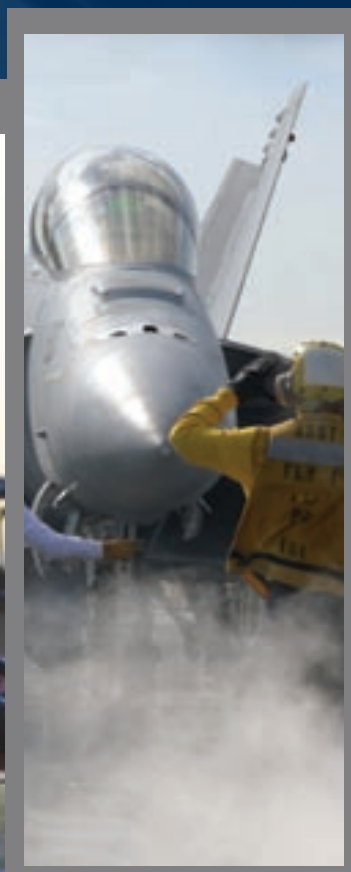
NAVY PROGRAM GUIDE
2011



FOREWORD

G. Roughead
Admiral, U.S. Navy
Chief of Naval Operations

SHIPS AND SAILORS GO TO SEA, AND GLOBAL NAVIES SAIL FAR FROM HOME. Today, your Navy is forward deployed and engaged around the world, delivering the full range of core capabilities defined in our Maritime Strategy and demonstrating the speed, agility, and flexibility required by a nation with global interests in a time of increasing unpredictability.

On any given day, more than 44,000 Sailors are deployed and nearly half of our 288 ships are underway. As we have throughout our 235 year history, America's Navy goes where America's interests are. So today, in full commitment to current combat operations in Afghanistan, more than 14,000 Sailors serve on the ground in the Middle East, and another 10,000 serve there at sea. At the same time, we know our nation's interests extend far beyond Afghanistan. Our Navy provides ballistic missile defense in the Mediterranean and humanitarian assistance in Central America. We are carrying out maritime security operations off the coast of Africa, and building partnerships and ensuring freedom of navigation in the waters of the Indian Ocean and Western Pacific.

Our Navy is in high demand today, and I expect this demand to only increase as global trends in demographics, economics, natural resources and climate change drive significant change in the maritime and global security environments. The opening of the Arctic and the imminent expansion of the Panama Canal are just two examples of events that will reshape the way the world moves goods across the globe, and by extension, will have profound effects on communities ashore. Meanwhile, the proliferation of new technologies is adding an entirely new dimension to our very concept of security, as the information domain evolves to become a central component of our nation's treasure and strength, and not simply a vehicle of them.

For the foreseeable future, disruption and disorder will persist while concerns abroad on issues of sovereignty will increase resistance to the extensive presence of foreign land forces and require us to maintain minimal footprint ashore. Seapower is the option to maintain U.S. presence and influence and, when necessary, project power without a costly, sizeable or permanent footprint ashore. Our Navy remains the most sustainable, enduring option for our nation to be actively involved in all the regions of the world where the security of our interests and those of our friends and allies are at stake.

Underpinning every capability we have are our Sailors, Navy civilians and their families. Our ships, aircraft, weapons and systems are highly capable, but our skilled, competent, and innovative Sailors turn them into capabilities that prevent conflict and win wars. Every day, our people do great things at sea, on land, in the air, in space, and in cyberspace. They are the true force that powers our Nation's Global Force for Good.

The plan for our Navy articulated in this document strikes the optimal balance among my priorities to build tomorrow's Navy while remaining ready to fight today and developing and supporting our Sailors, Navy civilians and their families. This 2011 Navy Program Guide is an overview of the key systems, programs and initiatives in which we must invest to build and maintain a Navy that meets the needs of our great Nation.

TABLE OF CONTENTS

MEETING TODAY'S CHALLENGES AND PREPARING FOR THE FUTURE 1

Strategic Imperatives 2
Core Capabilities 3
Building the Future Force 6
Maintaining our Warfighting Readiness 8
Develop and Support Our Sailors, Navy Civilians, and Their Families 9
Conclusion 9

SECTION 1: NAVAL AVIATION 11

AIRCRAFT CARRIER 12

CVN 68 and CVN 21 Aircraft Carrier Programs 12

AIRCRAFT 13

AH-1Z and UH-1Y Upgrades 13
AV-8B *Harrier II+* 14
Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS) 15
C-2A(R) *Greyhound* 15
C-37 Executive Transport 16
C-40A *Clipper* 17
C-130T/KC-130J *Hercules* 17
CH-53K Heavy Lift Replacement (HLR) 18
CNATRA Naval Aviation Training Aircraft 19
E-2C/D *Hawkeye* Airborne Early Warning Aircraft 20
E-6B Mercury 21
EA-6B *Prowler* Airborne Electronic Attack Aircraft 22
EA-18G *Growler* Airborne Electronic Attack Aircraft 23
EP-3E Modification and Sustainment 23
F/A-18A-D *Hornet* Strike-Fighter Aircraft 25
F/A-18E/F *Super Hornet* Strike-Fighter Aircraft 26
F-35 *Lightning II* Joint Strike Fighter (JSF) 27
KC-130J *Hercules* Tactical Tanker and Transport 27
Medium-Range Maritime UAS (MRMUAS) 28
MH-60 R/S *Seahawk* Multi-Mission Combat Helicopters 28
MQ-8B *Fire Scout* Vertical Takeoff and Landing Tactical UAV (VTUAV) 29
MV-22 *Osprey* 30
Navy Unmanned Combat Aircraft System Demonstration (UCAS-D) 30
P-3C *Orion* Modification, Improvement, and Sustainment 31
P-8A *Poseidon* Multi-mission Maritime Aircraft (MMA) 33
RQ-7B *Shadow* Marine Corps Tactical Unmanned Aircraft System (MCTUAS) 34
Small Tactical Unmanned Aircraft System (STUAS) 34

AVIATION WEAPONS 35

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) 35
AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) 36
AIM-9X Sidewinder Short Range Air-to-Air Missile (SRAAM) 36
AGM-154 Joint Standoff Weapon (JSOW) 37
Airborne Mine Neutralization System (AMNS) 37
Laser-Guided Bomb (LGB), Dual-Mode LGB (DMLGB), Direct-Attack Moving Target Capability (DAMTC) 38

AVIATION SENSORS 39

Airborne Laser Mine Detection System (ALMDS) 39
ALR-67(V)3 Advanced Special Receiver 40
APG-79 Active Electronically Scanned Array (AESA) Radar System 40
ASQ-228 Advanced Targeting Forward-Looking Infra-Red (ATFLIR) 41
Organic Airborne and Surface Influence Sweep (OASIS) MCM 41

AVIATION EQUIPMENT AND SYSTEMS 42

IDECM Integrated Defensive Electronic Counter-Measures 42
Joint and Allied Threat Awareness System (JATAS) 42
Joint Mission Planning Systems (JMPS) 43
Joint Precision Approach and Landing System (JPALS) 43
Large Aircraft Infrared Countermeasures (LAIRCM) 44
Military Flight Operations Quality Assurance (MFOQA) 45
Tactical Control System (TCS) 45
Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System 46

SECTION 2: SURFACE COMBATANTS 47

SHIPS 48

CG 47 Ticonderoga-Class Aegis Guided-Missile Cruiser Modernization (CG MOD) 48
DDG 51 Arleigh Burke-Class Aegis Guided-Missile Destroyer 49
DDG 51 Arleigh Burke-Class Aegis Guided-Missile Destroyer Modernization (DDG MOD) 49
DDG 1000 Zumwalt-Class 21st Century Destroyer 50
FFG 7 Oliver Hazard Perry-Class Guided-Missile Frigate Modernization 51
Littoral Combat Ship (LCS) 52

WEAPONS 53

Advanced Gun System (AGS) 53
BGM-109/UGM-109 Tomahawk Land-Attack Missile (TLAM) 53
Mk 15 Phalanx Close-In Weapon System (CIWS) 54
Mk 45 Mod 4 Five-Inch/62-Caliber Gun System Upgrade 55
Mk 54 Lightweight Torpedo (LWT) 55
Mk 57 NATO Sea Sparrow Missile System (NSSMS) / RIM-7P NATO Sea Sparrow Missile (NSSM) / RIM-162 Evolved Sea Sparrow Missile (ESSM) 56
Naval Surface Fire Support (NSFS) 56
RIM-66C SM-2 Standard Missile-2 Blocks III/IIIA/IIIB 57
RIM-116A Rolling Airframe Missile (RAM) 57
SM-6 Standard Missile-6 Extended-Range Active Missile (ERAM) Block I/II 58
Stabilized 25-mm Machine Gun System (MGS) 59

SURFACE SENSORS AND COMBAT SYSTEMS 59

Aegis Ashore 59
Aegis Ballistic Missile Defense (ABMD) 60
Aegis Combat System (ACS) 61
Air and Missile Defense Radar (AMDR) 62
Cooperative Engagement Capability (CEC) 62
Joint Biological Agent Identification and Diagnostic System (JBAIDS) 64
Maritime Integrated Air and Missile Defense Planning System (MIPS) 64
Naval Fires Control System (NFCS) 65
Nulka Radar Decoy System 66
S-Band Volume Search Radar (VSR) 66
SPQ-9B Anti-Ship Cruise Missile (ASCM) Radar 67
SPY-1 AEGIS Multi-Function Phased-Array Radar 67
SPY-3 Advanced Multi-Function Radar (MFR) 68
Ship Self-Defense System (SSDS) 68
Surface Electronic Warfare Improvement Program (SEWIP) Block 1 Upgrade 69
Surface Ship Torpedo Defense (SSTD) 70
SQQ-89 Anti-Submarine Warfare (ASW) Combat System 71
Tactical Tomahawk Weapon Control System (TTWCS) 72

Tomahawk Command and Control System (TC2S) 73

SURFACE EQUIPMENT AND TRAINING SYSTEMS 74

Battle Force Tactical Trainer (BFTT) 74

Chemical, Biological, Radiological and Nuclear Defense / Individual Protection Equipment / Readiness Improvement Program (CBRND/IPE/RIP) 74

Navy Ranges Branch / Target Systems 75

Shipboard Collective Protection System (CPS) 76

Shipboard Protection System (SPS) 77

SSQ-130 Ship Signal Exploitation Equipment (SSEE) Increment F 77

SECTION 3: SUBMARINE FORCE 79

SUBMARINES AND UNDERSEA VEHICLES 80

Littoral Battlespace Sensing – Unmanned Undersea Vehicles (LBS-UUV) 80

Ohio Replacement (OR) Fleet Ballistic-Missile Submarine 81

SSN 774 Virginia-Class Nuclear-Powered Attack Submarine 81

Submarine Rescue (SRC, SRDRS) 82

SUBMARINE WEAPONS 83

MK-48 Advanced Capability (ADCAP) Common Broadband Advanced Sonar System (CBASS) Torpedo 83

UGM-133A Trident II/D5 Submarine-Launched Ballistic Missile (SLBM) 84

SUBMARINE SENSORS 85

BQQ-10 Acoustic Rapid COTS Insertion (ARCI) 85

TB-33 Submarine Thin-Line Towed Array 86

SUBMARINE EQUIPMENT AND SYSTEMS 86

BYG-1 Submarine Combat Control System 86

Common Submarine Radio Room (CSRR) 87

Submarine Escape (SEIE) 87

Submarine Survivability 88

UYQ-100 Undersea Warfare – Decision Support System (USW-DSS) 88

SECTION 4: EXPEDITIONARY FORCES 91

EXPEDITIONARY FORCES 92

Explosive Ordnance Disposal / Mobile Diving and Salvage (EOD / MDSU) 92

Maritime Civil Affairs and Security Training (MCAST) 93

Maritime Expeditionary Security Force (MESF) 93

Naval Mobile Construction Battalion (NMCB) 94

Naval Special Warfare 94

Navy Expeditionary Logistics Support Group (NAVELSG) 95

Riverine Squadrons 96

EXPEDITIONARY AND SPECIAL-MISSION SHIPS AND CRAFT 96

Joint High Speed Vessel (JHSV) 96

Landing Craft, Air Cushion (LCAC) 97

LHA(R) General-Purpose Amphibious Assault Ship (Replacement) 98

LHD 1 Wasp-Class Amphibious Assault Ship 99

LPD 17 San Antonio-Class Amphibious Transport Dock Ship 99

MCM 1 Avenger-Class Mine Countermeasures Ship Modernization 100

Mobile Landing Platform (MLP) 101

Maritime Prepositioning Force Utility Boat (MPF UB) 101

PC 1 Cyclone-Class Patrol Coastal Service Life Extension Program (PC SLEP) 102

Seabase-to-Shore Connector (SSC) / LCAC 100 102

T-AGS 66 Oceanographic Survey Ship 103

T-AH 19 Mercy-Class Hospital Ships 104

T-AKE 1 Lewis and Clark Class Dry Cargo and Ammunition Ship 104

EXPEDITIONARY SYSTEMS 105

AQS-20A Mine-Hunting Sonar 105

Assault Breaching System (ABS) 105

Identity Dominance System (IDS) Biometrics 106

Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW / RCEID) 107

Joint Nuclear Biological Chemical Reconnaissance System 2 / Chemical, Biological, Radiological And Nuclear Monitoring And Survey Set, Kits And Outfits (JNBCRS 2 / CBRN) 107

Mk 62/63/65 TDD Mk 71 Naval Quickstrike Mines 108

Navy Energy Program 109

WLD-1 RMS Remote Minehunting System 110

SECTION 5: INFORMATION DOMINANCE 111

Advanced Tactical Data Link Systems (ATDLS) 112

Automated Digital Network System (ADNS) 113

Automatic Identification System (AIS) 114

Base Level Information Infrastructure (BLII) 115

Battle Force Tactical Network (BFTN) 115

Command and Control Processor/Common Data Link Management System (C2P/CDLMS) 116

Commercial Satellite Communications (COMSATCOM) 117

Consolidated Afloat Network Enterprise System (CANES) 118

Defense Messaging System (DMS) 119

Defense Red Switch Network (DRSN) 119

Deployable Joint Command and Control Capability (DJC2) 120

Distributed Common Ground System – Navy (DCGS-N) 121

DoD Teleport 122

Dynamic Network Management (DNM) 123

Enterprise Services 123

Extremely High Frequency/ Navy Multi-band Terminal (EHF/NMT) 125

Global Broadcast Service (GBS) 125

Global Command and Control System — Maritime (GCCS-M) 126

Information Systems Security Program (ISSP) 127

Integrated Broadcast Service/Joint Tactical Terminal (IBS/JTT) 128

Joint Milli-Arcsecond Pathfinder Survey (JMAPS) 129

Joint Tactical Information Distribution System (JTIDS) 129

Joint Tactical Radio System (JTRS) 130

Maritime Domain Awareness (MDA) 130

Maritime Operations Center (MOC) 131

Meteorological Mobile Facility Replacement Next Generation (METMF(R) NEXGEN) 132

Mk XIIA Mode 5 Identification Friend or Foe (IFF) 133

Mobile User Objective System (MUOS) 134

Multi-functional Information Distribution System Lightweight (MIDS-LVT) 134

Multi-functional Information Distribution System Joint Tactical Radio System (MIDS-JTRS) 135

NATO Improved Link-11 / Link-22 136

NAVSTAR Global Positioning System (GPS) 136

Navy Air Operations Command and Control (NAOC2) 137

Navy Enterprise Resource Planning (Navy ERP) 138

Next-Generation Enterprise Network (NGEN) 139

Naval Tactical Command Support System (NTCSS) 140
OCONUS Navy Enterprise Network (ONE-Net) 141
Open Architecture OA 142
SCI Networks Program 143
Super High-Frequency (SHF) Satellite Communications (SATCOM) 144
Tactical Mobile 145
Telephony 146
Trusted Information Systems (TIS) 146
UHF Satellite Communications Follow-On (UFO) 147
UQQ-2 Surveillance Towed Array Sensor System (SURTASS) 148
WQT-2 SURTASS/Low Frequency Active (LFA) Sonar 148

APPENDIX A 150
Navy-Marine Corps Crisis Response and Combat Actions 150

APPENDIX B 166
Glossary 166

MEETING TODAY'S CHALLENGES AND PREPARING FOR THE FUTURE

NAVY PROGRAM GUIDE 2011

The U.S. Navy remains a global force that is dominant, ready, and influential. A strong naval presence—through regionally concentrated, credible combat power as well as distributed, mission-tailored forces—provides security and stability around the world. Operating above, on, and beneath the global maritime commons as well as ashore around the world, our Navy has demonstrated its resolve to support our friends and allies, support U.S. national interests, and preserve the ability to execute the strategic imperatives expressed in our Maritime Strategy: *A Cooperative Strategy for 21st Century Seapower (CS 21)*. Taken together, these six imperatives support our commitment to winning our Nation's wars while preventing future conflicts and maintaining protection of our homeland.

