise and project management to assess and destroy the RCWM in the United States for explosives and munitions emergencies.

Prime Contractor(s): Bechtel National Incorporated; Pueblo, CO
Bechtel Parsons, Joint Venture; Richmond, KY

Chemical Demilitarization										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
Chemical Agents and Munitions Destruction	742.8	-	985.5	-	889.5	-	-	-	889.5	-
Total	742.8	-	985.5	-	889.5	-	-	-	889.5	-

Numbers may not add due to rounding

Joint Air-to-Ground Missile

DOD - JOINT

The Joint Air-to-Ground Missile (JAGM) system provides an improved air-to-ground missile capability for rotary-wing aircraft and unmanned aircraft systems. The JAGM is an aviation-launched, precision-guided munition for use against high-value stationary, moving, and relocatable land and naval targets. The JAGM is different than the HELLFIRE missile in that it utilizes a multi-mode seeker to provide precision



point and fire-and-forget targeting day or night in adverse weather, battlefield obscured conditions, and against a variety of countermeasures. A multi-purpose warhead provides lethal effects against a range of target types, from armored vehicles, thin-skinned vehicles and maritime patrol craft, to urban structures and field fortifications. The JAGM delivers the Joint services a single air-to-ground missile with improved lethality, operational flexibility, and a reduced logistics footprint.

Mission: Engages and defeats high value stationary, moving, and relocatable land and naval targets with precision point and fire-and-forget targeting day or night, in adverse weather, battlefield obscured conditions, and against a variety of countermeasures.

FY 2021 Program: Full Rate Production decision is scheduled for 3rd quarter in FY 2020.

Prime Contractor(s): Lockheed Martin; Orlando, FL

Joint Air-to-Ground Missile (JAGM)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E										
Army	12.4	-	6.6	-	8.9	-	-	-	8.9	-
Navy	16.0	-	18.4	-	12.7	-	-	-	12.7	-
Subtotal	28.4	-	25.0	-	21.6	-	-	-	21.6	-
Procurement										
Army	256.5	721	199.3	494	213.4	657	-	-	213.4	657
Navy	24.1	75	75.7	320	49.4	203	-	-	49.4	203
Air Force	-	-	10.0	40	-	-	-	-	-	-
Subtotal	280.6	796	285.0	854	262.8	860	-	-	262.8	860
Total	309.0	796	310.0	854	284.4	860	-	-	284.4	860

Numbers may not add due to rounding

Long Range Anti-Ship Missile (LRASM) DOD - JOINT



The Long Range Anti-Ship Missile (LRASM) is a Navy-lead joint (Navy/Air Force) program that provides Combatant Commanders the ability to conduct anti-surface warfare operations against high-value surface combatants protected by an Integrated Air Defense System with long-range surface-to-air missiles and deny adversaries the sanctuary of maneuver. LRASM is a precision guided anti-ship missile with semi-autonomous guidance, day/night and all-weather capability, which integrates a multi-modal sensor suite, a weapons data-link, enhanced digital anti-jam Global Positioning System capabilities and a 1,000 lb. penetrator/blast fragmentation warhead. LRASM achieved Early Operational Capability (EOC) on the Air Force B-1 bomber in December 2018 and on the Navy F/A-18E/F in November 2019. The Navy is developing LRASM 1.1 which will deliver incremental upgrades to keep pace with emerging threat capabilities, and is expected to begin fielding in fiscal year (FY) 2022.

Mission: Provide robust anti-surface warfare capability to ensure freedom of maneuver, maintain sea lines-of-communication, and extend joint warfighter combat reach in contested maritime environments.

FY 2021 Program: Development, integration and test phase of the air-launched LRASM 1.1 program. The factory will operate on the same production line as the Joint Air-to-Surface Standoff Missile (JASSM).

Prime Contractor(s): Lockheed Martin Corporation; Troy, AL

Long Range Anti-Ship Missile (LRASM)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	141.4	-	115.4	-	35.8	-	-	-	35.8	-
Procurement										
Navy	119.8	33	72.5	17	168.8	48	-	-	168.8	48
Air Force	54.4	15	-	-	19.8	5	-	-	19.8	5
Subtotal	174.2	48	72.5	17	188.6	53	-	-	188.6	53
Total	315.6	48	187.9	17	224.4	53	-	-	224.4	53

Numbers may not add due to rounding

Guided Multiple Launch Rocket System



The Guided Multiple Launch Rocket System (GMLRS) is a series of surface-to-surface artillery missile variants which can be fired from the M142 High Mobility Artillery Rocket System (HIMARS) and the M270A1/A2 Multiple Launch Rocket System (MLRS) launchers. They provide a responsive, all-weather, rapidly-deployable precision strike capability. The GMLRS uses an on-board Inertial Measurement Unit in



combination with a Global Positioning System guidance set to provide a high level of accuracy and effects against a variety of target sets. Production of the first variant, the M30 GMLRS Dual Purpose Improved Conventional Munition (DPICM) a cluster munition (CM) warhead was terminated in response to the June 2008 Department of Defense (DoD) Policy on CM and Unintended Harm to Civilians. The GMLRS program now produces two separate variants both with a range of 15-70+ kilometers. The M31/M31A1 GMLRS Unitary can engage precisely located point targets utilizing a single 200-pound low collateral damage high-explosive warhead and the M30A1 GMLRS Alternative Warhead (AW), a non-cluster munition used to engage area and imprecisely located targets. The GMLRS Unitary and AW variants are in compliance with the requirements outlined in the November 2017 update to DoD Policy on CM. The Army is currently executing an Extended Range (ER) GMLRS product improvement program extending the maximum range and integrating sensors and seekers into the rocket to engage complex targets with greater precision at greater ranges.

Mission: Neutralizes or suppresses enemy field artillery and air defense systems and complements cannon artillery fires.

FY 2021 Program: GMLRS to continue in production as well as developing product improvements such as insensitive munition propulsion.