STRATEGIC IMPERATIVES

- **Limit regional conflict with forward deployed decisive maritime power**
- **Deter major power war**
- **Win our Nation's wars**
- **Contribute to homeland defense in depth**
- **Foster and sustain cooperative relationships with more international partners**
- **Prevent or contain local disruptions before they impact the global system**

Our challenge is to apply seapower in a manner that protects U.S. vital interests even as it promotes greater collective security, stability, and trust.

A Cooperative Strategy for 21st Century Seapower

These enduring imperatives are aligned with our national security objectives, which depend on protecting and sustaining the global, interconnected system through which we prosper.

Reaffirming the Maritime Strategy, the 2010 Quadrennial Defense Review (QDR) identified four priority objectives: prevail in today's wars, prevent and deter conflict, prepare to defeat adversaries and prevail in a wide range of contingencies, and preserve and enhance the all-volunteer force. In order to implement our strategic imperatives and the priorities of the QDR, the Chief of Naval Operations (CNO) continues to focus on three overarching objectives: *building the future force, maintaining warfighting readiness, and developing and supporting Sailors, Navy civilians and their families.*

Through fiscally informed decisions within these objectives, Navy's Program of Record sustains our capability for current operations while investing appropriately in our future Navy. Keeping our ships and aircraft operating forward while taking care of our people will maintain our ability to fight and win today's wars, deter future potential conflicts, continue to build strong partnerships with like-minded nations, and respond to the myriad global commitments that define our contribution to the Nation.

Investments in our future naval force must provide the capabilities for global operations and the capacities necessary to maintain strategic competitive advantages in mission areas such as electronic warfare (EW), anti-submarine warfare (ASW), ballistic missile defense (BMD), and strike warfare. Providing the credible combat power with adequate capacity to be successful in today's fight

is also essential to the ability of our nation to deter major power conflicts. Our Navy continues to shape the force to meet the strategic imperatives today as well as potential future operations.

CORE CAPABILITIES

The strength of our Navy can be characterized in the six core capabilities that support the strategic imperatives of the Maritime Strategy. These capabilities comprise the core of U.S. maritime power and reflect emphasis on activities that prevent war and build partnerships. These core capabilities are:

- **Forward Presence**
- **Deterrence**
- **Sea Control**
- **Power Projection**
- **Maritime Security**
- **Humanitarian Assistance and Disaster Response**

Forward Presence is our Navy's capability to sustain a force operating forward, away from U.S. shores. The steady-state operations of sea-based naval forces enhance joint access in forward operating areas while fostering the international navy-to-navy relationships that may alleviate diplomatic impediments to access. These operations also provide the means to overcome geographic and, when necessary, military challenges to access. Forward deployed naval forces deter adversaries; demonstrate U.S. commitment to our international partners; and respond rapidly to tension, coercion, crises and conflicts.

Mindful of the sovereignty of other nations, our Navy maintains forces forward, supported by a robust Combat Logistics Force. These ships allow our fleet to remain deployed indefinitely, maintaining combat capabilities to assure allies and partners of our Nation's ability to deter or quickly respond to disaster, crisis and aggression.

Deterrence involves global, regional, and transnational efforts to deny aggressors any measure of success while providing the credible threat of prompt retaliation. Naval forces have historically provided deterrence through nuclear and conventional means to discourage aggression and dissuade adversaries from hostile action. The ability of naval forces to rapidly deploy and indefinitely sustain credible combat power worldwide provides national decision-makers with important tools to signal U.S. national resolve. A credible, forward-deployed combat force underpins assurance to regional allies and partners.

In the 21st century, effective deterrence requires a comprehensive approach that includes all elements of national power. Naval forces employ a broad set of capabilities to assure partners, dissuade adversaries, and deter or limit hostile action. These include continued nuclear and conventional combat preeminence, as well

as new capabilities to deter evolving threats posed by an array of current and potential adversaries.

CS 21 calls for U.S. naval forces to build confidence and trust among nations through collective security efforts that focus on common threats and mutual interests. In this environment, deterrent effects are achieved through the inherent combat power of forward postured naval task forces, as well as globally distributed, mission-tailored forces engaged in fostering, expanding and strengthening cooperative relationships.

Sea Control is the essence of seapower—it allows naval forces to close within striking distance of land to neutralize land-based threats to maritime access, which in turn enhances freedom of action at sea and the resulting ability to project power ashore. The interrelationship between sea control and power projection mandates that naval forces possess capabilities and capacity to concurrently shape conditions in the maritime, space and cyberspace domains, sufficient to accomplish our Nation's defense strategy.

The combatant commanders' operational objectives, the strategic maritime geography, and the capabilities of potential adversaries drive the scale of forward naval presence and surge forces necessary to conduct effective local and regional sea control operations. Moreover, deployment of joint forces and their sustainment during crisis response operations ashore is dependent on secure sea lines of communication. As a result, naval forces must conduct sea control operations to enforce freedom of navigation, sustain unhindered global maritime commerce, prevent or limit the spread of conflict, and prevail in war.

Power Projection in its broadest sense is "the ability of a nation to apply all or some of its elements of national power—political, economic, informational, or military—to rapidly and effectively deploy and sustain forces in and from multiple dispersed locations to respond to crises, to contribute to deterrence, and to enhance regional stability." *Globally distributed, mission-tailored and regionally concentrated naval forces* both routinely project power using naval strike and Marine amphibious capabilities, across the range of military operations. To support large operations, these forces can rapidly aggregate when required to form strike forces capable of projecting overwhelming combat power from the sea.

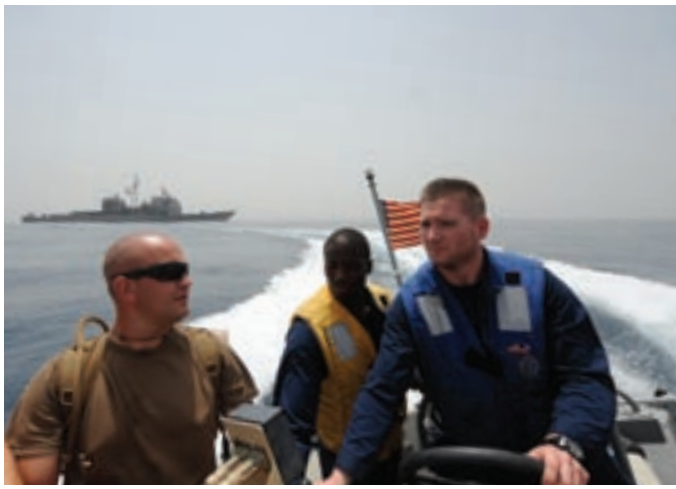
Gaining and maintaining operational access in a sophisticated hostile environment will invariably require the full spectrum of lethal, non-lethal, conventional and special capabilities possessed by the United States, applied synchronously to shape and achieve advantage across the sea, undersea, air, land, space and cyberspace domains.

While the Navy is capable of overcoming geographic challenges inherent in projecting power globally and faces fewer impediments to access than the other Services, naval forces are increasingly challenged by capable anti-access and area-denial threats. Additionally, the advantages in naval force capability and capacity

relative to potential adversaries are declining over time. Coupled with an increasing number of diverse, concurrent crises, these circumstances demand that naval forces creatively apply their inherent adaptability, flexibility and reach to project power effectively.

Maritime Security operations are conducted to protect sovereignty and maritime resources, support free and open seaborne commerce, and to counter maritime-related terrorism, weapons proliferation, transnational crime, piracy, environmental destruction, and illegal seaborne immigration. Effective maritime security requires a comprehensive effort to promote global economic stability and protect legitimate ocean-borne activities from hostile or illegal acts in the maritime domain.

The size and complexity of the maritime commons create unique security challenges as terrorists and criminals leverage the easily accessible, unregulated expanse of the maritime domain to mask their illicit activities. Identifying, tracking, and neutralizing these threats is essential to U.S. national security and the global economy. Comprehensive maritime security, however, can only be achieved through the coordinated activities of governments, the private sector, and multinational organizations including naval and maritime security forces, law enforcement agencies, customs and immigration officials.



The Navy plays a critical role in facilitating this coordination, and is uniquely manned, trained and equipped to assist allies and partners develop the maritime professionals, infrastructure, awareness and response capabilities that are prerequisites for maritime security. In addition to general purpose naval forces that conduct a variety of steady-state maritime security operations, the Navy provides unique capabilities from security forces and riverine squadrons to intelligence collectors and civil affairs teams. Our naval forces effectively conduct the full range of maritime security operations and are instrumental in building the capacity, proficiency and interoperability of partners and allies who share our aspiration to achieve security in the maritime commons.

Humanitarian Assistance and Disaster Response (HA/DR) activities are employed proactively, using globally distributed, mission-tailored naval forces. These forces address ally and partner needs that may not be directly related to national security, but reflect the values and desires of our Nation to render aid and reduce suffering. In so doing, these activities enhance or restore critical host nation capacity, provide an opportunity to engage with a broader cross-section of the host nation's population, and build relationships that serve to increase trust.

Activities undertaken during reactive HA/DR such as those conducted recently in the aftermath of devastating earthquakes in Haiti and the flood ravaged areas of Pakistan have a similar effect, but the often extreme circumstances and severe risks to the population that characterize such events demand an immediate response that can only be provided by expeditionary naval forces

trained and proficient in diverse crisis response operations. During a crisis, naval forces work to quickly provide emergent medical care, food and water, basic sanitation, transportation, shelter, and the restoration of public infrastructure.

HA/DR efforts are undertaken alongside the host nation; other participating nations; multinational, regional, and non-governmental organizations; and in close coordination with counterparts at the Department of State, USAID and other federal agencies. Operating without reliance on ports and airfields ashore, and in possession of organic medical support, strategic and tactical lift, logistics support, robust communications capabilities and premier planning and coordination tools, naval forces are well-suited for HA/DR efforts.

The core capabilities described above enable the imperatives of our Maritime Strategy and QDR priorities. Through Navy's focus on the following three overarching objectives; building the future force, maintaining warfighting readiness, and developing and supporting our Sailors, Navy civilians, and families, we continue to be a ready, capable and relevant global Navy.

BUILDING THE FUTURE FORCE

The last ten years of conflict in the Middle East and increased operations around the world have placed heavy stress on our Fleet. As demands have grown, our Fleet size has decreased; today, our Fleet is the smallest it has been since 1916. Our shipbuilding plan grows our future Fleet to more than 300 ships, enhancing our ability to meet commitments and sustain global presence. In addition to increasing our capacity, we are evolving American Seapower to incorporate a better mix of capability. We are emphasizing operations in the littorals, expanding onto shore our proven capability in ballistic missile defense, and improving our operational agility in the space and cyberspace domains.

Photo courtesy of Lockheed Martin

To maintain credible U.S. naval presence and combat power in the Middle East and Western Pacific, we will depend upon *Ford* and *Nimitz*-class aircraft carriers for forward air strike capability; *Arleigh Burke*-class destroyers for air and missile defense and surface warfare; and *Virginia*-class submarines to preserve surveillance and power projection in the face of growing threats to maritime access. For surveillance, ASW, and anti-surface warfare, we are complementing these ships with the new P-8A *Poseidon* multi-mission aircraft, the F/A-18 E/F *Super Hornet* and the F-35 *Lightning II* tactical aircraft, and the MH-60R and MH-60S *Seahawk* helicopters. To ensure the continuous presence of the most survivable leg of the nuclear deterrent triad, we are focusing on a replacement for the *Ohio*-class ballistic missile submarine. The littoral combat ship (LCS), already shown to be effective in deployments to South America and in Pacific exercises with maritime partner nations, are being built to deliver needed capabilities through its mine, surface, and anti-submarine warfare capabilities. In addition, the

joint high speed vessel (JHSV) will steadily expand our capacity to conduct security cooperation and training with partners, support operations ranging from HA/DR to major combat, and establish a "sea base" from which to operate.

The increasing technological advancements of potential adversaries require expansion of capabilities in the areas of EW, ISR, and air and missile defense. Challenges to regional access are a major concern; we must be able to operate from the maritime domain in the face of proliferating threats such as ballistic and cruise missiles, torpedoes, mines, and communications jamming. Gaining and maintaining access in a sophisticated hostile environment requires a full spectrum of lethal, non-lethal, conventional and special capabilities. To that end, we are focusing on a variety of solutions to overcome anti-access/area denial (A2/AD) challenges and maintain freedom of action.

Recognizing the need for an optimal blend of capabilities to meet a wide range of 21st century challenges, we are evolving expeditionary, unmanned systems, information, and cyber disciplines to strengthen capabilities in every domain our adversaries operate. Adjustments to expeditionary capabilities will reflect the new realities of a post OIF/OND environment. Riverine squadrons will be equipped with larger patrol craft to improve operational coverage of littoral coastal regions in addition to inland "brown water" zones.

To increase situational awareness, speed decision-making, and improve operational responsiveness, we are developing unmanned systems with sophisticated sensing suites, improved persistence, and reach. Supporting capabilities, including integrated communications, processing, exploitation, and dissemination paths, will be designed to maximize efficiency and effectiveness of new ISR systems. Land-based Broad Area Maritime Surveillance (BAMS) aircraft will provide Navy Component Commanders the ability to search more than 40,000 square miles of ocean a day in long dwell orbits. From the sea, we will continue to deploy the MQ-8 Fire Scout surveillance VTUAV and develop a follow-on Small Tactical UAS, increasing the number of sorties for organic coverage and specialized irregular warfare missions. In the mid-term, we are building the first demonstrators of the Unmanned Carrier Launched Airborne Surveillance and Strike System (UCLASS) to extend the aircraft carrier strike group's reach and versatility. We are developing a medium-range unmanned aerial system that will allow surface ships to see and act over hundreds of miles of surrounding ocean or land. We are also accelerating the development of unmanned undersea vehicles that will provide unique capabilities and improve our knowledge of the undersea and littoral battlespace. All of these capabilities require intense collaboration, internally and with our joint and industry partners, to improve "speed to the Fleet" in delivering game-changing technology to warfighters.

We continue to develop our Information Dominance Corps to amplify combat capabilities and strengthen our ability to influence, deny, degrade, disrupt or destroy enemies in the informational, electromagnetic, and cyber domains. Investments in ashore and afloat transport networks, information assurance, cyber security, electronic warfare, and associated human expertise and tools will improve our posture in the information domain and help deliver decision superiority to commanders. Fleet Cyber Command / 10th Fleet will continue to mature its organization, skills, and authorities as it leverages joint and national capabilities in support of maritime missions.

MAINTAINING OUR WARFIGHTING READINESS

Sustaining our fleet capacity is one of the most pressing issues facing our Navy over the next decade. Capacity is a function not only of the number of platforms, but also of their materiel condition. Therefore, we are fully funding maintenance needed to allow the Fleet to meet expected ships' service lives. Navy's ships and aircraft have operated at an extremely high tempo for the last decade. This situation will likely persist, as high demand for maritime forces will continue into the future.

Unlike other Services, when naval forces return to homeport, they "reset in stride," conducting required maintenance upkeep, modernization and training between regularly-scheduled deployments. To ensure Navy's rotational forces can redeploy as scheduled, depot maintenance programs for ships and aircraft are funded sufficiently to sustain service life in the face of high demand. While the "base budget" funds much of these critical accounts, supplemental funding for overseas contingency operations (OCO) remains crucial to sustain our Navy's readiness to support high-tempo operations. OCO continues to ensure we have sufficient flying hours, steaming days, and maintenance funding for operations and training.

Even with full funding for maintenance, demand for naval forces still exceeds supply. Ships and aircraft are exceeding projected utilization rates. For this reason, Navy has advocated within OSD for adjustments to the Fleet Response Plan in order to employ our naval forces in a more sustainable Fleet-wide optempo. In response to existing demands, we are focusing our readiness investments to prioritize deployment of combat-credible forces in the Western Pacific and the Middle East, ballistic missile defense to Europe, and globally distributing mission-tailored forces elsewhere.

In order to meet global commitments, but do so in an energy-efficient manner, the Navy is aggressively moving to address energy challenges and costs. We are on track to deliver half of our total energy consumption from alternative energy sources, such as biofuels and flex fuels, by 2020. We will deploy a "green" carrier strike group by 2016. The Navy's use of responsible technologies ashore and afloat will positively enhance our warfighting readiness.

DEVELOP AND SUPPORT OUR SAILORS, NAVY CIVILIANS, AND THEIR FAMILIES

Achieving the Nation's strategic imperatives would be impossible if not for the skills, character, talents and innovative spirit of our Sailors, Navy civilians, and families who support them. Navy's warfighters, both active and reserve components, are the most highly trained, motivated, and educated force we have ever employed. Taking care of families while our Sailors are deployed across the globe is one of the primary reasons Navy has been ranked as a "Top 50" employer. This remains one of our top priorities.

Taking care of our people entails maintaining strong family support programs and quality housing, including Homeport Ashore opportunities for Sailors. We will sustain momentum in important personnel readiness, child development, and youth programs. Increased deployment intensity and dangerous duty assignments have heightened the importance of caring for the mental, emotional, and financial well-being of returning warriors and their families. We will maintain our support for warriors through world-class medical assistance, exemplified by such programs as Families OverComing Under Stress (FOCUS) and Overcoming Adversity and Stress Injury Support (OASIS). Safe Harbor will continue to coordinate non-medical care for wounded, ill and injured Sailors and their families to speed recovery, rehabilitation, and reintegration.

The Navy places a high value on enhancing training and education to meet our global challenges. Training will be expanded to build up foreign language, regional, and cultural skills. These tools are needed to establish and foster relationships with a wide range of maritime partners and deepen our understanding of environments in which we operate. We are also investing in high-fidelity trainers and simulators to ensure our Sailors keep their competitive advantage in operating advanced and complex technical systems.

CONCLUSION

We are, and will remain, a maritime Nation whose security and economic interests lie well beyond our shores. The need for strong naval forces to maintain influence across the global maritime commons will only grow in importance for the foreseeable future. A strong, relevant Navy will continue to be essential in shaping a favorable security environment and supporting our Nation's prosperity. As articulated in our Maritime Strategy, the Navy remains committed to protecting our Nation's vital interests throughout the globe.

As we enter 2011, there are more than 14,500 Sailors on the ground and another 12,000 offshore in support of joint and coalition operations in the Central Command AOR. Our national interests, however, extend far beyond Iraq and Afghanistan; therefore so does our Navy with more than 40,000 Sailors deployed and almost half of our 288 ships underway around the world. Combatant Commanders worldwide recognize the value our Navy provides

through its ability to overcome geographic and military boundaries to access. Our ships, aircraft, and Sailors operate to support day-to-day security and stability operations around the world. They combine to perform highly integrated operations as part of a joint or coalition force when necessary. Our Navy is flexible and adaptable enough to provide the full spectrum of capabilities: from a single Sailor serving in a Provincial Reconstruction Team (PRT) on the ground in Afghanistan to a multi-ship aircraft carrier strike group operating halfway around the globe.

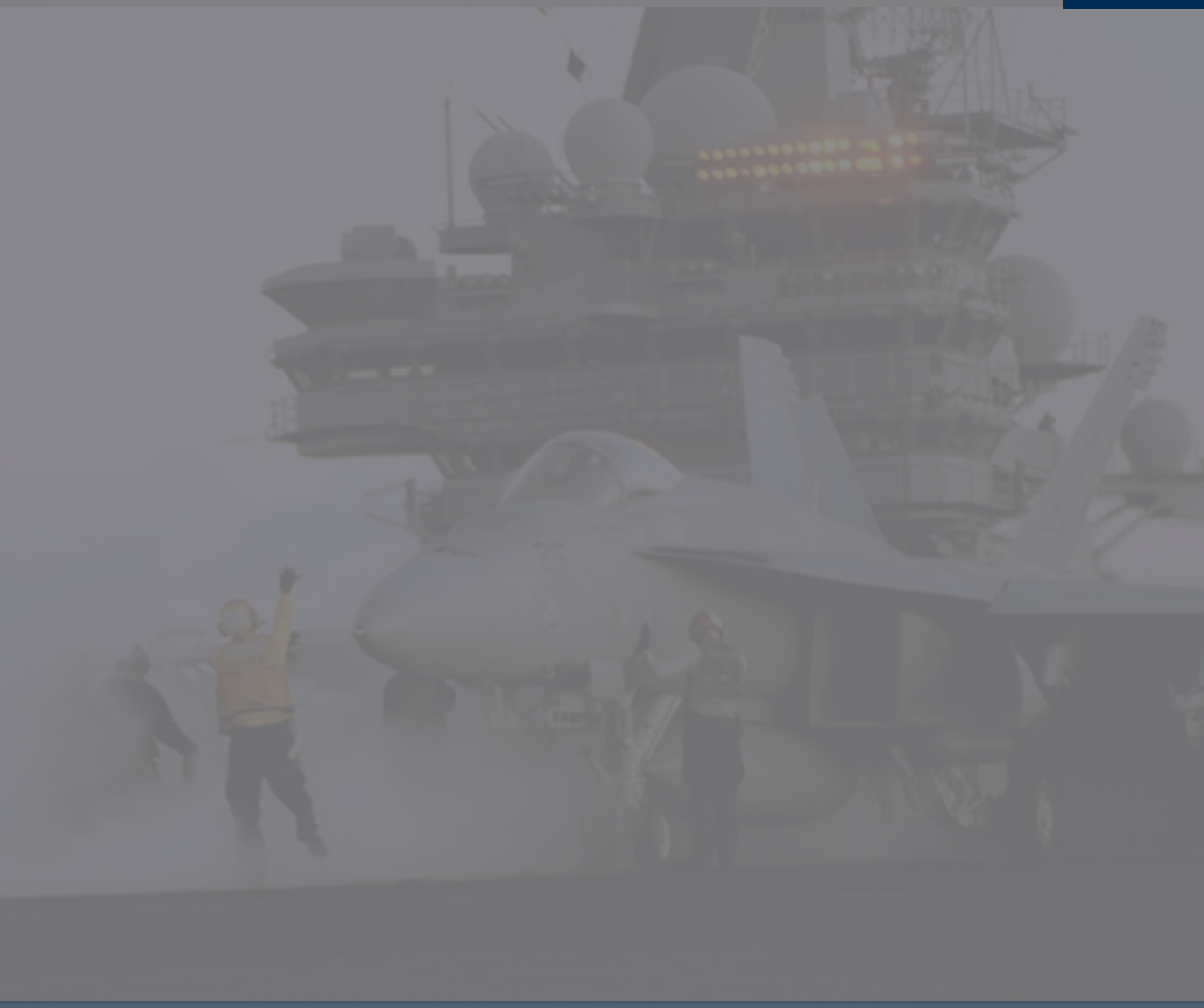
The Navy provides our Nation a force necessary to exert global influence, prevent conflict, promote security and stability, and win in combat. Our Navy is continuously present overseas to promote security without an increasingly controversial footprint on foreign soil.

Finally, our true strength remains in the skills, character, talents, innovation, and dedicated service of our people. Our commitment to them, and investments in them, uniformed and civilian, active and reserve, and Navy families are the foundation of operational excellence and maritime dominance.

The following sections of the 2011 Program Guide describe the programs that the Navy has fielded and is currently developing, which enable the capabilities described above. While some programs contribute significantly to a single capability, many of them are designed to and are capable of supporting multiple core capabilities and mission requirements. The strength of the Navy's forces lies in their adaptability and flexibility across the range of military operations.

SECTION 1

NAVAL AVIATION



Naval aviation is a critical component of the Nation's ability to carry out full-spectrum operations in the 21st Century—from delivering humanitarian assistance and disaster relief at home and overseas… to maritime security operations to ensure safe passage of commercial vessels…to high-intensity sea control and power projection in a major contingency. Helicopters and fixed-wing aircraft operating from nuclear aircraft carriers, large deck amphibious ships and shore stations, and helicopters operating from cruisers and destroyers—complemented by advanced unmanned aerial vehicles—are key contributors to the capabilities of the U.S. Navy and Marine Corps.

AIRCRAFT CARRIERS

CVN 68 and CVN 21 Aircraft Carrier Programs

Description

The U.S. Navy's force of 11 nuclear-powered aircraft carriers provides the operational flexibility and warfighting capability to meet all Fleet Response Plan (FRP) commitments, as well as the combatant commanders' requirements for persistent presence in support of national goals. The aircraft carriers support and operate the aircraft that conduct attack, early warning, surveillance, and electronic missions during warfare against seaborne, airborne, and land-based targets in support of joint and coalition forces. America's carriers deploy throughout the world in direct support of U.S. strategy and commitments. Additionally, our carriers play an important role as the Navy adjusts its emphasis toward the world's littoral regions. This becomes especially important as forward-deployed land-based forces are brought home to the United States.

To maintain a constant 11-carrier force for the next 30 years, aircraft carriers are replaced on a one-for-one basis, with a new ship planned for introduction into the Fleet every five years. Congress has approved a temporary reduction in the carrier fleet to 10 ships between the November 2012 inactivation of USS Enterprise (CVN 65), after nearly 52 years of service, and the commissioning of Gerald R. Ford (CVN 78) in 2015.

The Ford CVN 78-class carriers are America's first new class of aircraft carriers in almost 40 years. While nearly identical in size to Nimitz-class carriers, Ford-class ships will include upgraded hull, mechanical, electrical and electronics capabilities. The Ford class will also incorporate a new, more efficient nuclear propulsion plant; an Electro-Magnetic Aircraft Launch System (EMALS); Advanced Arresting Gear (AAG); and a nearly three-fold increase in electrical-generation capacity compared to a Nimitz-class carrier. These improvements, along with an expanded flight deck and other topside changes will provide significantly higher sortie-generation rates. At the same time, maintenance and manpower requirements for the ship will be greatly reduced allowing the Navy to reap more than $5 billion dollars in life-cycle cost savings per ship over a 50-year service life. The follow-ships, CVN 79 and CVN 80, will be built as repeats of CVN 78 at five-year intervals and are expected to deliver to the Fleet in 2020 and 2025, respectively. Subsequent hulls will also be built at five-year intervals, with a plan providing for the insertion of new technologies that have evolved in the previous decade.

Status

The George H. W. Bush (CVN 77), the tenth and final ship of the Nimitz-class, was commissioned in January 2009 and in early 2011 was undergoing initial training in preparation for a future deployment. Construction of Gerald R. Ford (CVN 78), the lead ship in the CVN 21 Program, was more than 15% complete in late 2010, at Northrop Grumman Newport News Shipbuilding in Newport News, Virginia. The ship is scheduled for delivery to the Navy in September 2015.

Developers

Northrop Grumman — Newport News, Virginia

AIRCRAFT

AH-1Z and UH-1Y Upgrades

Description

The H-1 Upgrade Program replaces the UH-1N and AH-1W aircraft with new UH-1Y and AH-1Z four-bladed, all-composite rotor system helicopters. The program will ensure that the Marine Air-Ground Task Force (MAGTF) possesses credible rotary-wing attack and utility-support platforms for the next 20 years. The H-1 Upgrade Program is designed to reduce life-cycle costs, significantly improve operational capabilities, and extend the service life of both aircraft. There is 84 percent commonality between the two aircraft, which will greatly enhance the maintainability and deployability of the systems, with the capability to support and operate both aircraft within the same squadron structure.

The upgrade program includes a new four-bladed all-composite rotor system coupled with a sophisticated fully integrated glass cockpit. The program also incorporates a performance-matched transmission, four-bladed tail rotor drive system, and upgraded landing gear. The integrated glass cockpit with modern avionics systems will provide a more lethal platform as well as enhanced joint interoperability. Operational enhancements include a dramatic increase in range, speed, survivability, payload, and lethality of both aircraft, with a significant decrease in logistics footprint. The UH-1Y will operate at nearly twice the current range with more than double the payload, compared to legacy aircraft. The AH-1Z will realize similar performance increases, with the ability to carry twice the current load of precision-guided munitions.

Status

The 27 most recent production aircraft have delivered ahead of contract schedule at Bell Helicopter in Amarillo, Texas. Ninety-eight aircraft (Lots 1-7) are on contract, which includes 70 UH-1Ys and 28 AH-1Zs, two of which are AH-1Z build-new (AH-1ZBN). As of October 2010, 43 production aircraft (32 UH-1Ys and 11 AH-1Zs) have been delivered to the Fleet; Lot 1-4 aircraft deliveries are complete, and Lot 5 deliveries are on schedule. The Overarching Integrated Product Team recommended a paper Defense Acquisition Board (DAB) and re-designation of the program to Acquisition Category (ACAT) 1C. With one exception, all acquisition program baseline schedule dates are currently on track; the September 2012 Navy Support Date (full organic depot level capability) for both the UH-1Y and AH-1Z will slip to December 2015 due to a previously unfunded requirement for a gearbox test facility at Fleet Readiness Center (FRC) East, Cherry Point, North Carolina. MILCON funding for this facility is in the 2012 budget. The Original Equipment Manufacturer (OEM) projects sufficient repair capacity on the affected components to continue to provide OEM repair until organic capability is established. Impacts of this delay to overall Operations and Support (O&S) costs are expected to be minimal. The current Marine Corps program of record requirement is 160 UH-1Ys and 189 AH-1Zs.

Developers

Bell Helicopter Textron	Fort Worth and Amarillo, Texas

AV-8B *Harrier II+*

Description

The AV-8B *Harrier II* is a single-seat, light-attack aircraft that supports the MAGTF commander by engaging surface targets and escorting friendly aircraft, day or night, under all weather conditions during expeditionary, joint or combined operations. By virtue of its Vertical/Short Take-Off and Landing (V/STOL) capability, the AV-8B can operate from a variety of amphibious ships, rapidly constructed expeditionary airfields, forward sites (e.g., roads, Forward Operating Bases (FOBs)), and damaged conventional airfields. Two variants of the aircraft are in operational service: the Night Attack and the Radar/Night Attack *Harrier*. The Night Attack *Harrier* improved the original AV-8B design through incorporation of a Navigation, Forward-Looking Infrared (NAVFLIR) sensor, a digital color moving map, night vision goggle compatibility, and a higher performance engine. The Radar/Night Attack *Harrier*, or *Harrier II+*, has all the improvements of the Night Attack aircraft plus the APG-65 multi-mode radar. The fusion of night and radar capabilities allows the *Harrier* to be responsive to the MAGTF's needs for expeditionary, night, and adverse weather offensive air support.

Status

Operational Flight Program (OFP) H5.0 integrates the Dual Mode Laser Guided Bomb and centerline LITENING pod carriage, and provides tremendous improvements in radar and LITENING Advanced Targeting Pod capability. FY 2011 will see the completion of testing of OFP H6.0, integrating digital improved triple ejector racks for increased carriage capacity for Joint Direct Attack Munition (JDAM), fully integrated ALE-47 decoy expendable hardware and software, adjustments for improving moving-target engagements, improved radar capability, and safety improvements. The AV-8B continues to maximize integration of the LITENING Advanced Targeting Pod, a third-generation dual TV/Infrared sensor providing target recognition and identification, laser designation and laser spot tracking for precision targeting capability. LITENING pods have also been equipped with a video downlink, which enables real-time video to be sent to ground-based commanders and forward-air controllers. This facilitates time-sensitive targeting and reduces the risk of fratricide and collateral damage. The Marine Corps is procuring LITENING Gen 4 pods with increased capability for employment on the AV-8B, F/A-18 *Hornets*, and EA-6B *Prowlers*. Program wholeness as well as warfighting capability enhancements are essential links to the *Harrier* providing continued support to the MAGTF.

Developers

Boeing St. Louis, Missouri

Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS)

Description

The BAMS MQ-4C UAS is integral to the recapitalization of Navy's airborne Intelligence, Surveillance, and Reconnaissance (ISR) capability inherent in the Maritime Patrol and Reconnaissance Force (MPRF). BAMS UAS on-station persistence enables unmatched Maritime Domain Awareness (MDA) by sustaining the maritime Common Operational Picture (COP) for surface warfare, overseas operations, and homeland defense. The system will act as a tripwire for surge forces, enhancing situational awareness of the battlespace and shortening the sensor-to-shooter kill chain. In its ISR role, it will support decision superiority precision and mobility while providing data and communication relay services that "net" the battlespace. BAMS UAS is a long endurance-class UAS that will operate from five land-based sites around the world. BAMS UAS will be co-located with the current P-3 aircraft, the planned P-8A, or the U.S. Air Force's RQ-4B *Global Hawk*. Because BAMS UAS and the P-3/P-8A have related and complementary missions, co-location will enhance manpower, training, and maintenance efficiencies. Additionally, the Navy is pursuing BAMS UAS operational, training, and production commonalities with its sister system, the U.S. Air Force's RQ-4B Global Hawk. The current Concept of Operations (CONOPS) includes systems of up to five air vehicles providing persistent ISR 24 hours a day, seven days a week, out to ranges of 2,000 nautical miles (NMs). Worldwide access is achieved by providing coverage over high-density sea lanes, littorals, and areas of national interest from its operating locations.

Status

The BAMS UAS Analysis of Alternatives (AoA), Operational Requirements Document (ORD), Capability Development Document (CDD), and initial CONOPS are complete. Milestone B was achieved in April 2008, and System Development and Demonstration (SDD) initiated in August 2008. Milestone C is scheduled for 2013, and IOC is expected in FY 2016.

Developers

Northrop Grumman — Palmdale, California

C-2A(R) *Greyhound*

Description

The C-2A *Greyhound* is the Navy's sole Medium-Lift/Long-Range (ML/LR) logistics support aircraft, providing time critical support to carrier strike groups (CSG). Its primary mission is transport of high-priority cargo, mail, and passengers between the CSG and shore support bases. A high wing monoplane powered by twin Allison T56-A-425 turboprop engines and Hamilton-Standard constant-speed propellers, the C-2A can deliver a combined payload of 10,000 pounds to a distance in excess of 1,000 NMs. The interior arrangement of the cabin can readily accommodate cargo,

passengers, and litter patients. Priority cargo such as jet engines or components can be transported from shore to ship in a matter of hours. A cargo cage system or transport stand provides restraint for loads during catapult launches and arrested landings. The large aft cargo ramp/door allows straight-in rear cargo loading and unloading for fast turnaround. The C-2A is capable of airdropping both supplies and personnel. Its onboard auxiliary power unit provides autonomous engine starting capability and ground power self-sufficiency at austere bases, providing operational versatility.