Prime Contractor(s): Lockheed Martin Corporation; Dallas, TX and Camden, AR

Guided Multiple Launch Rocket System										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	113.5	-	117.3	-	75.6	-	-	-	75.6	-
Procurement										
Army	975.5	7,668	1,176.4	8,211	850.2	5,384	127.0	904	977.2	6,288
Navy	29.5	283	44.7	312	133.7	952	17.5	120	151.2	1,072
Subtotal	1,005.0	7,951	1,221.1	8,523	983.9	6,336	144.5	1,024	1,128.4	7,360
Total	1,118.5	7,951	1,338.4	8,523	1,059.5	6,336	144.5	1,024	1,204.0	7,360

Numbers may not add due to rounding

Javelin Advanced Anti-Tank Weapon System - Medium



The Javelin is highly effective against a variety of targets at extended ranges under day/night, battlefield obscurants, adverse weather, and multiple counter-measure conditions. The system’s soft-launch feature permits firing from enclosures commonly found in complex urban terrain. The system consists of a reusable command launch unit (CLU) and a modular missile encased in a disposable launch tube assembly. The CLU provides stand-alone all-weather and day/night surveillance capability. Javelin provides precision effects in either a top-attack or direct-attack mode to defeat armored vehicles, fortifications and soft targets in full spectrum operations. It uses an imaging infrared two-dimensional staring focal plane array seeker and a tandem warhead with two shaped charges; a precursor warhead to defeat reactive armor, and a primary warhead to penetrate base armor and other structures. It is effective against stationary and moving targets.



USMC Photo

Mission: Provides the dismounted soldier with the only man-portable, fire-and-forget system that is highly lethal against targets ranging from main battle tanks to fleeting targets of opportunity found in current threat environments.

FY 2021 Program: JAVELIN FGM-148F (F model) continues in production. Continues development of a lightweight CLU to reduce soldier burden and bulk.

Prime Contractor(s): Raytheon Missile Systems/Lockheed Martin Javelin Joint Venture
Tucson, AZ and Orlando, FL

Javelin Advanced Anti-Tank Weapon System - Medium										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	5.3	-	15.0	-	7.5	-	-	-	7.5	-
Procurement										
Army	245.5	1,247	142.8	697	190.3	773	-	-	190.3	773
Navy	3.1	11	20.2	97	19.9	98	-	-	19.9	98
Subtotal	248.6	1,258	163.0	794	210.2	871	-	-	210.2	871
Total	253.9	1,258	178.0	794	217.7	871	-	-	217.7	871

Numbers may not add due to rounding

Precision Strike Missile

USA

The Precision Strike Missile (PrSM) is the Army's next generation surface-to-surface ballistic missile that replaces and improves upon the Army Tactical Missile System (ATACMS). PrSM will provide Joint Force Commanders with a 24/7, all weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. PrSM provides Field Artillery units with long range and deep strike capability while supporting brigade, division, corps, Army, theater, Joint/Coalition Forces and Marine Air-Ground Task Forces in full, limited, or expeditionary operations.



Mission: The mission of the PrSM is to destroy/neutralize/suppress targets at ranges from 60-499 km using missile-delivered indirect precision fires.

FY 2021 Program: Milestone B decision is scheduled for 3rd quarter FY 2021 and the program will enter into the Engineering, Manufacturing and Development (EMD) phase.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ /Lockheed Martin; Grand Prairie, TX

Precision Strike Missile										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	152.6	-	156.7	-	122.7	-	-	-	122.7	-
Procurement	-	-	-	-	49.9	30	-	-	49.9	30
Total	152.6	-	156.7	-	172.6	30	-	-	172.6	30

Numbers may not add due to rounding

Trident II Ballistic Missile Modifications



The Trident II (D5) is a submarine launched ballistic missile. It provides the most survivable, second-strike capability in our nation’s nuclear Triad. The Trident II missile is carried on the OHIO-class Fleet Ballistic Missile Submarine. The ongoing Life Extension Program (LEP) ensures viability of a highly survivable strategic deterrent through 2042, providing the ability to precisely attack time-critical, high value, fixed targets. The LEP includes the procurement of missile electronic and guidance Supportability Mods/Strategic Programs Alteration (SPALT) kits. The importance of this program as a key component to the sea-based leg of the nuclear triad was re-confirmed by the President and Congress with the ratification of the New START Treaty in 2011.



US Navy Photo

Mission: Aboard a virtually undetectable platform, the submarine launched fleet ballistic missile deters nuclear war by means of assured second-strike capability in response to a major attack on the United States or its allies.

FY 2021 Program: FY 2021 funding supports the production of the redesigned guidance system and missile electronics packages, which must be replaced to support the extended service life of the Ohio Class Submarines. Funds also support procurement of Trident II D5 missile LEP, to include missile motors, guidance, fuzing, arming and firing systems, and other critical components.

Prime Contractor(s): Lockheed Martin Corporation; Sunnyvale, CA

Trident II Ballistic Missile Modifications										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	61.6	-	23.2	-	17.3	-	-	-	17.3	-
Procurement	1,048.0	-	1,165.7	-	1,173.8	-	-	-	1,173.8	-
Total	1,109.6	-	1,188.9	-	1,191.1	-	-	-	1,191.1	-

Numbers may not add due to rounding

Standard Missile-6



The Standard Missile-6 (SM-6) is a surface Navy Anti-Air Warfare (AAW) missile that provides area and ship self-defense. The missile is intended to project power and contribute to raid annihilation by destroying manned fixed and rotary wing aircraft, Unmanned Aerial Vehicles



US Navy Photo

(UAV), Land Attack Cruise Missiles (LACM), and Anti-Ship Cruise Missiles (ASCM) in flight. It was designed to fulfill the need for a vertically launched, extended range missile compatible with the Aegis Weapon System (AWS) to be used against extended range threats at-sea, near land, and overland. The SM-6 combines the tested legacy of STANDARD Missile-2 (SM-2) propulsion and ordnance with an active Radio Frequency (RF) seeker modified from the AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM), allowing for over-the-horizon engagements, enhanced capability at extended ranges, and increased firepower.

Mission: Provides all-weather, anti-aircraft armament for cruisers and destroyers. The most recent variant of Standard Missile is SM-6, which incorporates an AMRAAM seeker for increased performance, including overland capability.

FY 2021 Program: Continues a 5-year multiyear procurement (MYP) contract (FY 2019 – FY 2023), which continues production of the SM-6 variant. The factory will operate at the maximum production rate.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ

Standard Missile-6										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	127.7	-	155.1	-	293.4	-	-	-	293.4	-
Procurement	615.9	125	500.6	125	522.9	125	-	-	522.9	125
Total	743.6	125	655.7	125	816.3	125	-	-	816.3	125

Numbers may not add due to rounding

Rolling Airframe Missile



The Rolling Airframe Missile (RAM) is a high firepower, lightweight complementary self-defense system to engage anti-ship cruise missiles. The systems design is based upon the infrared (IR) seeker of the Stinger (FIM-92) missile, and the warhead, rocket motor, and fuse from the Sidewinder (AIM-9) missile. The missile uses Radio Frequency (RF) for midcourse guidance, and transitions to IR guidance for terminal engagement. The current RM-116 configuration is Block II (RIM-116C).



Mission: Provides high firepower close-in defense of combatant and auxiliary ships by utilizing a dual mode, passive radio frequency/infrared missile in a compact 21 missile launcher.