Status

The aircraft is currently undergoing a service life extension program (SLEP) to increase operating service life from 15,020 landings and 10,000 flight hours to 36,000 landings and 15,000 flight hours. The changes being incorporated include structural enhancements, aircraft rewire, cockpit avionics systems improvements, and a new 8-blade propeller system (NP2000). SLEP will make the C-2A a viable and maintainable platform until it is replaced. Additionally, as mandated by Congress and the Chief of Naval Operations (CNO), two passenger carrying safety requirements have been integrated into the C-2A, Traffic Alert and Collision Avoidance System (TCAS) and Terrain Awareness Warning System (TAWS).

Developers

Northrop Grumman — Bethpage, New York

C-37 Executive Transport

Description

The Navy maintains executive transport airlift in accordance with the DoD Directive 4500.56. Senior leaders require air transport that has secure communications capability. In late 2010, three C-37Bs (*Gulfstream 550*), one C-37A (*Gulfstream V*), two C-20Ds (*Gulfstream III*), and one C-20A (*Gulfstream III*) provide executive transport services. The C-37A/B aircraft have replaced the VP-3A, substantially lowering operating costs. The C-37A/B meets all known international imposed air traffic management communications, navigation, and surveillance requirements through FY 2014.

Status

The first C-37 aircraft was delivered in 2002. A second aircraft was delivered in 2005, and two more were delivered in 2006. The first aircraft, the Navy's only C-37A, is now based at Hickam Air Force Base (AFB), Hawaii and supports Commander Pacific Fleet (PACFLT). The C-37Bs are based at Naval Air Facility (NAF) Washington, DC and are assigned to Fleet Logistics Support Squadron One (VR-1). Additionally, the Navy acquired a surplus C-20A from the Air Force in order to meet Commander Naval Forces Europe (CNE) executive transportation requirements.

Developers

General Dynamics Gulfstream Division — Savannah, Georgia

C-40A *Clipper*

Description

The Naval Air Force Reserve provides 100 percent of the Navy's organic intra-theater logistics airlift capability via its Navy Unique Fleet Essential Airlift (NUFEA) program. NUFEA provides Navy Component Commanders with short-notice, fast-response, and intra-theater logistics support for naval power projection worldwide. Twelve C-9B aircraft, which currently perform the majority of these services, are being replaced by the C-40A Clipper, a modified Boeing 737-700 series aircraft. This state-of-the-art aircraft––not to be confused with Executive/VIP Transport—can transport 121 passengers (passenger configuration), 40,000 pounds of cargo (cargo configuration), or a combination of the two (combination configuration) at ranges greater than 3,000 NMs at Mach 0.8 cruise speed. The ability to simultaneously carry cargo pallets and passengers maximizes the operational capability, safety, and capacity. The C-40A has an electronic flight deck fully compliant with future communications, navigation, and air traffic control architectures; advanced-technology Stage III noise-compliant, fuel-efficient engines; and an integral cargo door/cargo handling system. Maximum gross take-off weight is 171,000 pounds.

Status

Nine aircraft are in the inventory in late 2010, with three additional aircraft on contract to be delivered by late spring 2012. The Navy is purchasing the aircraft via commercial-off-the-shelf (COTS) standards using standard best commercial practices. Three aircraft are stationed in Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas; NAS Jacksonville, Florida; and NAS North Island, San Diego, California.

Developers

Boeing — Seattle, Washington

C-130T/J *Hercules*

Description

The Navy C-130T *Hercules*, a component of the NUFEA program, provides heavy, over-and-outsized lift capability. With its increased performance and maintenance reliability, the C-130J is the follow-on aircraft to meet the Combatant Commanders' requirements well into the 21st Century. These aircraft are deployed worldwide and provide rapid-response direct-support to the Navy's Component Commanders' theater requirements. This aircraft can be rigged/re-rigged within minutes to transport up to 40,000 pounds of cargo or up to 75 passengers.

Status

The Navy has begun a procurement strategy to replace its C-130T aircraft with a modern C-130J. The current fleet is Communications Navigation Surveillance/Air Traffic Management (CNS/ATM) program compliant through FY 2014. Aircraft are currently

stationed at NAS JRB Willow Grove, Pennsylvania; NAS Jacksonville, Florida; NAS JRB New Orleans, Louisiana; NAF Washington, DC; and Naval Base Ventura County (NBVC) Point Mugu, California.

Developers

Lockheed Martin	Bethesda, Maryland
Lockheed Martin	Marietta, Georgia

CH-53K Heavy-Lift Replacement (HLR)

Description

The CH-53K is the follow-on to the Marine Corps CH-53E Heavy Lift Helicopter. Major systems improvements of the newly manufactured helicopter include new, greater horsepower, and more capable engines; expanded gross weight airframe and drive train; advanced composite rotor blades; modern interoperable cockpit, external and internal cargo handling systems; and survivability. The CH-53K will be capable of externally lifting 27,000 pounds on a "sea level hot day" (103° Fahrenheit) to a range of 110 NMs and dropping cargo in a landing zone at a pressure altitude of 3,000 feet at 91.5 degrees Fahrenheit, a capability improvement that nearly triples the current CH-53E abilities under the same conditions. Additionally, the CH-53K will be capable of carrying a normal load of 30 combat-loaded troops.

The CH-53K's increased capabilities are essential to meeting the Marine Expeditionary Brigade of 2015 Ship-to-Objective Maneuver (STOM) vision and it fully supports the Joint Operations Concept of Full Spectrum Dominance and Sea Power 21 by enabling rapid, decisive operations and the early termination of conflict by projecting and sustaining forces to distant anti-access, area-denial environments. Expeditionary Maneuver Warfare (EMW) establishes the basis for the organization, deployment, and employment of the Marine Corps to conduct maneuver warfare and provides the doctrine to make joint and multinational operations possible.

Status

The Navy awarded a Post Milestone (MS) B SDD contract of $2.7 billion to Sikorsky Aircraft Corporation on April 5, 2006. The program conducted its Preliminary Design Review (PDR) during the fourth quarter FY 2008. The Critical Design Review (CDR) was successfully completed ahead of schedule in the third quarter of FY 2010, and the program has now transitioned from the design to the manufacturing phase. The Marine Corps requirement remains 200 aircraft. U.S. Navy and Foreign Military Sales (FMS) participation is to be determined, however FMS interest is growing.

Developers

Sikorsky Aircraft Corporation	Stratford, Connecticut

CNATRA Naval Aviation Training Aircraft

Description

Commander Naval Air Training Command's (CNATRA) mission, to safely train and produce the world's finest combat quality aviation professionals—Aviators and Military Flight Officers—and deliver them at the right time, in the right numbers, and at the right cost to the Fleet for follow-on tasking in current operations, is key to affordable readiness. CNATRA's training aircraft inventory includes the T-34 *Turbo Mentor*, T-6 *Texan II*, T-45 *Goshawk*, TH-57 *Sea Ranger*, T-44 *Pegasus*, TC-12 *Huron*, and T-39 *Sabreliner*.

The first aircraft that all aspiring future USN/USMC pilots and flight officers fly are the T-34C *Turbo Mentor* or the T-6B *Texan II* (pilots) and the T-6A *Texan II* (flight officers). The T-34 began its Navy career in 1977 and has successfully completed its service at NAS Pensacola where it was the primary training aircraft for the Undergraduate Military Flight Officer (UMFO) syllabus. All primary UMFO training is now conducted in the T-6A. The Joint Primary Aircraft Training System (JPATS) comprises the T-6, flight simulators, computer-aided academics, and a Training Integration Management System (TIMS). The aircraft, built by Hawker Beechcraft Corporation, is a derivative of the Swiss *Pilatus* PC-9 aircraft and features a Pratt & Whitney PT-6A-68 engine, a digital cockpit, ejection seats, and cockpit pressurization and onboard oxygen-generating systems. The T-34C continues to be used for primary pilot training at NAS Whiting Field and at NAS Corpus Christi, but will be replaced by the T-6B. The transition to the T-6B began in April 2010 at NAS Whiting Field and is scheduled to commence in FY 2012 at NAS Corpus Christi.

The T-45 *Goshawk*, the Navy version of the British Aerospace Hawk aircraft, is used for intermediate and advanced training in the strike (jet) pilot syllabi. Upgrades to the T-45 include the conversion from analog (T-45A) to digital cockpits (T-45C), resolving an engine surge issue to enhance fuel efficiency and safety, and preservation of current aircraft through service life assessment and service life extension programs.

The TH-57 *Sea Ranger*, the Navy version of the commercial Bell *Jet Ranger*, is used for advanced training in the rotary-wing (helicopter) pilot syllabus. The TH-57B (visual flight), the TH-57C (instrument flight) and associated simulators will be converted from analog to digital cockpits (TH-57D), guaranteeing aircraft availability and relevance through 2030.

The T-44 *Pegasus* and the TC-12 *Huron* are both twin turboprop, pressurized, fixed-wing aircraft that are used for intermediate and advanced training in the multi-engine and tilt-rotor pilot syllabi. Future improvements to the T-44 include the replacement of wing wiring, simulator upgrades and the conversion from analog to digital cockpits (T-44C).

The T-39 *Sabreliner* is a multi-purpose low-wing, twin turbojet aircraft that has been in naval service since the early 1990s. The

T-39 is used for intermediate and advanced training in the strike/strike-fighter UMFO syllabi. The T-45 is currently being used for the tactical maneuvering portion of strike/strike-fighter UMFO syllabus and will replace the T-39 as the advanced phase radar trainer in FY 2013 with the integration of the Virtual Mission Training System (VMTS), an embedded synthetic radar training system.

CNATRA has recently charted a course to revolutionize UMFO training by employing the T-6, the T-45C with VMTS, and high-fidelity simulators to train future UMFOs. This new training program will capitalize on cutting-edge technologies, allowing the Navy to divest of the aging T-39 platform. The new training syllabus is planned to achieve IOC at NAS Pensacola in FY 2013.

Status

The T-6 is currently in production with a planned inventory objective of 315 aircraft. The Navy took final delivery of its T-45C in October 2009.

Developers

Boeing (T-45)	St. Louis, Missouri
Hawker Beechcraft (T-6)	Wichita, Kansas

E-2C/D *Hawkeye* Airborne Early Warning Aircraft

Description

The E-2C *Hawkeye* is the Navy's airborne surveillance and Battle Management Command and Control (BMC2) platform, providing support of decisive power projection at sea and over land in a joint operational architecture. In addition to current capabilities, the E-2 has an extensive upgrade and development program to improve the capability of the aircraft as it is a critical element in the overall Integrated Air and Missile Defense (IAMD) program. Two upgrades will ensure the E-2 keeps pace with changing tactical environments: the E-2C *Hawkeye 2000* and the E-2D *Advanced Hawkeye*.

The E-2C *Hawkeye 2000*, with the APS-145 radar, features a Mission Computer Upgrade (MCU), Cooperative Engagement Capability (CEC), improved Electronic Support Measures (ESM), Link-16, Global Positioning System (GPS), and satellite data and voice capability. The MCU greatly improves weapons systems processing power, enabling incorporation of CEC. In turn, the CEC-equipped *Hawkeye 2000s* significantly extends the engagement capability of air defense ships. It is the key to early cueing of the Aegis Weapons System, dramatically extending the lethal range of the Navy's ship-launched Standard Missile.

The E-2D *Advanced Hawkeye*, with the APY-9 radar, is a two-generation leap in technology, which brings an improved over-the-horizon, overland, and littoral detection and tracking capability to the strike group. The APY-9, coupled with CEC, Link-16, and the Advanced Tactical Data Link (ADL), fully integrates the E-2D *Advanced Hawkeye* into the Joint Integrated Air and Missile De-

fense (JIAMD) role. The APY-9's advanced detection and tracking capability, in conjunction with Aegis and the upgraded Standard Missile, as well as, the F/A-18 *Hornet* and its upgraded AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM), will allow strike groups to deploy an organic, theater-wide air and cruise missile defense capability to protect high-priority areas and U.S. and coalition forces ashore and afloat. The E-2D will continue as the airborne "eyes and ears" of the Fleet as it applies its capabilities in the integrated joint, overland, theater-wide air, and cruise missile-defense environment.

Status

In late 2010 there were 68 E-2C aircraft in the Fleet, 27 of which are *Hawkeye 2000s*. Two E-2D *Advanced Hawkeye* System Development and Demonstration aircraft are in flight test at NAS Patuxent River, Maryland. First flight took place in August 2007 and to date the aircraft is meeting or exceeding all Key Performance Parameters (KPPs). In addition to a comprehensive developmental test program, the E-2D successfully executed a second operational assessment in August 2010. Two of three pilot production aircraft have been delivered to support testing and initial training, with the Fleet Replacement Squadron (FRS) receiving their first E-2D on July 29th, 2010, in a ceremony officiated by the CNO. Five Low Rate Initial Production (LRIP) aircraft were in production at St. Augustine in late 2010. Four lots of LRIP aircraft are planned for procurement through FY 2012, with delivery scheduled two years after procurement, beginning in 2011. Full rate production begins in FY 2013 with an objective of 75 aircraft. Operational evaluation (OPEVAL) is planned for FY 2012 and the first fleet squadron will begin the transition to E-2D in 2013 with IOC and first deployment planned for October 2014.

Developers

Lockheed Martin	Syracuse, New York
Northrop Grumman	Bethpage, New York
Northrop Grumman	St. Augustine, Florida

E-6B Mercury

Description

The E-6B aircraft, derived from the Boeing 707, provides the Commander U.S. Strategic Command (USSTRATCOM) with the command, control, and communications (C3) capability needed for execution and direction of strategic forces. Designed to support a robust and flexible nuclear deterrent posture well into the 21st Century, the E-6B performs VLF emergency communications, the U. S. Strategic Command Airborne Command Post mission, and Airborne Launch Control of ground-based ICBMs. It is the Navy's only survivable means of nuclear C3.

Status

The Block I modification program was developed to sustain and improve E-6B capability. The contract for Block I was awarded

to Rockwell Collins in March 2004, and it is designed to repair a number of aircraft deficiencies identified by the USSTRATCOM. Initial Operating Capability is planned for 2013. In 2005, the Navy initiated the Internet Protocol and Bandwidth Expansion (IP/BE) program to modernize the E-6B platform, and in 2008 directed the Block II program to provide additional enhancements to field a T-3 capability and the replacement of the MILSTAR terminals to connect with the Advanced Extremely High Frequency (AEHF) satellite system. The IP/BE and Block II programs will support USSTRATCOM's migration of Nuclear Command and Control (C2) to a distributed, network/IP-based global C2 system as an airborne node. The IP/BE IOC is scheduled for 2012, and Block II IOC is 2015.

Developers

Boeing	Wichita, Kansas
L3/Link	Arlington, Texas
L3/VERTEX	Meridian, Mississippi
Rockwell Collins	Richardson, Texas

EA-6B *Prowler* Airborne Electronic Attack Aircraft

Description

The EA-6B *Prowler* provides Electronic Warfare (EW) capabilities, most notably Airborne Electronic Attack (AEA) and Anti-Radiation Missile (ARM), against enemy systems operating within the radio frequency spectrum. EA-6B capabilities have traditionally enhanced the strike capabilities of aircraft carrier air wings and Marine Air Ground Task Force operations. The need for EW has increased during numerous joint and allied operations since 1995, against traditional and non-traditional target sets in support of ground forces. These capabilities continue to be required in Overseas Contingency Operations (OCO), particularly in Afghanistan and Iraq, where EA-6B operations protect coalition forces and disrupt critical command and control links. The enormous demand for AEA in *Operation Enduring Freedom* (OEF) and *Operation Iraqi Freedom* (OIF) has driven EA-6B use rates to record levels.

Status

The EA-6B Improved Capability (ICAP) III upgrade reached IOC in September 2005. This generational leap in EW capability deployed for the first time in 2006. ICAP III includes a completely redesigned receiver system (ALQ-218), new displays, and MIDS/Link-16, which dramatically improve joint interoperability. The Navy will eventually "sundown" the *Prowler* and transition to an all EA-18G *Growler* force by 2015. The Marine Corps has transitioned its first ICAP III squadron and will complete its transition to an all ICAP III force by 2012. The Marines plan to fly the EA-6B through 2019. Its planned replacement is a series of networked payloads forming a system of systems, labeled MAGTF EW, which will provide increased capacity scalable to meet the requirements of Marine and joint commanders.

Developers

Northrop Grumman Corporation	Bethpage, New York

EA-18G *Growler* Airborne Electronic Attack Aircraft

Description

The EA-18G *Growler* will replace the Navy's EA-6B *Prowler*. Like the Prowler, the EA-18G will provide full-spectrum electronic attack to counter enemy air defenses and communication networks. The *Growler* will maintain a high degree of commonality with the F/A-18F *Hornet*, retaining the latter's inherent strike-fighter and self-protection capabilities while providing air-to-air self-protection to free other assets for other strike-fighter tasking.

Status

The EA-18G *Growler* reached IOC in September 2009 and was approved to enter Full Rate Production (FRP) shortly afterward in November 2009. In December 2009, the Department of Defense made the decision to continue the Navy Expeditionary Airborne Electronic Attack mission and recapitalize the Navy EA-6B expeditionary force with the EA-18G. As a result, the first squadrons to transition to the EA-18G will become expeditionary squadrons with the exception of VAQ-141, which will remain carrier based. VAQ-132 is the first EA-18G expeditionary squadron to deploy. Through late 2010, 34 EA-18G aircraft have been delivered with another 22 aircraft scheduled for delivery in FY 2011. An inventory objective of 114 aircraft is planned to support ten carrier-based squadrons, three active expeditionary squadrons, and one reserve squadron. Full Operational Capability (FOC) is planned for FY 2015.

Developers

Boeing	St. Louis, Missouri
Northrop Grumman Corporation	Bethpage, New York

EP-3E Modification and Sustainment

Description

The EP-3E is the Navy's only airborne Information Warfare (IW) and tactical Signals Intelligence (SIGINT) platform supporting naval and joint commanders. EP-3Es provide long-range, high-endurance support to carrier strike groups and expeditionary strike groups in addition to performing independent maritime operations. The current force consists of two active duty squadrons based at NAS Whidbey Island, Washington. The EP-3E fleet is focused on sustainment and modernization to keep pace with emerging threats until a replacement capability can be fielded.

Status

Sustainment:

EP-3Es will be sustained through a series of Special Structural Inspections (SSIs) and Special Structural Inspection-Kits (SSI-Ks). SSIs provide inspection and repairs necessary to ensure safety of flight until more comprehensive maintenance can be performed. SSI-Ks provide pre-emptive modification and replacement of critical structural components to allow up to 7,000 additional flight

hours. A lower wing surface (Zone 5) modification program and outer-wing replacements were instituted after analysis revealed that the rear area of Zone 5 experienced fatigue much worse than previously estimated. These programs will allow sustainment of the EP-3E fleet until a new capability is developed.

Modernization:
The original EP-3E Joint Airborne SIGINT Architecture Modification (JMOD) program was designed to accelerate advanced capabilities to the fleet. The resultant JMOD Common Configuration (JCC) program aligns mission systems to meet the challenges of rapidly emerging threat technology and also addresses obsolescence issues. Using spiral developments, JCC is IP-based SCI network capable and includes improved ELINT and COMINT capabilities, multi-platform geo-location capabilities, advanced Special Signals Collection (SSC) capability, and IW/Information Operations (IO) capability, and incorporates quick-reaction capabilities (QRCs) developed for OEF/OIF. JCC is also equipped with FLIR and remote reachback capabilities in response to surge requirements for current operations. In order to ensure EP-3E relevance beyond FY 2020, the aircraft have received ISR task force modifications and continue to incorporate QRCs in response to critical warfighter demands. The Recapitalization Capabilities Migration (RCM) program will allow development of the EP-3E and also vital testing of equipment for the next generation of Intelligence Surveillance Reconnaissance and Targeting (ISR&T) platforms. JCC Spiral 3 upgrade allows the EP-3E to better pace the enemy threat by providing faster, more precise geo-location capability and allowing for better precision targeting and I&W against our enemy's rapidly developing technology. It also shortens the kill-chain and reduces risk of fratricide. The first JCC Spiral 3 aircraft is currently undergoing developmental testing.

Developers

Aeronixs	Melbourne, Florida
Allied Signal	Sunnyvale, California
AT&T Solutions	Vienna, Virginia
EDO Corporation	San Jose, California
General Dynamics	San Jose, California
L-3 Communications	Waco, Texas
Lockheed Martin	Fort Worth, Texas
Lockheed Martin	Denver, Colorado
Naval Aviation Depot	Jacksonville, Florida
Northrop Grumman	Baltimore, Maryland
NSWC	Crane, Indiana
NSWC	Dahlgren, Virginia
Raytheon	Indianapolis, Indiana
Titan	Vienna, Virginia
TRW	Sunnyvale, California

F/A-18A-D *Hornet* Strike-Fighter Aircraft

Description

The F/A-18 *Hornet* is a multi-mission strike fighter that combines the capabilities of a fighter and an attack aircraft. The single-seat F/A-18A and two-seat F/A-18B became operational in 1983. Eventually, the *Hornet* replaced the Navy's A-6, A-7, and F-4 and the Marine Corps' F-4 aircraft. Reliability and ease of maintenance were emphasized in the *Hornet*'s design, and F/A-18s have consistently flown three times as many hours without failure as other Navy tactical aircraft, while requiring half the maintenance time.

The F/A-18 is equipped with a digital fly-by-wire flight control system that provides exceptional maneuverability and allows the pilot to concentrate on operating the aircraft's weapons system. A solid thrust-to-weight ratio and superior turn characteristics, combined with energy sustainability, enable the *Hornet* to hold its own against any adversary. The ability to sustain evasive action is what many pilots consider to be the *Hornet*'s finest trait. The F/A-18 is the Navy's first tactical jet to incorporate digital-bus architecture for the entire avionics suite, making this component of the aircraft relatively easy to upgrade on a regular and affordable basis.

Following a production run of more than 400 F/A-18A/Bs, deliveries of the single-seat F/A-18C and two-seat F/A-18D began in September 1987. The F/A-18C/D models incorporated upgrades for employing updated missiles and jamming devices. These versions are armed with the AIM-120 AMRAAM and the infrared-imaging version of the AGM-65 Maverick.

The *Hornet* has been battle tested and proved to be a highly reliable and versatile strike fighter. Navy and Marine Corps *Hornets* were in the forefront of strikes in Afghanistan in 2001 during *Operation Enduring Freedom* and continue serving in *Operations Enduring Freedom and Iraqi Freedom*. The latest lot of F/A-18C/D Hornets is far more capable than the first F/A-18A/Bs. Although the F/A-18C/D's growth is now limited, the *Hornet* will continue to fill carrier air wings for years to come, before gradually giving way to the larger, longer-range and more capable F/A-18E/F *Super Hornet* and the F-35 *Lightning II* Joint Strike Fighter (JSF). The last *Hornet*, an F/A-18D, rolled off the Boeing production line in August 2000.

Status

As of October 2010, the Navy and Marine Corps had 98 F/A-18A, 26 F/A-18B, 376 F/A-18C, and 133 F/A-18D aircraft in service and test roles, and two NF/A-18C and two NF/A-18D versions in permanent test roles. Hornets equip 27 active Navy and Marine Corps and three Navy and Marine Corps Reserve strike fighter squadrons, two FRS, three air test and evaluation squadrons, the Navy's Flight Demonstration Squadron (Blue Angels), the Naval Strike & Air Warfare Center, and the Naval Test Pilot School.

Developers

Boeing	St. Louis, Missouri
General Electric	Lynn, Massachusetts

F/A-18E/F *Super Hornet* Strike-Fighter Aircraft

Description

The multi-mission F/A-18E/F *Super Hornet* strike fighter is an evolutionary upgrade of the F/A-18C/D *Hornet*. The F/A-18E/F is able to conduct unescorted strikes against highly defended targets early in a conflict. The *Super Hornet* provides the carrier strike group with a strike fighter that has significant growth potential, more than adequate carrier-based landing weight, range, endurance, and ordnance-carrying capabilities comparable to those of the F-14 Tomcat and F/A-18A/C *Hornet* it replaces. The single-seat F/A-18E and the two-seat F/A-18F have a 25 percent larger wing area and a 33 percent higher internal fuel capacity that effectively increase endurance by 50 percent and mission range by 41 percent. Its carrier-recovery payload is more than 9,000 pounds. The *Super Hornet* incorporates two additional wing stations that allow for increased payload flexibility in the mix of air-to-air and air-to-ground ordnance. It has five "wet" stations that give the *Super Hornet* in-flight tanker capability, allowing it to replace the S-3 *Viking* in the tanking role. The *Super Hornet* is also able to carry a full array of the newest joint "smart" weapons—e.g., the Joint Direct Attack Munition and the Joint Standoff Weapon (JSOW).

The *Super Hornet* has the ability to recover aboard a carrier with optimum reserve fuel while carrying a load of precision-strike weapons. The *Super Hornet* also has the space, power, and cooling capability needed to accommodate valuable but installation-sensitive avionics when they become available, including the Active Electronically Scanned-Array (AESA) radar. Compared to the F-14 Tomcat, the *Super Hornet*'s cost per flight hour is 40 percent lower, and the *Super Hornet* requires 75 percent fewer labor hours per flight hour. Sophisticated systems—such as the Integrated Defensive Electronic Countermeasures System (IDECMS); Advanced Targeting Forward Looking Infrared (ATFLIR), Joint Helmet-Mounted Cueing System (JHMCS); JDAM and JSOW; AIM-9X missile; SHARP Shared Reconnaissance Pod; APG-79 AESA radar and advanced mission computers and displays—make the F/A-18E/F an extremely capable and lethal strike platform. Future planned upgrades include Joint Air-to-Surface Standoff Missile (JASSM) and Advanced Aft-Cockpit Crew Station. The first operational F/A-18E *Super Hornet* squadron deployed on board the USS Abraham Lincoln (CVN 72) on July 24, 2002, for a ten-month initial deployment. F/A-18E/F *Super Hornets* remain at the forefront of combat operations in both Afghanistan and Iraq. *Super Hornet* squadrons have been integrated into all ten US Navy air wings and with future capability upgrades are well suited to complement the arrival of the F-35 JSF.

Status

As of October 2010, there are 185 F/A-18E models and 226 F/A-18F models in the U.S. Navy inventory. The F/A-18E will supplement and eventually replace the older F/A-18C, while the F/A-18F version has replaced the F-14 in Fleet service.

Developers

Boeing	St. Louis, Missouri
General Electric	Lynn, Massachusetts

F-35 Lightning II Joint Strike Fighter (JSF)

Description

The JSF F-35 *Lightning II* program will deliver a transformational family of next-generation strike aircraft, combining stealth and enhanced sensors to provide lethal, survivable, and supportable tactical jet aviation strike fighters. The Navy Carrier Variant (CV), the Marine Corps Short Takeoff and Vertical Landing (STOVL), and Air Force Conventional Takeoff and Landing (CTOL) "family of aircraft" design share a high level of commonality while meeting specific U.S. service and allied partner needs. The STOVL variant will replace Marine F/A-18s and AV-8Bs. The CV will replace F/A-18A-C aircraft and complement the F/A-18E/F.

The keystone of this effort is a mission systems avionics suite that delivers unparalleled interoperability among U.S. Armed Services and coalition partners. Agreements for international participation in SDD have been negotiated with Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, and the United Kingdom. A Security Cooperation Partnership Memoranda of Understanding (MoU) has been established with Singapore. Israel has signed a Letter of Offer and Acceptance to procure aircraft as an FMS customer.

Status

The JSF is in its tenth year of a planned 15-year SDD program. Following a Nunn-McCurdy breach, the Office of the Secretary of Defense (OSD) certified the JSF as essential to national security. First CTOL variant SDD flight was December 2006, first STOVL flight was June 2008, and first CV flight was June 2010. The DoD Base Realignment and Closure Commission 2005 directed the first JSF Integrated Training Center to be at Eglin Air Force Base, Florida.

Developers

Lockheed Martin	Fort Worth, Texas
Pratt & Whitney	Hartford, Connecticut

KC-130J *Hercules* Tactical Tanker and Transport

Description

The KC-130 is a four-engine turbo-prop, multi-role, multi-mission tactical aerial refueler and tactical transport aircraft that supports all six functions of Marine Aviation and is well suited to meet the mission needs of the forward-deployed MAGTF. The *Hercules* provides fixed-wing, rotary-wing, and tilt-rotor tactical air-to-air refueling; rapid ground refueling of aircraft and tactical vehicles; assault air transport of air-landed or air-delivered personnel, supplies, and equipment; command-and-control augmentation; battlefield illumination; tactical aero medical evacuation; and combat search and rescue support. When equipped with the Harvest HAWK ISR / Weapon Mission kit, the aircraft can perform Multi-Sensor Image Reconnaissance (MIR) and provide Close Air Support (CAS). With its increase in speed, altitude, range, and performance; state-of-the-art flight station, which includes two

heads-up displays (HUDs), night vision lighting, an augmented crew station, fully integrated digital avionics; enhanced air-to-air refueling capability; and aircraft survivability enhancements, the KC-130J provides the MAGTF commander with multi-mission capabilities well into the 21st Century.

Status
The USMC requirement is for 79 KC-130Js. The legacy fleet of 51 KC-130F and R model aircraft has been retired as of December 2008, with 28 KC-130T model aircraft yet to be replaced. As of December 2010, the USMC KC-130J inventory consisted of 41 KC-130Js.

Developers
Lockheed Martin Marietta, Georgia

Medium-Range Maritime UAS (MRMUAS)

Description
In FY 2010, the Office of the Chief of Naval Operations (OPNAV) conducted the Medium-Range Maritime UAS Capabilities Based Assessment. The draft MRMUAS CBA identified gaps in range, endurance, and intelligence-collection capabilities for a maritime-based airborne platform. In addition, the Maritime Intelligence, Surveillance, and Reconnaissance (ISR) support to Special Operations Forces (SOF) Initial Capabilities Document identified airborne ISR capable of sea- and land-basing as a gap in support to SOF missions. The Navy (OPNAV N2N6) identified funding in FY 2012 to develop and procure a system capable of operation from any air-capable ship to close these gaps. The envisioned system will perform up to eight hours of effective on-station time; it will have the capability to carry modular multi-mission ISR payloads and/or weapons. The system would possess both line-of-sight and beyond line of sight communications capability for air vehicle control and sensor data dissemination.

Status
FY 2012 represents a new start budget submission. The program will be structured to match program resources to United States Navy and Joint objectives/constraints with the goal of delivering an initial capability in FY 2019.

Developers
To be determined.

MH-60 R/S *Seahawk* Multi-Mission Combat Helicopters

Description
The MH-60R and MH-60S multi-mission combat helicopters are the two pillars of the CNO's Naval Helicopter Concept of Operations for the 21st Century. Under the Helicopter CONOPS, the *Seahawk* will deploy in companion squadrons embarked in the Navy's aircraft carriers, surface warships, and logistics ships. The MH-60R will provide surface and undersea warfare support to operations with a suite of sensors and weapons that include dip-

ping sonar, electronic support measures, advanced Forward Looking Infrared, and precision air-to-surface missiles. The MH-60S will provide mine warfare support for Sea Shield and will partner with the MH-60R for surface warfare missions carrying the same FLIR air-to-ground sensors and weapons. The MH-60S will be reconfigurable to provide Combat Search and Rescue (CSAR) and Naval Special Warfare (NSW) support to joint theater operations. Airborne mine countermeasures (AMCM) operations will be accomplished using advanced sensor and weapons packages to provide detection, localization, and neutralization of anti-access threats. The MH-60S will anchor the fleet logistics role in carrier strike group and expeditionary strike group operations. MH-60R/S platforms are produced with 85 percent common components (e.g., common cockpit and dynamic components) to simplify maintenance, logistics, and training.

Status

The MH-60R completed its OPEVAL in third quarter FY 2005. It was authorized to enter Full Rate Production in March 2006. The Navy plans to acquire 300 MH-60Rs. The MH-60S was approved for FRP in August 2002 and is currently undergoing scheduled block upgrades for Armed Helicopter and AMCM missions. The Navy plans to acquire 275 MH-60S helicopters.

Developers

Lockheed Martin	Oswego, New York
Sikorsky	Stratford, Connecticut

MQ-8B *Fire Scout* Vertical Takeoff and Landing Tactical UAV (VTUAV)

Description

Fire Scout supports warfighting requirements as a part of the Littoral Combat Ship (LCS) anti-submarine warfare (ASW), mine warfare (MIW), and surface warfare (SUW) mission modules. *Fire Scout* provides day/night real-time intelligence, surveillance, and reconnaissance (ISR); target acquisition; voice communications relay; and battlefield management capabilities to the tactical commander. It is operated and maintained by members of a composite VTUAV/MH-60R or VTUAV/MH-60S aviation detachment.

Status

In late 2010, *Fire Scout* was completing development testing (DT). Operational testing (OT) will be conducted in the first quarter of FY 2011 on board USS Halyburton (FFG 40). IOC will occur in the third quarter of FY 2011 on board Halyburton. Testing and integration on LCS is underway and will complete in FY 2012. The *Fire Scout* program is funding efforts to add a maritime radar and weapon capability to support LCS IOC planned for FY 2013. *Fire Scout* will also deploy to the CENTCOM theater of operation in March 2011 in a land-based application.