FY 2021 Program: Continues Full Rate Production (FRP) for the Block II (RIM-116C) missile.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ

Rolling Airframe Missile										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	25.3	-	22.0	-	6.2	-	-	-	6.2	-
Procurement	96.2	108	106.8	120	90.5	100	-	-	90.5	100
Total	121.5	108	128.8	120	96.7	100	-	-	96.7	100

Numbers may not add due to rounding

Tactical Tomahawk Cruise Missile



Tomahawk is a combat-proven, long-range strike weapon that delivers a 1,000 lb class warhead at ranges greater than 900 nm. There have been more than 2,000 Tomahawk combat expenditures to-date due to the weapon providing a



US Navy Photo

high precision, all-weather, deep-strike attack capability against fixed and mobile targets. Tomahawk is launched from U.S. Navy surface combatants and submarines. Key weapon features include: precision navigation/guidance; robust anti-jam Global Positioning System (GPS) capabilities; high responsiveness and mission flexibility due to an in-flight re-targeting capability; and the ability to transmit Battle Damage Indication (BDI) reports prior to weapon impact.

Mission: Provides precision strike against long and medium range tactical targets.

FY 2021 Program: Continues the procurement of Tomahawk missiles and mid-life recertification phase to increase the service life of the missile. Continues funding the development of a maritime strike variant to engage surface target and the Joint Multi-Effects Warhead System for optimal lethality.

Prime Contractor(s): Raytheon Missile Systems; Tucson, AZ

Tactical Tomahawk Cruise Missile										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	233.9	-	273.0		200.3	-	-	-	200.3	-
Procurement										
Navy	98.6	-	386.2	90	277.7	155	-	-	277.7	155
Marine Corps	-	-	-	-	125.0	48	-	-	125.0	48
Subtotal	98.6	-	386.2	90	402.7	203	-	-	402.7	203
Total	332.5	-	659.2	90	603.0	203	-	-	603.0	203

Numbers may not add due to rounding

Ground Based Strategic Deterrent (GBSD)



The Ground Based Strategic Deterrent (GBSD) program is the Air Force effort to replace the aging LGM-30 Minuteman III intercontinental ballistic missile (ICBM). The Minuteman III missile fleet was fielded in the 1970s with an initial 10-year service life, while its launch and command and control systems date back to the 1960s. The new GBSD weapon system will meet existing user requirements, while having the adaptability and flexibility to affordably address changing technology and threat environments through 2075. Deployment is projected to begin in the late 2020s.



Mission: As a critical part of the nuclear triad, ICBMs provide land-based strategic nuclear deterrence, assurance, and stability by providing a responsive and resilient capability that assures allies they do not need to expand their own capability, dissuades proliferation, deters adversaries, and, should deterrence fail, will decisively defeat adversary targets and retaliatory capabilities as authorized and directed by the President. The GBSD will continue to maintain strategic stability at a reasonable cost, while hedging against potential problems or vulnerabilities in other portions of the triad.

FY 2021 Program: Funds activities to deliver a flexible integrated weapon system critical design.

Prime Contractor: Northrop Grumman Corporation; El Segundo, CA

Ground Based Strategic Deterrent (GBSD)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	401.2	-	557.5	-	1,524.8	-	-	-	1,524.8	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	401.2	-	557.5	-	1,524.8	-	-	-	1,524.8	-

Numbers may not add due to rounding

B61 Tail Kit Assembly (TKA)



The B61 is a nuclear gravity bomb developed by the Department of Energy’s National Nuclear Security Administration (DOE/NNSA) for the Department of Defense. Current versions in the inventory were fielded between 1978 and 1990 and require component refurbishment and replacement to maintain a safe, secure and effective capability.



Mission: Provide the strategic weapons for the airborne leg of the nuclear triad and are carried on the F-15E, the B-2, and NATO dual-use aircraft today. The new variant consolidates four versions and will be carried by the B-2 and North Atlantic Treaty Organization (NATO) aircraft as well as the F-35 and the B-21 bomber. To extend the life of this weapon, DOE/NNSA and the Air Force are jointly implementing a Life Extension Program (LEP) to refurbish the B61 with a First Production Unit in 2020. The Air Force portion of the LEP is to provide the development, acquisition and delivery of a guided tail kit assembly (TKA) and all up round technical integration, system qualification and fielding of the B61-12 variant.

FY 2021 Program: Met Milestone C in October 2018. Completes integration efforts for the F-15E, F-16, and B-2 aircraft, as well as development of mission planning systems. Funds the completion of test activities. Production (Lots 1 and 2) contract negotiations are expected to be completed in 2QFY20. FY 2021 funds will procure additional bomb assembly trainers.

Prime Contractor(s): The Boeing Company; St. Charles, MO

B61 Tail Kit Assembly (TKA)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	42.0	-	27.6	-	9.7	-	-	-	9.7	-
Procurement	152.2	250	80.8	533	35.7	-	-	-	35.7	-
Total	194.2	250	108.4	533	45.4	-	-	-	45.4	-

Numbers may not add due to rounding

Long Range Stand-Off (LRSO) Weapon



Long Range Stand-Off (LRSO) Weapon is a nuclear cruise missile capable of penetrating and surviving complex advanced integrated air defense systems and GPS-denied environments from significant standoff ranges. The LRSO replaces the Air Launched Cruise Missile (ALCM) which entered service in 1982 and is well past its original 10-year design service life. LRSO details are classified to protect critical program information.



Mission: The Long Range Stand Off cruise missile retains penetrating and survivable capabilities in advanced Integrated Air Defense Systems and GPS-denied environments from significant standoff ranges, ensuring we maintain a credible deterrent. Combined with nuclear capable bombers, LRSO provides the nuclear triad with a clear, visible, and tailorable deterrent to provide the President and U.S. Forces the ability to project power and hold at risk any target at any location on the globe. LRSO provides a hedge against future technological and geopolitical uncertainties. LRSO provides a reliable cost-effective force multiplier for the B-52 and the B-21 bomber.

FY 2021 Program: Funds the development, design, and planning for test, integration, qualification and nuclear certification activities. It continues funding for the Technology Maturation Risk Reduction (TMRR) efforts to include design reviews, warhead and aircraft integration. The next major milestone after TMRR award is Milestone B decision with an Engineering Manufacturing and Development contract award planned for FY 2022.