Developers

Northrop Grumman	San Diego, California
Schweizer Aircraft Corporation	Big Flats, New York

MV-22 *Osprey*

Description

The MV-22 *Osprey* is a tilt-rotor—the only such operational military aircraft in the world—Vertical/Short Take-Off or Landing (V/STOL) aircraft designed as the medium-lift replacement for the CH-46E helicopter. The MV-22 design incorporates advanced technologies in composite materials, survivability, airfoil design, fly-by-wire controls, digital avionics, and manufacturing. The MV-22 is capable of carrying 24 combat-equipped Marines or a 12,500 pound dual-hook or 10,000 pound single-hook external load, and has a strategic self-deployment capability of 2,100 NMs with a single aerial refueling. The MV-22 flight capabilities are far superior to the CH-46E it replaces with twice the speed, three times the payload, and six times the range. The MV-22 represents a revolutionary change in aircraft capability to meet a plethora of expeditionary and unique missions for the 21st Century. A Special Operation Forces (SOF) variant, the CV-22, is being procured by the Air Force and U.S. Special Operations Command (USSOCOM).

Status

With MS III complete and the program approved for Full Rate Production, the V-22 entered a congressionally approved joint five-year Multi-Year Procurement (MYP) in FY 2008. IOC was declared for the MV-22 in June 2007. Six East Coast VMM squadrons have successfully stood up and completed combat tours in Iraq and Afghanistan, and on shipboard expeditionary deployments. Two MV-22 squadrons have stood up on the West Coast with their first deployments scheduled in FY 2013. CV-22 IOC occurred in FY 2009.

Developers

Bell Helicopter Textron	Fort Worth, Texas
Boeing Defense and Space Group Helicopter Division	Philadelphia, Pennsylvania
Rolls Royce	Indianapolis, Indiana

Numerous other major suppliers, including BAE, EFW, General Dynamics, Honeywell, Moog, Northrop Grumman, Raytheon, Smiths, Sundstrand, and Vought.

Navy Unmanned Combat Aircraft System Demonstration (UCAS-D)

Description

The Navy Unmanned Combat Air System Demonstration (UCAS-D) evolved from the joint Navy/Air Force development program called J-UCAS. The 2006 QDR and other program decisions restructured the J-UCAS program to initiate development of an "unmanned longer-range carrier-based aircraft...to provide greater standoff capability...and increase naval reach and persistence." Program management and associated technologies were transferred to the Navy in August 2006. The initial efforts in the UCAS program are to demonstrate critical technologies for a carrier suitable low-observable (LO) air vehicle in a relevant environment (UCAS-D) and to conduct automated air refueling (AAR)

demonstrations. These and other risk reduction efforts must be completed to achieve the appropriate Technology Readiness Level (TRL-6) in preparation for a future acquisition program.

The UCAS-D air vehicles will neither carry weapons nor be operational, as they will not include any mission systems or sensors. Future UCAS technology development areas include transformational communications, integrated advanced propulsion, carrier-suitable materials, LO sensors and apertures, sense and avoid functionality (operating in a LO environment), and expanded autonomous operations. Critical technological risks are associated with landing unmanned LO shapes on board ships, the integration of UCAS into manned carrier air wing operations, and high levels of vehicle and sensor autonomy. A deliberate and step-wise approach is required to successfully make this transformation.

The Navy is also exploring the capabilities required for a future unmanned, carrier-based aircraft that could conduct ISR and precision-strike missions.

Status
On August 1, 2007, Northrop Grumman Systems Corporation was awarded the UCAS-D contract. Demonstration areas for shipboard operations include catapult launches, arrested landings, and flight in the vicinity of an aircraft carrier. Two air vehicles are being built for the UCAS-D, with first flight of Air Vehicle #1 completed in FY 2010. Carrier operations are to be conducted with both air vehicles in FY 2012. The AAR efforts will be conducted with Air Vehicle #2 after the CV demonstration.

Developers
Northrop Grumman Systems Corporation Palmdale, California

P-3C *Orion* Modification, Improvement, and Sustainment

Description
A key enabler to the tri-service maritime strategy, the legacy P-3C *Orion* provides Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), and Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities to naval and joint commanders. The P-3C contributes directly to maritime domain awareness across the globe in support of carrier and expeditionary strike groups. Squadrons are based in Jacksonville, Florida; Whidbey Island, Washington; and Kaneohe Bay, Hawaii.

An airframe in very high demand, the Navy's P-3 roadmap focuses on three areas: airframe sustainment; mission systems sustainment; and re-capitalization by the P-8A *Poseidon* to provide a force optimized for regional and littoral crisis and conflict. Specific program elements include:

Airframe Sustainment: In 2003 a service life assessment program (SLAP) was completed to determine what actions must be taken to safely extend the P-3C airframe service life. Based on SLAP data, the Navy determined that all P-3s require varying degrees of fatigue

inspections and/or repairs at periodic intervals throughout their service lives. Initially a three-tiered approach was undertaken to address fatigue critical areas that included Special Structural Inspections (SSI), Enhanced Special Structural Inspections (ESSI), and Special Structural Inspection Kits (SSI-K), implemented with the objective of minimizing investment requirements to safely enable sustainment of the P-3C fleet until the P-8A IOC/FOC. SSIs provided fatigue inspections and subsequent repairs necessary to ensure safety of flight until more comprehensive maintenance could be performed. ESSI (FY 2003-06) and the follow-on SSI-K (FY 2005-current) program of record provide pre-emptive modification and replacement of critical airframe structural components to enable the airframe to reach its designed service life. In December 2007, 39 aircraft were grounded as a result of P-3C Fatigue Life Management Program (FLMP) analysis that revealed the aft lower surface of the outer-wing (Zone 5) experienced fatigue at higher levels than previously estimated. Subsequently, the CNO approved a P-3 Recovery Plan that included a dual-path approach to structurally modify outer wings in order to return grounded aircraft back to the Fleet. The dual-path approach encompassed targeted Zone 5 modifications, which included limited replacement of outer-wing components, as well as the manufacturing and installation of new outer-wing assemblies. Though P-3C fatigue and material condition continues to be evaluated via FLMP and remains a persistent risk, inspection, repair, and modification efforts remain essential to sustaining the P-3C fleet until the P-8A starts replacing the P-3C in 2013.

Mission Systems Sustainment: The Mission System Sustainment program is designed to improve aircraft availability through replacement and upgrades of obsolete systems with modern and more reliable hardware systems and software. These programs ensure the P-3C continues to meet the Navy's ASW, ASUW, Over-the-Horizon Targeting, and C4ISR requirements, while also reducing risk in mission system migration/integration for the P-8A Poseidon.

Recapitalization: The P-8A *Poseidon* recapitalizes the Maritime Patrol ASW, ASUW, and armed ISR capabilities that reside in P-3 squadrons. The P-8A will start to fill the P-3C capability in 2013.

Status

With more than 100 aircraft having been periodically grounded for fatigue since 2005, P-3 sustainment and modernization programs remain critical to ensure successful transition to the P-8A *Poseidon*. Continued groundings are expected during semiannual updates to individual airframe fatigue analysis. Through CY 2010, 87 SSIs were completed (inspection and repair efforts finished), 39 ESSIs were completed (inspection and repair efforts finished), 29 SSI-Ks were completed with 29 aircraft and 13 rotable wingsets in work, and 31 Zone 5 modifications have been completed with 31 aircraft and 11 rotable wingsets in work. Procurement of 17 outer wing assemblies was initiated in 2008 with installs commencing in 2010 (up to 29 planned).

Developers

Lockheed Martin	Eagan, Minnesota
Lockheed Martin	Greenville, South Carolina
Lockheed Martin	Manassas, Virginia
Lockheed Martin	Marietta, Georgia
Other Developers:	
L-3 Communications	Greenville, Texas
L-3 Communications	Waco, Texas

P-8A *Poseidon* Multi-mission Maritime Aircraft (MMA)

Photo courtesy of Boeing

Description

The P-8A *Poseidon* will replace the P-3C *Orion*, which has reached the end of its service life. The P-8A will feature a technologically agile, open architecture that enables integration of modern, capable sensors with robust communications. P-8A will tailor integration of its on-board mission suite with unmanned aerial vehicles and satellite-based systems and sensors to assure maritime access in support of the Sea Shield pillar of Sea Power 21, as well as the Force Application, Command and Control, and Battlespace Awareness Joint Capability Areas. P-8A will provide unique broad-area, persistent undersea warfare cueing-to-killing capability, as well as significant ASUW and ISR capability. P-8A will leverage global logistics support infrastructure and established advanced training applications to provide both higher availability and improved warfighting readiness.

Status

The MMA program received a Milestone 0 decision in March 2000 and explored concepts for MMA with industry. Included in the concepts was the integration of UAVs to augment MMA capability. An analysis of alternatives began in the summer of 2000 and leveraged previous analyses and the results of the industry studies. The AoA concluded that manned aircraft are an essential element of providing broad- area maritime and littoral armed ISR, and that UAVs provided a transformational opportunity for obtaining additional capability for warfighters. In 2002, the Navy re-engaged industry in Component Advanced Development, refining concepts, matching architecture to fill the Navy vision, and validating requirements. The Under Secretary of Defense (AT&L) approved a revised acquisition strategy to focus MMA on P-3 replacement, not a P-3 service life extension. The Operational ORD/CDD was endorsed by the Navy staff and received the required certifications from the Joint staff in preparation for a 2004 Milestone B (entry into SDD). That milestone was successfully passed in May 2004 and the Navy selected the McDonnell-Douglas Corporation, a wholly owned subsidiary of the Boeing Company, as the single system integrator in June 2004. P-8A completed Preliminary Design Review in November 2005, Critical Design Review in June 2007, and Design Readiness Review in August 2007. The program successfully passed Milestone C on 27 August 2010 and received permission from USD AT&L to buy three Low Rate Initial Production lots totaling 24 aircraft. The first lot of six P-8As will be delivered in FY 2012 to support an Initial Operational Capability in FY 2013.

Developers

Boeing	Renton, Washington

RQ-7B MCTUAS *Shadow*
Marine Corps Tactical Unmanned Aircraft System

Description

The RQ-7B *Shadow* is an Expeditionary Group 3 Unmanned Aircraft System (UAS) integral to the Marine Aircraft Wings (MAWs). The *Shadow* provides dedicated tactical reconnaissance, surveillance, target acquisition, target laser designation, and communications relay in support of MAGTF and maritime-control operations. Each individual *Shadow* system consists of two ground control stations, four air vehicles, a pneumatic-hydraulic launcher, and support equipment. Each air vehicle is equipped with a full-motion video (FMV) electro-optical/infrared (EO/IR) camera with an integral laser pointer/designator and a dedicated communications relay package for ground support. Three active duty VMU squadrons and one reserve component squadron provide organic UAS multi-mission capability to the Marine Expeditionary Force/Joint Task Force (MEF/JTF) Commander. Each VMU squadron operates three RQ-7B systems that are task-organized to operate independently (distributed operations) as separate detachments.

Status

The RQ-7B *Shadow* is a U.S. Army ACAT 2 program. The Army, acting as lead service, provides configuration management, training, research/development/test/evaluation (RDTE), and production contracting support to the Navy/USMC team. By maintaining a common RQ-7B configuration, all services are able to realize programmatic economic efficiencies. The fielded USMC Shadow systems are scheduled to receive several technical upgrades in FY 2011-13. These upgrades include a Tactical Common Data Link (TCDL), a digital Universal Ground Control Station (UGCS), and an air vehicle wing modification to increase endurance. Additionally, USMC RQ-7B systems will serve as the air vehicle platforms for a Wide Angle Augmentation System (WAAS) payload field user evaluation scheduled for early 2012.

Developers

AAI — Hunt Valley, Maryland

Small Tactical Unmanned Aircraft System (STUAS)

Description

STUAS is a Group 3 organic asset for Navy Special Warfare and Whidbey Island (LSD 41) class ships to provide tactical ISR capability. Sensors are EO/IR with laser range finder and illuminator, communications relay (land-based version), and Automatic Identification System (AIS) (shipboard version) capability. Four systems are planned, three for NSW and one for LSD class ships. A system consists of five vehicles, a ground control station, launch and recovery equipment, spares, and other government furnished equipment.

Status

The STUAS CDD is complete. Milestone B was achieved in July 2010 and the Engineering Manufacturing and Development (EMD) phase initiated in August 2010. Milestone C is scheduled for 2012, and IOC is expected in FY 2013. The Insitu *Integrator* was

selected as the STUAS vehicle. The *Integrator* is a 75-pound, 16-foot wingspan vehicle capable of 12-15 hours endurance, 55 knots, and altitudes greater than 15,000 feet.

Developers

Insitu, Inc.	Bingen, Washington

AVIATION WEAPONS

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM)

Description

The Navy's AGM-88E AARGM is the latest evolution of the High-speed Anti-Radiation Anti-Missile (HARM) weapon system. HARM is the Navy's only anti-radiation, defense-suppression, air-to-surface missile. Employed successfully in naval operations for decades, HARM is designed to destroy or suppress broadcasting enemy electronic emitters, especially those associated with radar sites used to direct anti-aircraft guns and surface-to-air missiles. AGM-88B (Block IIIA) and AGM-88C (Block V) are the fielded fleet configurations of HARM. The legacy HARM program was a joint-service program with the Navy as lead service. The AGM-88E project upgrades a portion of existing HARM missile inventory with a new guidance section incorporating multi-sensor, multi-spectral digital anti-radiation homing detection capability, GPS/INS) guidance, and a millimeter-wave terminal seeker. AARGM also includes a netted situation awareness/targeting capability and weapon impact assessment reporting via direct connectivity with national technical means. The AARGM system will provide the U.S. Navy/Marine Corps and the Italian Air Force with a transformational and affordable destruction of enemy air defenses (DEAD) and time-sensitive strike capability upgrade to HARM. The U.S. DoD and the Ministry of Defense of the Republic of Italy have signed an international MoA for cooperative development of AGM-88E.

Status

The AGM-88E is an ACAT-IC SDD program with a planned IOC in 2011. The AARGM inventory objective is 1,750 tactical rounds for integration on F/A-18C/D/E/F and EA-18G aircraft. The Italian Air Force will integrate AARGM on their Tornado ECR aircraft. AARGM was successfully demonstrated in eight developmental test firings and is scheduled to begin initial operational test and evaluation (IOT&E) in late 2010 or early 2011.

Developers

ATK	Woodland Hills, California
Raytheon	Tucson, Arizona

AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM)

Description

AIM-120 AMRAAM is an all-weather, all-environment radar-guided missile developed by the Air Force and Navy. The missile is deployed on the F/A-18A+/C/D Hornet and the F/A-18E/F Super Hornet, and will be deployed on the EA-18G and Joint Strike Fighter aircraft. Entering the fleet in September 1993, AMRAAM has evolved to maintain air superiority through pre-planned product improvement (P3I) programs. This modernization plan includes clipped wings for internal carriage, a propulsion enhancement program, increased warhead lethality, and enhanced electronic counter-countermeasures (ECCM) capabilities through hardware and software upgrades. Most importantly to the warfighter, the missile has improved capabilities against low- and high-altitude targets in an advancing threat environment. AMRAAM is expected to be the sole medium/beyond visual range (M/BVR) missile with the "sundown" of the AIM-7 Sparrow by the end of the Future Years Defense Program (FYDP). The Department of the Navy is investigating follow-on options for BVR missile capabilities to match the NAV2031 requirements.

Status

The AIM-120C7 missile variant is a product of P3I and it IOC'd in FY 2008. AIM-120C7 completed production in FY 2008 as AIM-120D production began. AIM-120D IOC is scheduled for FY 2012.

Developers

Raytheon — Tucson, Arizona

AIM-9X Sidewinder Short Range Air-to-Air Missile (SRAAM)

Description

The AIM-9X is the latest in the Sidewinder series. It is a 5th generation IR launch-and-leave missile with superior detection and tracking capability, high off-boresight capability, robust IR counter-countermeasures (IRCCM), enhanced maneuverability, and growth potential via software improvements. The AIM-9X development leveraged existing AIM-9M components to minimize development risk and cost. AIM-9X achieved IOC in FY 2004 and is in production for both the U.S. and FMS customers. Various independent obsolescence and P3I efforts have been on-going since IOC. A series of independent engineering change proposals (ECPs) provided improved performance in terms of faster processors in the guidance control unit, an improved fuze/target detector (DSU-41), and smaller components freeing up space within the missile. Exploiting these improvements and additional space as part of an integrated solution provided an opportunity to increase the AIM-9X capability beyond what is fielded. The warfighter has documented these requirements in the AIM-9X Block II Capability Production Document (CPD) currently in Navy staffing.

Status

More than 900 9X Block I all-up rounds (AUR) and 350 Block I captive air-training missiles (CATM) have been delivered to

the Navy. The AIM-9X Block II is in developmental test, and the Block II program is expected to be established via a Milestone C decision in FY 2011 to meet the new requirements.

Developers

Raytheon	Tucson, Arizona

AGM-154 Joint Standoff Weapon (JSOW)

Description

JSOW is a family of armaments that permit naval aircraft to attack targets at increased standoff distances. The weapons use GPS and INS for guidance. All JSOW variants share a common body but can be configured for use against area targets or bunker penetration. The JSOW Unitary (JSOW-C) variant adds an imaging IR seeker and autonomous target acquisition (ATA) to attack point targets with precision accuracy. The JSOW-C-1 will incorporate new target-tracking algorithms into the seeker for moving targets, giving the joint force commanders an affordable, air delivered, standoff weapon that is effective against fixed and re-locatable land targets, as well as maritime targets. Used in conjunction with accurate targeting information and anti-radiation weapons, JSOW-C-1 will destroy enemy air defenses, creating sanctuaries that permit the rapid transition to low-cost, direct-attack ordnance.

Status

AGM-154A reached IOC in 1999, and the AGM-154C variant achieved IOC in FY 2005. Procurement of JSOW C continues until FY 2011 when procurement of the JSOW C-1 will begin. JSOW C-1 is planned to be procured until 2020.

Developers

Raytheon	Tucson, Arizona

Airborne Mine Neutralization System (AMNS)

Description

The AMNS is an expendable, remotely operated mine neutralization device that leverages non-developmental integration and COTS technologies. Deployed from MH-60S helicopters, it provides identification and neutralization of "proud" (i.e., not buried) and in-volume naval mines. AMNS devices are intended for use in previously detected mine locations, where they will reacquire and neutralize identified targets.

Status

Beginning in FY 2003, legacy AMNS (ASQ-232) systems were procured for the MH-53E to provide a near-term contingency airborne neutralization capability. Follow-on AMNS (AN/ASQ-235) system integration work for the MH-60S began in FY 2003 and will continue through a projected FY 2013 IOC for the AMNS on the MH-60S.

Developers

BAE	Waterloo, United Kingdom
Alliant Techsystems	Keyser, West Virginia
Raytheon	Portsmouth, Rhode Island

Laser-Guided Bomb (LGB), Dual-Mode LGB (DMLGB), Direct-Attack Moving Target Capability (DAMTC)

Description

The LGB program is a Navy and Air Force joint effort, with the latter acting as the lead and executive service for procurement. LGBs include GBU-10, 12, and 16 that use MK-80/BLU series general-purpose (GP) bomb bodies, and GBU-24 that uses the BLU-109 bomb body incorporating state-of-the-art guidance and control features. GBU-12 is a 500-pound class weapon, GBU-16 is a 1,000-pound class weapon, and GBU-10 is a 2,000-pound class weapon. An LGB has a MK-80/BLU-series warhead fitted with a laser-guidance kit and computer control group (CCG) mounted on the bomb nose. An electronic fuse housed in the aft section of the bomb body initiates the warhead. The seeker, housed in the CCG, senses laser energy and sends signals to the CCG canards to guide the weapon to the spot of reflected energy. Laser energy can be applied to the target by ground or airborne designators, or self-designated by laser-configured aircraft. LGBs will remain in the inventory until at least 2020.

The DMLGB is a retrofit to the legacy LGBs in the Navy's inventory, which converts them to the dual-mode configuration using common components. It provides increased flexibility to the warfighter by combining the proven technology of laser terminal guidance with all-weather fire-and-forget capability of INS/GPS guidance. The retrofit involves replacing the existing CCG system with an INS/GPS to provide legacy LGBs with an all-weather guidance system. By using a retrofit strategy vice developing a new weapon, the services have streamlined the qualification timelines and are putting a new weapon capability in the warfighters' hands faster. DMLGB reached IOC in September 2007 on both the AV-8B *Harrier* and F/A-18 strike-fighter aircraft, with planned future integration on the F-35 JSF.

Dual-mode LGBs offer the flexibility to precisely attack fixed targets in all-weather conditions while offering the ability to attack "pop-up" targets of opportunity. However, LGBs were designed to attack fixed targets, and joint forces fixed-wing aircraft have had few level-of-effort options for attacking moving targets for close air support scenarios and other fires in support of maneuver operations. In September 2006, Commander Central Air Force (CENTAF) released an urgent operational need (UON) to address this capability gap against ground moving targets. The Department of the Navy and the Department of the Air Force released a rapid deployment capability (RDC) and quick reaction capability (QRC), respectively, to provide a low-cost, non-developmental enhancement to GBU-38 to quickly address the moving target capability gap. DAMTC adds a clear-weather capability against moving targets by adding enhancements to existing inventory of precision-guidance munitions (PGMs). The intent of DAMTC is to provide a limited near-term capability gap-filler against moving targets as other weapons are in development. SDB II and JAGM will provide the Joint Forces the ability to engage moving targets at standoff ranges, and are scheduled to become operational after 2015.

Status
Approximately 7,500 Dual-Mode Kits will be procured through the life of the program. Open competition of source selection for the DAMTC was completed in February 2010 with the Milestone C decision. Boeing was awarded the contract to produce the Laser Joint Direct Attack Missile (LJDAM), which provides the DAMTC capability to Navy strike aircraft. LJDAM provides added capability and an extra degree of flexibility to the Fleet's existing inventory of PGMs to satisfy the ground moving target capability gap. Approximately 5,600 LJDAM Kits will be procured through the life of the program

Developers

Lockheed Martin	Bethesda, Maryland
Raytheon	Tucson, Arizona

AVIATION SENSORS

Airborne Laser Mine Detection System (ALMDS)

Description
The ALMDS is a high-area coverage, electro-optic airborne mine countermeasures laser system that detects, classifies, and localizes floating and near-surface moored sea mines. Deployed from the MH-60S helicopter, ALMDS will satisfy the Navy's need for a quick-response, wide-area MCM system that can rapidly detect and classify mine-like contacts for subsequent prosecution. This capability will be critical in littoral zones, confined straits, choke points, operating areas, and amphibious objective areas. ALMDS offers a much greater area search rate than other types of AMCM equipment, and it represents a capability that does not exist in the current inventory.

Status
A competitive contract was awarded in April 2000 for development of an integrated ALMDS system for the MH-60S. Milestone C and LRIP I occurred in FY 2005. The IOC is scheduled for FY 2012.

Developers

Arete Associates	Tucson, Arizona
Northrop Grumman	Melbourne, Florida

ALR-67(V)3 Advanced Special Receiver

Description

The ALR-67(V)3 Radar Warning Receiver (RWR) will satisfy Navy requirements through the year 2020. It enables the Navy F/A-18 family of strike-fighter aircraft to detect threat radar emissions, thus enhancing aircrew situational awareness and aircraft survivability.

Status

The ALR-67(V)3 program successfully completed EMD phase and operational testing in 1999 and is in full-rate production. Production quantities will eventually outfit all F/A-18 aircraft.

Developers

Raytheon	Goleta, California

APG-79 Active Electronically Scanned Array (AESA) Radar System

Description

The APG-79 AESA Phase I upgrade provides multi-mode function flexibility while enhancing performance in the air-to-air arena (including cruise missile defense) as well as the air-to-ground arena. The Phase II upgrade will provide enhanced performance in hostile electronic countermeasures environments and also provide significant electronic warfare improvements enabling the targeting of hostile emitters. Growth provisions will allow for future reconnaissance capability through the use of synthetic aperture radar technology and improved hardware and software.

Status

The APG-79 completed subcontractor competition in November 1999, the Engineering and Manufacturing Development contract was awarded in February 2001, and the radar achieved Initial Operational Capability in 2007. Planned APG-79 AESA procurement is 445 systems—310 forward fit and 135 retrofit. AESA Milestone C and LRIP II approvals were received in January 2004, for initial delivery with Lot 27 *Super Hornets* in FY 2005. Full Rate Production was achieved in June 2007, following completion of the Initial OPEVAL in December 2006. The first deployment for AESA was with VFA-22 in 2008. Retrofit installs into Lot 26-29 F/A-18E/Fs are planned to begin in 2011.

Developers

Boeing	St. Louis, Missouri
Raytheon	El Segundo, California

ASQ-228 Advanced Targeting Forward-Looking Infra-Red (ATFLIR)

Description

The ATFLIR provides the F/A-18A+/C/D/E/F strike-fighter aircraft with a significantly enhanced capability to detect, track, and attack air and ground targets. Laser-guided and GPS standoff weapons systems and higher-altitude attack profiles require improved performance over the current AAS-38/46 NITEHAWK Targeting FLIR. The ATFLIR is designed to provide a quantum leap in operational effectiveness to support fully the standoff precision-strike mission. Improved reliability and maintainability will increase operational availability while reducing total ownership costs.

Status

ATFLIR completed Phase I OPEVAL in September 2003 and was determined to be operationally suitable and effective and was recommended for further fleet introduction. ATFLIR achieved IOC in September 2003 and demonstrated its combat capability in support of Operation Iraqi Freedom. The program was awarded MS III/FRP decision on October 17, 2003. Additional procurement of data link kits and upgrades will continue through the FYDP.

Developers

Boeing	St. Louis, Missouri
Raytheon	El Segundo, California

Organic Airborne and Surface Influence Sweep (OASIS) MCM

Description

The OASIS MCM system will provide the Littoral Combat Ship (LCS) with a high-speed, magnetic/acoustic influence minesweeping capability to effectively neutralize sea mine threats in operating areas where mine hunting is not possible due to mine burial or high bottom clutter. The OASIS system is one of four AMCM systems under development that will be deployed and operated from the MH-60S helicopter.

Status

Milestone C and LRIP I completed in FY 2008. System re-design completed in FY 2009. IOC is scheduled for 2014.

Developers

ITT	Panama City, Florida

AVIATION EQUIPMENT AND SYSTEMS

IDECM Integrated Defensive Electronic Counter-Measures

Description

The IDECM system is used to defend the host aircraft against radar-guided surface-to-air missile (SAM) and air-to-air missile (AAM) systems. Either through a towed decoy or several on-board transmitters, the ALQ-214 produces complex waveform radar jamming that defeats advanced SAM/AAM systems. IDECM systems are employed on the FA-18E/F *Super Hornet*; the ALQ-214 On-Board Jammer component is also employed on the F/A-18A+C/D Hornet aircraft.

Status

IDECM has been developed in three phases:

IDECM Blk 1: ALQ-165 On Board Jammer and ALE-50 towed decoy (IOC FY 2002)

IDECM Blk 2: ALQ-214 On Board Jammer and ALE-50 towed decoy (IOC FY 2005)

IDECM Blk 3: ALQ-214 On Board Jammer and ALE-55 Fiber Optic Towed Decoy (IOC FY 2009)

The ALQ-214 and ALE-50 (towed decoy) combination is in full-rate production. The ALE-55 Fiber Optic Towed Decoy is in developmental/operational test.

Developers

BAE Systems	Nashua, New Hampshire
ITT	Clifton, New Jersey

Joint and Allied Threat Awareness System (JATAS)

Description

JATAS is an advanced missile warning system to increase the survivability of Marine Corps and Navy rotary-wing aircraft against IR threats. JATAS will be designed to enhance aircraft survivability by providing advanced missile warning capability, warning of laser-based weapon systems, and unguided hostile fire detection.

Status

A 16-month competitive prototyping technology development phase, directed by ASN(RD&A) in the JATAS Technology Development Strategy (TDS) in January 2009, includes two prime contractors. Approaching the conclusion of the TD Phase, the Naval Air Systems Command PMA-272 will conduct a full and open competitive source selection for the EMD system contractor.

Developers

ATK	Clearwater, Florida
Lockheed Martin	Orlando, Florida

Joint Mission Planning Systems (JMPS)

Description

Navy Joint Mission Planning System (NavMPS)—primarily comprising the Joint Mission Planning System (JMPS) suite of applications—is used to plan and load mission data into an aircraft's avionics systems. It allows aircrew to perform tactical mission planning at the Secret level for a variety of aviation platforms and air-launched weapons. JMPS incorporates legacy Navy Portable Flight Planning Software (N-PFPS) capabilities and other platform-specific mission planning capabilities to bring all "stovepipe" legacy Department of Defense (DoD) mission-planning systems under one program and within a common JMPS framework. For platforms that have migrated, JMPS is now the sole interface to load mission-critical data into the aircraft.

Status

JMPS is fielded to all F/A-18 variants (including EA-18G), E-2C, EA-6B, AV-8B, V-22 and Naval Aviation training aircraft. All N-PFPS users plan to transition to JMPS by FY 2012. N-PFPS is used primarily by the Navy/Marine Corps expeditionary warfare, helicopter, maritime patrol aircraft, and intelligence communities. JMPS began replacing the legacy Tactical Automated Mission Planning System (TAMPS) in FY 2005; TAMPS retired in FY 2007. In FY 2008, JMPS began development to transition to a DoD-mandated Service Oriented Architecture (SOA); an initial SOA-based JMPS is scheduled to IOC by FY 2012.

Developers

British Aerospace	Camarillo, California
Northrop Grumman	San Pedro, California
USAF 46TS/TYBRIN	Fort Walton, Florida

Joint Precision Approach and Landing System (JPALS)

Description

JPALS is a joint DoD effort with the Air Force and Army. The Navy assumed the lead service role in March 2007. JPALS fulfills the need for a rapidly deployable, adverse weather, adverse terrain, day-night, survivable, DoD/civil/internationally interoperable, and mobile precision approach and landing capability that can support the principles of forward presence, crisis response, and mobility. Sea-based JPALS consists of a global positing system/inertial navigation (GPS-INS)-based precision landing system component (Shipboard Relative GPS, or SRGPS) with a low-probability of intercept (LPI) two-way data-link, as well as an independent backup system. JPALS provides critical enabling technology for emerging naval programs such as CVN 78 class aircraft carriers, Joint Strike Fighter, N-UCAS, and Zumwalt (DDG 1000) class surface warships. Sea-based JPALS will also be installed on all air-capable surface ships, most CVN air wing aircraft (F/A-18E/F, E/A-18G, E-2C/D, C-2A, and MH-60 R/S), and all DoD aircraft

capable of operating from Navy ships. Except for the system designated as the SRGPS backup, JPALS will replace the Automatic Carrier Landing System (ACLS) on aircraft carriers, SPN-35 on LH-class amphibious ships, and various approach systems ashore, including Instrument Landing Systems (ILS), TACAN, and Precision Approach Radar (PAR) both fixed and mobile. JPALS will be civil interoperable and FAA certifiable.

Status

JPALS completed Milestone B in June 2008 with contract award on September 15, 2008. Sea-based JPALS IOC is 2014. The system is on schedule for installation in CVN 78, the lead ship of the CVN 21 program new-design aircraft carrier.

Developers

Raytheon — Fullerton, California

Partnering developers include Rockwell Collins, Northrop Grumman, SAIC.

Large Aircraft Infrared Countermeasures (LAIRCM)

Description

The AAQ-24(V)25, Department of the Navy (DoN) LAIRCM System combines advanced, two-color infrared (IR) missile-warning system (MWS) and directed-laser countermeasures to defeat shoulder-launched missiles. The system is being deployed on Marine Corps CH-53E and CH-46E assault helicopters to meet the urgent need for a state-of-the-art, reliable, carrier- and land-based MWS and IR countermeasures.

The DoN LAIRCM system consists of five major components: five IR MWS sensors; a dedicated processor; a control indicator unit for cockpit display; two Guardian laser tracker assemblies consisting of four-axis stabilized gimbaled system, a fine track sensor, and a ViperTM laser.

The Naval Air Systems Command (NAVAIR) is working plans to incorporate DoN LAIRCM on additional USN/USMC platforms. Spiral upgrades include advanced threat warning and laser warning are being evaluated to address future threats and enhance overall survivability. The DoN LAIRCM Program Office continues to work closely with the Air Force in supporting test and evaluation and sustainment efforts.

Status

The DoN LAIRCM system is in FRP in late 2010. IOC was achieved in May 2009, and the FRP decision was approved in January 2010.

Developers

Northrop Grumman — Rolling Meadows, Illinois

Military Flight Operations Quality Assurance (MFOQA)

Description

MFOQA is a knowledge-management process using data collected during flight to conduct post-flight analysis of aircrew and aircraft systems performance. MFOQA requires no additional equipment to be mounted on the aircraft platform, and no additional tasking is added to the aircrew during flight. After each flight event, the aircrew can remove the data collection card, take it to the squadron ready room, and load in the data to squadron computers. Applying MFOQA software already loaded in the computer, the aircrew can replay the flight in animation, noting geographic position, instrument readings, and aircraft-performance parameters. In addition, maintenance personnel can perform diagnostic analysis of the aircraft systems, aircrews can self-evaluate their performance, and squadron leadership can review and counsel on flight procedures and safety and training issues. The ultimate payoff will be increased readiness through improved safety, better training, and faster maintenance troubleshooting. Data from each flight are aggregated for trend analysis at upper tiers of command at the group, wing, and type command levels. Flight operations quality assurance has been used in the commercial aviation industry for years. Surveys from the airline industry have yielded high praise for the process and its benefits to the Maintenance, Operations, Safety and Training (MOST) paradigm.