Prime Contractor(s): Lockheed Martin Corporation; Orlando, FL
Raytheon Company; Tucson, AZ

Long Range Stand-Off (LRSO) Weapon										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	646.8	-	712.5	-	474.4	-	-	-	474.4	-
Procurement	-	-	-	-	-	-	-	-	-	-
Total	646.8	-	712.5	-	474.4	-	-	-	474.4	-

Numbers may not add due to rounding



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Shipbuilding and Maritime Systems

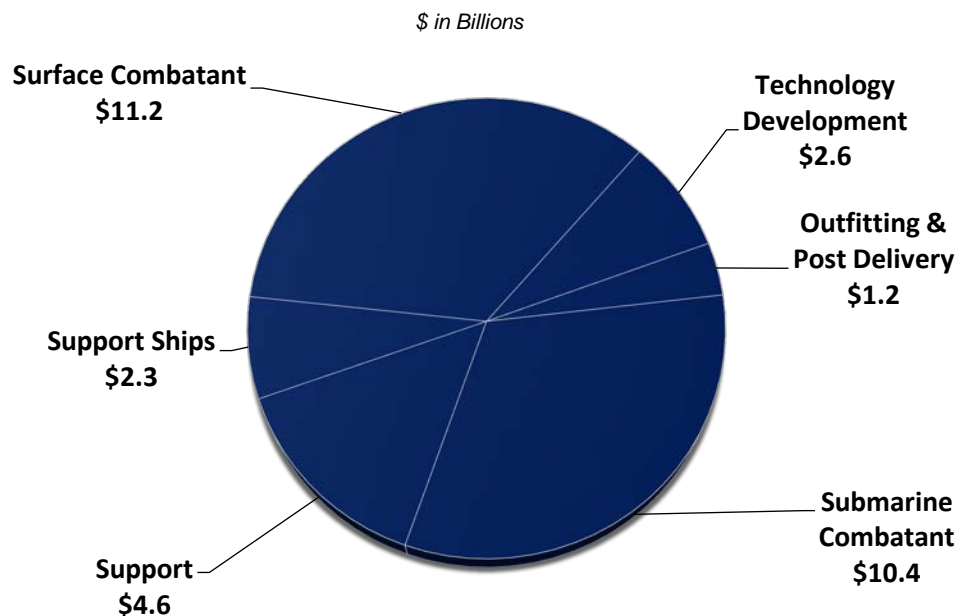
A central principle to the United States Maritime Strategy is forward presence, which promotes conflict deterrence by ensuring forces are in a position to expeditiously respond to conflict. Therefore, sea services must procure, build, and maintain maritime systems in accordance with mission needs.

Consistent with the National Defense Strategy's (NDS) line of effort, "Build a More Lethal Force", the Navy's shipbuilding plan for the Future Years Defense Program (FYDP) provides for the construction of 44 Battle Force Ships along with 10 futuristic Unmanned Surface Vessels (USV) (*note: USV are not considered to be elements of the battle force ship count*).

The funding in this category finances developmental efforts, equipment procurements, and construction of ships that will allow the U.S. Navy to maintain maritime dominance and superiority well into the 21st century.

The FY 2021 Shipbuilding Portfolio includes funding for the construction and service life extension of 16 vessels. Eight battle force fleet ships will begin construction: 1 SSBN *Columbia* Class Submarine; 1 SSN 774 *Virginia* Class nuclear attack submarine, equipped with the Virginia Payload Module; 2 DDG 51 *Arleigh Burke* Class Flight III destroyers; 1 Frigate; 1 LPD *San Antonio* Class Flight II Amphibious Transport Dock ship; and 2 Towing, Salvage and Rescue Ship (T-ATS); additionally, 3 LCAC Landing Craft will begin Service Life Extension programs and 5 LCU Landing Craft, Utility vessels will begin construction. The FY 2021 request includes funding for 2 Unmanned Surface Vessels (USV).

FY 2021 Shipbuilding and Maritime Systems Total: \$32.3 Billion



Numbers may not add due to rounding

CVN 78 *Gerald R. Ford* Class Nuclear Aircraft Carrier



Aircraft carriers are the centerpiece of U.S. Naval forces. The CVN 78 class ships include new technologies and improvements that improve efficiency and operating costs as well as reduced crew requirements. This new class brings improved warfighting capability, quality-of-life improvements for Sailors, and reduced total ownership costs. USS *Gerald R. Ford* is the first aircraft carrier designed with all electric utilities, eliminating steam service lines from the ship, reducing maintenance requirements and improving corrosion control. The new A1B reactor, Electromagnetic Aircraft Launch System (EMALS), Advanced Arresting Gear (AAG) and Dual Band Radar (DBR) all offer enhanced capability with reduced manning. The ship's systems and configuration are optimized to maximize the sortie generation rate (SGR) of attached strike aircraft.



Mission: Provides the United States with the core capabilities for forward presence, deterrence, sea control, power projection, maritime security and humanitarian assistance. The *Gerald R. Ford* class will be the premier forward asset for crisis response and early decisive striking power in a major combat operation.

FY 2021 Program: Funds ongoing construction of 3 carriers: USS *John F Kennedy* (CVN 79), USS *Enterprise* (CVN 80) and USS *Doris Miller* (CVN 81). Additional funding includes outfitting, training equipment, continued development of ship systems, and completion costs for USS *Gerald R Ford* (CVN 78).

Prime Contractor(s): Huntington Ingalls Industries; Newport News, VA

CVN 78 <i>Gerald R. Ford</i> Class Nuclear Aircraft Carrier										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	129.8	-	148.3	-	149.9	-	-	-	149.9	-
Procurement	1,694.7	-	2,334.7	1	2,873.8	-	-	-	2,873.8	-
Total	1,824.5	-	2,483.1	1	3,023.7	-	-	-	3,023.7	-

Numbers may not add due to rounding

Columbia Class Ballistic Missile Submarine Program



The *Columbia* Class Ballistic Missile Submarine (SSBN) will replace the current *Ohio* class of Fleet Ballistic Missile Submarine. The USS *Columbia* program will deliver 12 SSBNs with the necessary capability and capacity to meet the sea based strategic deterrence mission beyond retirement of the current submarine force and with sufficient mission capability to counter credible threats through 2080.



Artist conception courtesy of the U.S. Navy

Construction begins in FY 2021 for FY 2028 delivery when the first *Ohio* class ships begin decommissioning. The nuclear propulsion systems will be acquired from the nuclear industrial base under the direction of Naval Reactors. The program includes the development and construction of a Common Missile Compartment (CMC) capable of hosting the existing TRIDENT II missile system, which is conducted jointly with the United Kingdom to support the *Dreadnought* class SSBN.

Mission: Provides a sea-based strategic nuclear force. Maintains an appropriate state of readiness to assist in deterring nuclear attack on the United States and its allies. Launches missiles against targets should deterrence fail. Performs extended strategic deterrent patrols without requiring assistance or replenishment.

FY 2021 Program: Funds the first year of construction for SSBN 826 and supports detail design and construction of Contractor Furnished Equipment and Government Furnished Equipment. Continues funding for research and development of nuclear technologies and ship systems such as the propulsion system, combat systems technology, and the common missile compartment. Funding also supports continuous production of missile tubes, Economic Order Quantity for multi-program procurement, continuous production of shipyard manufactured items, and supplier development.

Prime Contractor(s): General Dynamics; Groton, CT
Huntington Ingalls Industries, Newport News, VA

Columbia Class Ballistic Missile Submarine Program										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	718.2	-	541.1	-	397.3	-	-	-	397.3	-
Procurement	3,173.4	-	1,820.9	-	4,014.7	1	-	-	4,014.7	1
Total	3,891.6	-	2,362.0	-	4,411.9	1	-	-	4,411.9	1

Numbers may not add due to rounding

SSN 774 Virginia Class Submarine



The *Virginia* Class Submarine is a multi-mission nuclear-powered attack submarine that provides the Navy with the capabilities to maintain undersea supremacy in the 21st century. Characterized by advanced stealth and enhanced features for Special Operations Forces, this submarine is able to operate in deep water and littoral environments. Equipped with vertical



launchers and torpedo tubes, the submarine is able to launch Tomahawk cruise missiles as well as heavyweight torpedoes. Block V variants will incorporate Acoustic Superiority and the Virginia Payload Module, which is an 84-foot hull section with four additional payload tubes, each capable of carrying seven Tomahawk cruise missiles or various other payloads. The Virginia Payload Module helps mitigate the loss of undersea strike capability with the retirement of the Service's four guided missile submarines (SSGNs) in the mid-2020s.

Mission: Seeks and destroys enemy ships and submarines across a wide spectrum of scenarios, working independently and in concert with a battle group, separate ships, and independent units. Provides theater commanders with time sensitive critical information for accurate knowledge of the battlefield.

FY 2021 Program: Funds one ship in the third year of multiyear procurement (MYP) contract from FY 2019 to FY 2023, Economic Order Quantity (EOQ), advance procurement for four ships in future years, and outfitting and support equipment. Continues funding the development of the Virginia Payload Module, technology, prototype components, and systems engineering required for design and construction. The FY 2021 ship will include the Virginia Payload Module.

Prime Contractor(s): General Dynamics Corporation; Groton, CT
Huntington Ingalls Industries; Newport News, VA

SSN 774 Virginia Class Submarine										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	171.8	-	317.9	-	256.7	-	-	-	256.7	-
Procurement	7,250.5	2	8,499.4	2	4,401.1	1	-	-	4,401.1	1
Total	7,422.3	2	8,817.3	2	4,657.8	1	-	-	4,657.8	1

Numbers may not add due to rounding

DDG 51 *Arleigh Burke* Class Destroyer



The DDG 51 class guided missile destroyers provide a wide range of war fighting capabilities in multi-threat air, surface, and subsurface environments. The DDG 51 class ship is armed with a vertical launching system, which accommodates 96 missiles, and a 5-inch gun that provides Naval Surface Fire Support to forces ashore and anti-ship gunnery capability against other ships. This is the first class of destroyers with a ballistic missile defense capability. The *Arleigh Burke* class is comprised of four separate variants; DDG 51-71 represent the original design, designated Flight I ships, and are being modernized to current capability standards; DDG 72-78 are Flight II ships; DDG 79-124 and DDG 127 ships are Flight IIA ships; DDG 125, DDG 126, and DDG 128 – DDG 142 will be constructed as Flight III ships with the Air and Missile Defense Radar (AMDR) capability.



US Navy Photo

Mission: Provides multi-mission offensive and defensive capabilities and can operate as part of a carrier strike group or independently. Conducts Anti-Air Warfare, Anti-Submarine Warfare, and Anti-Surface Warfare.

FY 2021 Program: Funds two Flight III DDG 51 class destroyers as part of a multiyear procurement (MYP) contract for ten ships from FY 2018 – FY 2022 (with potential options for additional ships), outfitting costs, completion costs and continued development of ship systems. Starting in FY 2021, Bridge System Upgrades will be incorporated for improved navigation capability.

Prime Contractor(s): General Dynamics Corporation; Bath, ME
 Huntington Ingalls Industries; Pascagoula, MS

DDG 51 <i>Arleigh Burke</i> Class Destroyer										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	205.7	-	240.8	-	282.9	-	-	-	282.9	-
Procurement	5,987.2	3	5,934.6	3	3,213.4	2	-	-	3,213.4	2
Total	6,192.9	3	6,175.4	3	3,496.3	2	-	-	3,496.3	2

Numbers may not add due to rounding

FFG(X) Guided Missile Frigate



The Guided Missile Frigate (FFG(X)) is a lethal and survivable multi-mission small surface combatant. With FFG(X), the Navy will maximize the small surface combatant survivability and capabilities in the anti-surface warfare, anti-submarine warfare, electromagnetic maneuver warfare, air warfare mission areas, while keeping the ship affordable as a part of a "high-low" mix of surface ships. The FFG(X) will form into strike groups and Large Surface Combatant action groups while maintaining the ability to operate independently. The ships in this class will have a MK48 Mod 2 Gun Weapon System, a MK41 Vertical Launch System, and a Rolling Airframe Missile (RAM) Guided Missile Weapon System (GMWS).



Mission: Provides the Fleet with escort mission capabilities, performs naval-presence missions and conducts offensive operations.

FY 2021 Program: Funds the first year of construction of FFG 2 and continues research and development of ship systems and design.

Prime Contractor(s): TBD

FFG(X) Guided Missile Frigate										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	59.0	-	82.3	-	-	-	82.3	-
Procurement	-	-	1,281.2	1	1,053.1	1	-	-	1,053.1	1
Total	-	-	1,340.2	1	1,135.4	1	-	-	1,135.4	1

Numbers may not add due to rounding

CVN Refueling Complex Overhaul



The CVN Refueling Complex Overhaul (RCOH) life extension program involves refueling and modernizing the nuclear powered fleet aircraft carriers. During the RCOH, the nuclear fuel is replaced, major systems are modernized; obsolete parts are replaced, and corrosion damage is repaired. *Nimitz* class aircraft carriers are designed for a 50-year life span and the RCOH is performed approximately midway through the ship's lifespan.



Photo Courtesy of Northrop Grumman

Mission: Refuel and upgrade the *Nimitz* class aircraft carriers at mid-life to ensure reliable operations during the remaining 25 plus years of ship life using only the normal maintenance cycle.

FY 2021 Program: Funds second year of incremental funding for refueling and modernization efforts for USS *John C Stennis* (CVN 74), Advance Procurement for USS *Harry S Truman* (CVN 75), and completion costs for USS *George Washington* (CVN 73).

Prime Contractor(s): Huntington Ingalls Industries; Newport News, VA

CVN Refueling Complex Overhaul										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	-	-	-	-	-	-
Procurement	425.9	-	651.5	1	2,093.8	-	-	-	2,093.8	-
Total	425.9	-	651.5	1	2,093.8	-	-	-	2,093.8	-

Numbers may not add due to rounding

John Lewis Class Fleet Replenishment Oiler



The Fleet Replenishment Oiler (T-AO) program is building a new class of fleet oilers for the Navy. The lead ship in the class is USNS John Lewis (T-AO 205). The T-AO provides fuel and cargo delivery to support fleet operations. As compared to the previous class of oilers, this class has increased space for dry cargo and a helicopter refueling capability. The John Lewis class are built with a double-hull to guard against oil spills and to comply with international agreements concerning pollution from ships.



Mission: Transfers fuel and lubricants to Navy surface ships operating at sea to extend at-sea time for the ships and embarked aircraft. The T-AO Class operates as shuttle ships from resupply posts to customer ships. Additionally, in conjunction with a T-AKE, they will accompany and stay on-station with a Carrier Strike Group (CSG) to provide fuel as required to customer ships.

FY 2021 Program: Funds continued development of ship systems, outfitting costs, and cost-to-complete for prior year ships.

Prime Contractor(s): General Dynamics, National Steel and Shipbuilding Co.; San Diego, CA

John Lewis Class Fleet Replenishment Oiler										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	1.3	-	1.7	-	5.1	-	-	-	5.1	-
Procurement	1,072.2	2	1,076.9	2	89.7	-	-	-	89.7	-
Total	1,073.4	2	1,078.6	2	94.9	-	-	-	94.9	-

Numbers may not add due to rounding

T-ATS Towing, Salvage, and Rescue Ship



The T-ATS is a new class of towing, salvage, and rescue ship that will replace the Navy's current Fleet Ocean Tugs (T-ATF) and Rescue and Salvage Ships (T-ARS). The lead ship in the class is USNS Navajo (T-ATS 6). The new T-ATS will recapitalize the existing T-ATF and T-ARS fleet with a common hull that will be capable of performing the existing missions. The current *Powhatan* class of Fleet tugs are used to tow ships, barges and targets for gunnery exercises. They are also used as platforms for salvage and diving work, as participants in naval exercises, to conduct search and rescue missions, to aid in the cleanup of oil spills and ocean accidents, and to provide firefighting assistance. Delivered in 1981, USNS Apache (T-ATF 172) is the last of the *Powhatan* class of ocean tugs. The current Safeguard class of Rescue and Salvage ships have a four-fold mission: to debeach stranded vessels, provide heavy lift capability from ocean depths, to tow other vessels, and provide manned diving operations. For rescue missions, these ships are equipped with fire monitors, which can deliver either firefighting foam or sea water. The salvage holds of these ships are outfitted to provide assistance to other vessels in dewatering, patching, supply of electrical power and other essential service required to return a disabled ship to an operating condition. Delivered in 1986, USNS Salvor (T-ARS 52) is the last of the Safeguard class.



Mission: Supports a diverse set of missions including submarine rescue, deep ocean search and recovery, and expeditionary diving.

FY 2021 Program: Funds construction of two Towing, Salvage, and Rescue Ships.

Prime Contractor(s): Gulf Island Shipyard; Houma, LA

T-ATS Towing, Salvage, and Rescue Ship										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	-	-	-	-	-	-	-	-
Procurement	80.5	1	150.3	2	168.2	2	-	-	168.2	2
Total	80.5	1	150.3	2	168.2	2	-	-	168.2	2

Numbers may not add due to rounding

Unmanned Surface Vessels (USV)



The Unmanned Surface Vessel (USV) is a reconfigurable, multi-mission vessel designed to provide low cost, high endurance, reconfigurable ships able to accommodate various payloads for unmanned missions and augment the Navy's manned surface force. Future missions and payloads will be informed as the concept of operations is developed. While unmanned surface vehicles are new additions to fleet units, they are intended to be relatively low developmental technologies that combine robust and proven commercial vessel designs with existing military payloads to rapidly and affordably expand the capacity and capability of the surface fleet. The program benefits from years of investment and full scale demonstration efforts in autonomy, endurance, command and control, payloads and testing from the Defense Advanced Research Projects Agency (DARPA) Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) and Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vessel (MDUSV)/Sea Hunter and Office of the Secretary of Defense Strategic Capabilities Office (OSD SCO) Ghost Fleet Overlord Large USV experimentation efforts.



Mission: Supports combatant ships by providing additional Anti-Surface Warfare and Strike capacity.

FY 2021 Program: Funds continued development, testing, and procurement of two Large Unmanned Surface Vessels and continues research and development of payload systems.

Prime Contractor(s): TBD

Unmanned Surface Vessels (USV)										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	116.1	-	407.8	2	464.0	2	-	-	464.0	2
Procurement	-	-	-	-	-	-	-	-	-	-
Total	116.1	-	407.8	2	464.0	2	-	-	464.0	2

Numbers may not add due to rounding

LPD Flight II

The LPD Flight II is a new variant of the *San Antonio* class Amphibious Transport Dock ship. This flight II variant is designed to be adaptable and will be used across the range of military operations, from major combat operations to humanitarian assistance and disaster relief. Utilizing the LPD 17 class' proven hull, the Flight II ships will feature a fully capable flight deck and hangar, a well deck, and the vehicle and cargo capacities to support and sustain more than 500 combat-equipped marines for up to 30 days. The ship will feature a Rolling Airframe Missile (RAM) Block 2 system; the MK 46 Gun system, and the AN/SPQ-9B radar. The LPD 17 Flight II functionally replaces LSD 41 class ships and LSD 49 class ships.



Mission: Transports and lands Marines, their equipment, and supplies by embarked Landing Craft Air Cushion (LCAC) or conventional landing craft and amphibious assault vehicles (AAV) augmented by helicopters or vertical take-off and landing aircraft (MV 22). These ships support amphibious assault, special operations, or expeditionary warfare missions and serve as secondary aviation platforms for amphibious operations.

FY 2021 Program: Funds the first year of construction for LPD 30; continued development of ship systems, outfitting costs and cost-to-complete for prior year ships including LPD Flight I ships.

Prime Contractor(s): Huntington Ingalls Industries; Newport News, VA

LPD Flight II										
	FY 2019		FY 2020		FY 2021					
					Base Budget		OCO Budget		Total Request	
	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	-	-	12.5	-	10.2		-	-	10.2	-
Procurement	352.0	-	542.8	-	1,209.8	1	-	-	1,209.8	1
Total	352.0	-	555.3	-	1,220.0	1	-	-	1,220.0	1

Numbers may not add due to rounding



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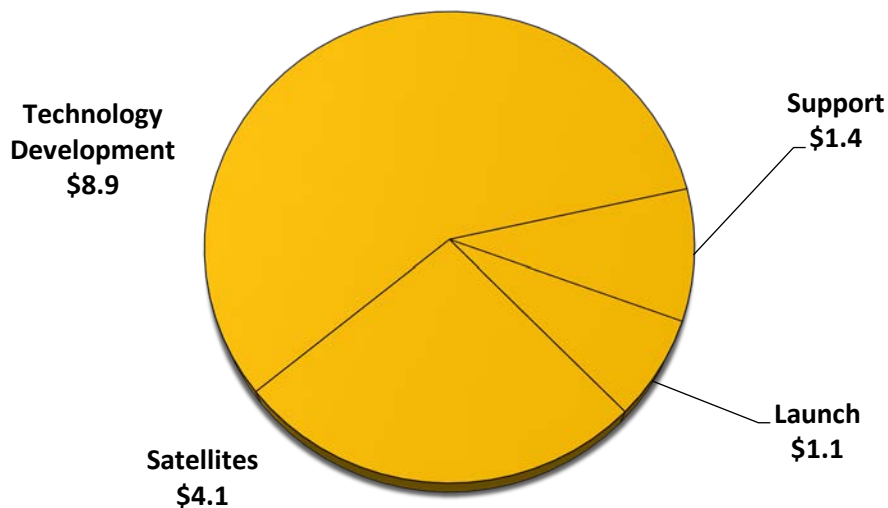
Space Based Systems

Space assets support deployed U.S. forces by providing communications services, navigation capabilities, and information collected by remote sensors such as weather satellites and intelligence collection systems. Space forces contribute to the overall effectiveness of U.S. military forces by acting as a force multiplier that enhances combat power. This investment addresses growing threats, complicating an adversary's ability to counter U.S. space superiority, while enhancing the Department's ability to identify, characterize, and attribute all threatening actions in space. The capability to control space contributes to achieving information superiority and battle space dominance. Procurement of launch vehicles and launch services are typically funded 2 years prior to launch. Under existing budget policy, the first two satellites of a new system are financed with Research, Development, Test and Evaluation (RDT&E) funding and the remainder follow-on satellites are fully funded with Procurement funding.

The FY2021 budget highlights include funding for integration and launch costs of the Space Based Infrared System (SBIRS) Geosynchronous Earth Orbit (GEO)-5 and GEO-6 space vehicles, and development of the Next Generation Overhead Persistent Infrared (NG OPIR) satellites; continues funding for the Evolved Strategic SATCOM (ESS) and Enhanced Polar System-Recapitalization (EPS-R) developmental satellites, and continues the Space Modernization Initiative RDT&E activities. The budget funds the procurement of National Security Space Launch (NSSL) launch services for medium and heavy lift class satellites, specifically three Space Force launch service activities.

FY 2021 Space Based Systems Total: \$15.5 Billion

\$ in Billions



Numbers may not add due to rounding

National Security Space Launch USSF

The National Security Space Launch (NSSL) program, formerly known as the Evolved Expendable Launch Vehicle (EELV), provides launch services for medium and heavy lift class satellites to the Space Force, Air Force, Navy, the National Reconnaissance Office (NRO), Space Development Agency (SDA), and other government agencies.

Mission: Acquire launch services to satisfy DoD warfighter, national security, NRO, and other government space lift requirements. Provides launch services and support for medium to heavy class national security space satellites. This mission includes the execution of a flight worthiness certification process and booster-to-satellite mission integration to maintain assured access to space and achieve mission success. The mission also includes launch site operations activities, activities in support of assured access, systems integration and tests, and other related support activities. Additionally the program is working to develop two or more domestic, commercially viable, space launch providers that meet all National Security Space launch requirements.



Photos courtesy of ULA and SpaceX

FY 2021 Program: Competitively procures three Space Force launch services through the Phase 2 Indefinite Delivery, Indefinite Quantity (IDIQ) contract. Planned for competition, launches are usually ordered not-later-than 24 months prior to the planned mission unless additional first-time integration is needed. Funds Launch Service Support (LSS) effort, which are non-discrete tasks necessary to support a sustained national security space readiness posture. Continues launch service investment in public private partnerships to provide two commercially-viable, domestic space launch service providers.

Prime Contractor(s): Blue Origin; Kent, WA
 Northrop Grumman Innovation Systems (NGIS); Chandler, AZ
 SpaceX; Hawthorne, CA
 United Launch Alliance (ULA); Centennial, CO

National Security Space Launch										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	428.5	-	432.0	-	561.0	-	-	-	561.0	-
Procurement	1,402.7	5	1,237.6	4	1,043.2	3	-	-	1,043.2	3
Total	1,831.3	5	1,669.6	4	1,604.1	3	-	-	1,604.1	3

Numbers may not add due to rounding

Global Positioning System III and Projects

USSF

The Global Positioning System (GPS) provides world-wide, 24-hour a day, all-weather 3-dimensional positioning, navigation, and precise timing (PNT) information for military and civilian users. The GPS III space vehicles will be fully backward compatible with legacy signals while delivering new capabilities and enhancements to include a new Galileo-compatible signal (civilian), and a more powerful M-code (military) signal. The GPS Next Generation Operational Control System (OCX) will enable operational use of all modernized GPS signals, as well as enabling improved PNT performance. Military GPS User Equipment (MGUE) provides a robust PNT capability to warfighters on the ground, as well as aircraft, ships, and weapons, enabling continued operations in the most contested environments.

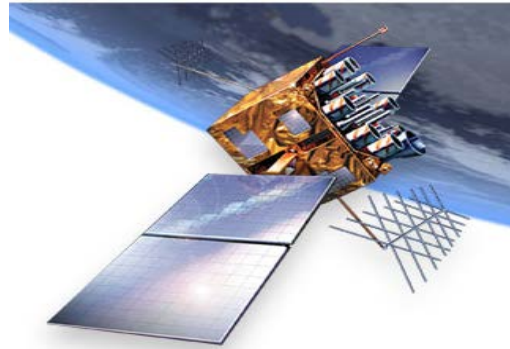


Image courtesy of Lockheed Martin

Mission: Provides worldwide PNT to military and civilian users.

FY 2021 Program: Funds independent, technical, systems engineering and integration support critical to managing SVs 05-10 production milestones. Funds continued development of the GPS III Follow-On satellites (SV 11+) and funds two of 20 production satellites (SVs 14 & 15). Continues the integration and testing activities of GPS OCX Blocks 1 and 2, and enhancements to the legacy Operational Control System prior to OCX delivery. Funds the testing and lead platform integration of MGUE Increment 1. Funds up to three development contracts for MGUE Increment 2 and preliminary design activities to address MGUE Increment 1 obsolescence. Funds the GPS Program Office’s responsibility as the Prime Integrator (Enterprise Integration) to synchronize space, control, and user segment programs and manage civil/military specifications and requirements.

Prime Contractor(s): GPS III and GPS IIIF: Lockheed Martin Corporation; Denver, CO
 GPS OCX: Raytheon Company; Aurora, CO
 GPS MGUE Inc 1: L3Harris; Anaheim, CA
 Rockwell Collins International; Cedar Rapids, IA
 Raytheon Company; El Segundo, CA

Global Positioning System III and Projects										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	1,286.2	2	1,256.2	-	1,149.0	-	-	-	1,149.0	-
Procurement	98.4	-	457.0	1	664.5	2	-	-	664.5	2
Total	1,384.6	2	1,713.2	1	1,813.5	2	-	-	1,813.5	2

Numbers may not add due to rounding

Space Based Overhead Persistent Infrared (OPIR) Systems

USSF

Next Generation OPIR is the follow-on system to the Space Based Infrared System (SBIRS) that will notionally field three satellites in Geosynchronous Earth Orbit (GEO), two Polar satellites in Highly Elliptical Orbit (HEO), and an integrated centralized ground station. The Next-Gen OPIR will rapidly deliver strategically survivable missile warning that counters adversary advances in missile technology and counter-space systems with added resiliency features.

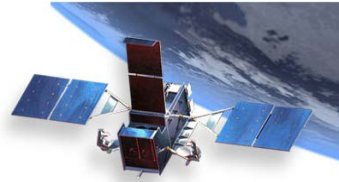


Image courtesy of Lockheed Martin

- The SBIRS HEO 01-04 payloads are on orbit; SBIRS GEO space vehicles (SV) 01-04 are operationally accepted.
- The GEO SVs 05 and 06 are scheduled to launch in 2021 and 2022 as replenishment satellites.
- The Next-Gen OPIR Block 0 will incrementally launch five satellites: 3 GEO with target launch dates of 2025, 2027, and 2028; and 2 Polar free-flyer satellites in HEO with target launch dates of 2027 and 2029.
- SBIRS Ground increment 2 (Block 10) consolidated the Defense Space Program (DSP), HEO, and GEO operations into a single site in 2017; operationally accepted Block 20 in September 2019 and declared Initial Operational Capability.

Mission: Provides initial warning of strategic missile attack on the United States, its deployed forces, and its allies. Supports missile defense, battlespace awareness, and technical intelligence.

FY 2021 Program: Funds continue development of Next-Gen OPIR (GEO and HEO) satellites and funds the Future Operationally Resilient Ground Evolution (FORGE) ground system development. Funds continue the Space Modernization Initiative (SMI), which consists of three thrust areas: technical maturation, data exploitation, and demonstrations. SMI funds the Wide Field of View Prototype scheduled for launch in 2020 and starts development of a Next-Gen OPIR block 1 operational prototype which will reduce technical risk and target operations in the 2026 timeframe.

Prime Contractor(s): Lockheed Martin; Sunnyvale, CA (SBIRS 5/6 & Ground/Mobile, and Next-Gen GEO); Northrop Grumman; Redondo Beach, CA (Next-Gen Polar)

Space Based Overhead Persistent Infrared (OPIR) Systems										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	795.2	5	1,470.3	-	2,318.9	-	-	-	2,318.9	-
Procurement	108.4	-	232.9	-	160.9	-	-	-	160.9	-
Total	903.6	5	1,703.2	-	2,479.8	-	-	-	2,479.8	-

Numbers may not add due to rounding

Satellite Communications (SATCOM) Projects

USSF

The Space Force views SATCOM in three capability sets: strategic for Nuclear Command, Control, and Communications (NC3); protected to enable tactical communications in contested environments; and wideband/narrowband to provide large throughput in less contested environments.



Image courtesy of Lockheed Martin

1. Strategic

- Advanced Extremely High Frequency (AEHF) System - Provides strategic and protected tactical SATCOM. AEHF 1-4 are operational. AEHF-5 was launched in 2019 and is undergoing on-orbit testing. AEHF-6, the final AEHF is planned to launch in 2020.
- Evolved Strategic SATCOM (ESS) – Plans prototypes for next-generation constellation.

2. Protected Tactical

- Enhanced Polar System-Recapitalization (EPS-R) - Plans two hosted payloads for SATCOM in the North Polar Region as part of a partnership with Norway.
- Protected Tactical Enterprise Service (PTES) - Provides improved anti-jam SATCOM over existing wideband satellites and enables future tactical SATCOM systems.
- Protected Tactical SATCOM (PTS) - Develops prototypes to demo new technologies on-orbit, informing the acquisition approach and architecture for robust anti-jam SATCOM.

3. Wideband and Narrowband

- Wideband Global SATCOM (WGS) - WGS 1-10 are operational. WGS-11+, with twice the operational capacity of WGS-10, is pending contract definitization in 2020.
- The Multi User Objective System (MUOS) provides UHF voice and data communications.

Mission: Provides survivable, anti-jam, low probability of detection/intercept, and worldwide secure communications for tactical and strategic users.

FY 2021 Program: Funds the post-launch activities for the sixth, and final, AEHF space vehicle. Continues selected strategic, protected tactical, and wideband SATCOM development activities. Funds startup of a 2-satellite MUOS Service Life Extension program.

Prime Contractor(s): - AEHF and MUOS: Lockheed Martin Corporation; Sunnyvale, CA
 - WGS: Boeing Satellite Systems; El Segundo, CA - PTES: Boeing; El Segundo, CA
 - EPS-R: Northrop Grumman; Redondo Beach, CA

Satellite Communications (SATCOM) Projects										
	FY 2019		FY 2020		FY 2021					
	\$M	Qty	\$M	Qty	Base Budget		OCO Budget		Total Request	
					\$M	Qty	\$M	Qty	\$M	Qty
RDT&E	721.8	2	988.4	-	789.5	-	-	-	789.5	-
Procurement	299.3	-	85.0	-	68.2	-	-	-	68.2	-
Total	1,021.1	2	1,073.4	-	857.7	-	-	-	857.7	-

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