Status

MFOQA completed MS B in the first quarter of 2007 and is scheduled for MS C in the first quarter of FY 2012, with IOC to follow shortly thereafter. The plan is to implement MFOQA capability for 26 type/model/series aircraft over an annual phased approach. The lead platforms are the F/A-18C/D/E/F strike fighter and the EA-18G *Growler*. Follow-on phases will provide MFOQA capability to the MH-60R/S helicopters, the CH-53E heavy-lift helicopter, the MV-22B tilt-rotor aircraft, and the T-45 jet trainer, with additional platforms to follow. Platform priorities are driven by several factors, including mishap rates, system architecture to support data collection, and fleet concerns.

Developers

To be determined. Multiple sources following competition.

Tactical Control System (TCS)

Description

TCS is the ground station software operating system for the MQ-8B *Fire Scout* Vertical Takeoff and Landing Tactical UAV (VTUAV) Program. The software provides a full range of scalable unmanned aircraft system capabilities from passive receipt of air vehicle and payload data to full air vehicle and payload command and control from control stations ashore and afloat. TCS is designed to control multiple UAS aircraft simultaneously. TCS has the potential to be the common operating system for the Broad Area Maritime Surveillance (BAMS) UAS and Small Tactical UAS

(STUAS) programs, providing interoperability and commonality for mission planning, command and control, and C4I interfaces. It is compliant with NATO Standardization Agreement (STANAG) 4586 for UAS interoperability.

Status
As part of the *Fire Scout* VTUAV Program, TCS is completing development, and will IOC with the *Fire Scout* in FY 2011.

Developers
Raytheon Systems Inc. Falls Church, Virginia

Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System

Description
In FY 2009, the Office of the Chief of Naval Operations (OPNAV) conducted the Power Projection from the Sea (PPftS) Capabilities Based Assessment (CBA). The PPftS CBA identified gaps in persistent sea-based strike and reconnaissance, irregular warfare, coastal-defense cruise missile search, and theater ballistic missile search. The Navy identified funding in FY 2012 to develop and procure a carrier-based, unmanned air system (UAS) to provide ISR with precision strike capability to close these gaps. The envisioned system will enhance carrier versatility through integration of four-to-eight UAVs into a carrier air wing by FY 2018. The envisioned system will enable a single carrier to conduct "24/7" operations that include ISR, targeting, strike, and bomb damage assessment).

The envisioned UAS will be designed for autonomous operations from CVN 68 and CVN 78 class carriers. The UCLASS System comprises an air vehicle segment (airframe, ISR payloads, mission systems, weapons integration, and associated avionics), a shipboard launch/recovery control segment, a land-based control segment, a support segment, and a government-led aircraft carrier integration segment. Balanced survivability will be a feature of the system. Interfaces to existing shipboard and land-based tasking, collection, processing, exploitation, and dissemination (TCPED) systems will be provided. The scope of the effort includes design, development, integration, test, and training.

The program will be structured to match program resources to USN objectives/constraints with the goal of delivering a limited operational capability by the end of FY 2018.

Status
FY 2012 represents a new-start budget submission.

Developers
To be determined.

SECTION 2

SURFACE COMBATANTS

The Navy's surface force adapts to contribute to all of the Navy's core capabilities. A warship that provides power projection one day can deliver humanitarian aid and provide maritime security the next. Surface ships are on the front line of forward presence, sea control, and power projection, and also provide maritime security, deterrence, and humanitarian assistance.

SHIPS

CG 47 Ticonderoga-Class Aegis Guided-Missile Cruiser Modernization (CG MOD)

Description

Ticonderoga-class guided missile cruisers provide multi-mission offensive and defensive capabilities and can operate independently or as part of carrier strike groups, expeditionary strike forces, and surface action groups in support of global operations. The 22 remaining Ticonderoga-class cruisers (the first five Baseline 1 cruisers have been retired) have a combat system centered on the Aegis Weapon System and the SPY-1 multi-function, phased-array radar. The combat system includes the Mk 41 Vertical Launching System (VLS), which employs Standard Missile surface-to-air missiles and Tomahawk Land-Attack Missiles, advanced undersea and surface warfare systems, embarked sea-control helicopters, and robust command, control and communications systems in a potent, multi-mission warship. The Aegis Cruiser Modernization program includes hull, mechanical, and electrical (HM&E) upgrades as well as improved quality of life, mission life extension, integrated ship's control (ISC), all-electric auxiliaries, and weight and moment stability modifications. Combat Systems upgrades include an open architecture computing environment. Specific improvements include upgrades in air dominance with Cooperative Engagement Capability (CEC) and SPY radar upgrades, maritime force protection upgrades with the Close-In Weapon System (CIWS) Blk 1B, Evolved Sea Sparrow Missile (ESSM), Nulka decoy and SPQ-9B surface surveillance and tracking radar, and the SQQ-89A(V)15 anti-submarine warfare suite.

Cruiser Modernization warfighting improvements using an open architecture design will extend the Aegis Weapons System's capabilities against projected threats well into the 21st Century.

Status

Combat systems modernization commenced in FY 2008 with USS Bunker Hill (CG 52). Eight ships have completed the HM&E upgrade through the end of CY 2010 with one in progress in early FY 2011. Bunker Hill (CG 52) completed the first combined HM&E and CS modernization availability in FY 2009. Two additional ships have completed combat systems modernization, with two in progress. The remaining cruisers will be modernized by 2018.

Developers

General Dynamics Bath Iron Works	Bath, Maine
Lockheed Martin	Moorestown, New Jersey
Northrop Grumman Ship Systems	Pascagoula, Mississippi

DDG 51 Arleigh Burke-Class Aegis Guided-Missile Destroyer

Description

Arleigh Burke-class guided missile destroyers have combat systems centered on the Aegis Weapon System and the SPY-1D(V) multi-function, phased-array radar. The combat system includes the Mk 41 VLS, an advanced anti-submarine warfare system, advanced anti-air warfare missiles, and Tomahawk cruise missiles. Incorporating all-steel construction and gas-turbine propulsion, DDG 51 destroyers provide multi-mission offensive and defensive capabilities and can operate independently or as part of carrier strike groups, surface action groups, and expeditionary strike forces. The Flight IIA variants currently under construction incorporate facilities to support two embarked helicopters, significantly enhancing the ship's sea-control capabilities. A Flight III variant, which will incorporate the advanced Air and Missile Defense Radar to replace SPY-1D(V) currently under development, is in the technology development phase.

Status

The final Flight IIA, DDG 112 will deliver in FY 2012, completing the original DDG 51 line. DDG 112 will be fitted with Aegis combat system Baseline 7 Phase 1R, which incorporates CEC, Evolved Sea Sparrow Missile (ESSM), improved SPY-1D(V) radar, and open architecture combat systems using commercially developed processors and display equipment.

In FY 2010, the DDG 51 line was restarted ("DDG Restart") to continue production of this highly capable platform. Aegis Baseline 7 Phase 1R will be replaced with the Open Architecture Advanced Capability Build (ACB) 12 Aegis Combat System, in development for the DDG Modernization Program.

Flight III ships will begin production late in the FYDP.

Developers

General Dynamics Bath Iron Works	Bath, Maine
Lockheed Martin	Moorestown, New Jersey
Northrop Grumman Ship Systems	Pascagoula, Mississippi

DDG 51 Arleigh Burke-Class Aegis Guided-Missile Destroyer Modernization (DDG MOD)

Description

Arleigh Burke-class guided missile destroyers commenced mid-life modernization in FY 2010 with DDGs 51 and 53. The program will be accomplished in two phases. The first phase will concentrate on the HM&E systems, including new gigabit ethernet connectivity in the engineering plant, a Digital Video Surveillance System (DVSS), an Integrated Bridge System (IBS), an advanced galley, and other habitability and manpower-reduction modifications. A complete open architecture computing environment will be the foundation for warfighting improvements in the second phase of

the modernization for each ship. The upgrade plan consists of an improved Multi-Mission Signal Processor (MMSP) to accommodate an integrated air and ballistic missile defense (IABMD) capability and an improvement to radar performance in the littoral regions. Upon completion of the modernization program, the ships will have the following weapons and sensors: CEC, ESSM, CIWS Blk 1B, Surface Electronic Warfare Improvement Program (SEWIP), and Nulka. The Mk 41 VLS will be upgraded to support Standard Missile SM-3 and newer variants of the Standard Missile family. These two phases will be accomplished on each ship approximately two years apart. DDG 51 destroyers will continue to provide multi-mission offensive and defensive capabilities with the added benefit of sea-based protection from the ballistic missile threat.

Status

The HM&E modifications have been designed into the most recent new-construction Arleigh Burke-class destroyers. This design in new construction maximizes risk reduction and proofs these alterations in the builder's yards, reducing risk in the modernization program. DDG Modernization initially concentrates on the Flight I and II ships (hulls 51-78), but is intended as a modernization program for the entire class.

Developers

General Dynamics, Bath Iron Works	Bath, Maine
Northrop Grumman Ship Systems	Pascagoula, Mississippi
Lockheed Martin	Moorestown, New Jersey

DDG 1000 Zumwalt-Class 21st Century Destroyer

Description

The DDG 1000 Zumwalt guided-missile destroyer will be an optimally crewed, multi-mission surface combatant designed to fulfill long-range precision land-attack requirements and other missions shaped for the littoral operational environment. These ships will provide offensive, distributed, and precision, volume, and sustained fires in support of forces ashore. Additionally, they will serve as test-beds for advanced technology, such as integrated power systems and advanced survivability features, which can be incorporated into other ship classes. Other DDG 1000 features include an advanced hull form, optimal manning based on comprehensive human-systems integration and human-factors engineering studies, extensive automation, and advanced apertures. The crew size will be approximately half the size of a DDG 51.

Status

The DDG 1000 class was truncated to three ships in August 2008. DDG 1000 Nunn-McCurdy certification was completed in June 2010 due to the truncation of ship class to three ships resulting in higher per unit ship cost. DDG 1000 fabrication commenced in February 2009, and the lead ship is scheduled for delivery in FY 2014. At fabrication start, design detail was more than 80 percent

complete and surpassed any previous surface combatant in design fidelity. DDG 1001 fabrication commenced in February 2010 and is scheduled for delivery in FY 2015. The DDG 1000 class will be built by General Dynamics and Northrop Grumman, with final assembly conducted at General Dynamics Bath Iron Works. Initial operational capability is scheduled for FY 2016.

Developers

Northrop Grumman Ship Systems	Pascagoula, Mississippi
General Dynamics Bath Iron Works	Bath, Maine
Raytheon Systems, Inc	Sudbury, Massachusetts
BAE Systems	Minneapolis, Minnesota

More than 80 companies nationwide, including Lockheed Martin, are also involved with DDG 1000.

FFG 7 Oliver Hazard Perry-Class Guided-Missile Frigate Modernization

Description

Oliver Hazard Perry-class frigates are capable of operating as integral parts of carrier strike groups or surface action groups. They are primarily used today to conduct maritime interception operations, presence missions, and counter-drug operations. A total of 55 Oliver Hazard Perry-class ships were built; 51 for the U.S. Navy and four for the Royal Australian Navy. After the recent decommissioning of USS Hawes (FFG 53), as of December 2010 28 of the 51 ships built for the United States remain in active commissioned service.

Status

The Perry–class frigates are undergoing a modernization program that commenced in FY 2003. This program corrects numerous maintenance and obsolescence issues, including replacing four obsolete ship service diesel denerators (SSDG) with COTS SSDGs, obsolete evaporators with COTS reverse osmosis (RO) units, and track-way boat davits with COTS Slewing Arm Davits (SLADs). Other major HM&E alterations included ventilation modifications and Auxiliary Machinery Room #3 fire-fighting sprinkler modifications. The modernization effort is scheduled for completion in 2011. All ships have been completed with the exception of two that will receive the COTS SSDG upgrade during 2011. Of the 28 FFGs in service, 25 will be retired prior to the end of FY 2016.

Developers

General Dynamics Bath Iron Works	Bath, Maine

Littoral Combat Ship (LCS)

Description

Future joint and combined operations will hinge on our ability to provide access in the face of unpredictable and asymmetric threats. This has been recognized for some time; however, the events of the last decade have brought a renewed sense of urgency to these requirements. The anti-access threats challenging our naval forces in the littorals include quiet diesel submarines, mines, and small, highly maneuverable surface-attack craft. Such threats have great potential to be effectively employed by many less-capable countries and non-state actors to prevent unhindered access by U.S. forces to littoral areas.

The Littoral Combat Ship (LCS) is a key element of Navy's future force and is optimized to defeat the anti-access threats in the littoral. It uses an open architecture design, modular weapons and sensor systems, and a variety of manned and unmanned vehicles to help gain, sustain, and exploit littoral maritime supremacy, ensuring U.S. joint forces access to critical theaters. Technology has matured to the point where significant warfighting capability can be employed from a small, focused-mission warship like the LCS. Focused-mission LCS mission packages are being developed that will provide capabilities critical to forcible entry, sea/littoral superiority, and homeland defense missions. The ship also possesses inherent capabilities to conduct missions supporting ISR, special operations, intra-theater lift, anti-terrorism/force protection, and maritime interdiction. Fully self-deployable and capable of worldwide sustained underway operations, LCS will have the speed, endurance, and underway replenishment capabilities to transit and operate independently or with carrier strike groups, surface action groups, and expeditionary strike groups.

LCS will capitalize on emerging unmanned vehicle, sensor, and weapons technologies to deliver mine countermeasures, surface warfare (SUW), and anti-submarine warfare missions. In May 2004, Navy awarded two contracts options to Lockheed Martin and General Dynamics to build the first LCS ships. The Lockheed Martin design is a steel semi-planing monohull. The General Dynamics design is an aluminum trimaran hull.

Status

USS Freedom (LCS 1), the first Lockheed Martin ship, was commissioned in November 2008 and conducted a successful early deployment in spring of 2010. USS Independence (LCS 2), the first General Dynamics ship, was commissioned in January 2010. Both ships are undergoing post-delivery tests and trials. Fixed-price type contracts were awarded for LCS 3 (Lockheed Martin) and LCS 4 (General Dynamics) in 2009. LCS 3 and 4 are under construction and scheduled to deliver in 2012. LCS 3 was christened in early December 2010. LCS 4 is scheduled to be christened in August 2011. LCS Dual Award strategy was executed with contract awards to Lockheed-Martin and Austal USA in December 2010.

The first MCM mission packages were delivered in 2008 and 2009. ASW and SUW mission packages were delivered in 2008. The second SUW mission package was delivered in late 2010.

Developers

Lockheed Martin and	
Marinette Marine (LCS 1 and 3)	Marinette, Wisconsin
General Dynamics and Austal (LCS 2 and 4)	Mobile, Alabama

WEAPONS

Advanced Gun System (AGS)

Description
The 155mm AGS is planned for installation in the DDG 1000 Zumwalt-class destroyers to provide precision, volume, and sustained fires in support of distributed joint and coalition forces ashore. AGS is a fully integrated, automatic gun and magazine weapon system that will support the DDG-1000 Naval Surface Fire Support (NSFS) mission. Each system will be capable of independently firing up to ten rounds per minute from a fully automated magazine. The AGS program includes development of the GPS-guided 155mm Long-Range Land-Attack Projectile (LRLAP), the first of a family of AGS munitions. AGS is designed to meet Zumwalt-class optimal manning and radar-signature requirements.

Status
AGS manufacturing is underway at three facilities (Cordova, Alabama; Fridley, Minnesota; and Louisville, Kentucky) and is on track to meet the lead ship production schedule.

Developers
BAE Systems — Minneapolis, Minnesota

BGM-109/UGM-109 Tomahawk Land-Attack Missile (TLAM)

Description
TLAM is Navy's premier, all-weather, long-range, subsonic land-attack cruise missile deployed on surface warships and attack and guided missile submarines. The Block IV Tactical Tomahawk (TACTOM BGM-109E/UGM-109E) preserves Tomahawk's long-range precision-strike capability while significantly increasing responsiveness and flexibility.

TACTOM improvements include in-flight retargeting, ability to loiter over the battlefield, in-flight missile health status monitoring, and battle damage indication imagery providing a digital look-down "snapshot" of the battlefield (via a satellite data link), rapid mission planning and execution via GPS on board the launch platform; improved anti-jam GPS; and alternative payloads that include smart sub-munitions, a penetrator warhead, and a multiple-response warhead.

Plans call for the Navy to continue to procure TACTOM missiles throughout the FYDP. TLAM Block III BGM-109 and UGM-109 missiles will be retired from service by 2020.

Status
A full-rate production contract was signed in August 2004. It was Navy's first multi-year contract for TACTOM procurement, producing more than 1,500 missiles. This contract ended in FY 2008. Tomahawk Block IV procurement in FY 2009-11 is being executed via annualized procurement firm fixed-price contracts.

Developers
Raytheon Missile Systems — Tucson, Arizona

Mk 15 Phalanx Close-In Weapon System (CIWS)

Description

The Mk 15 Mod 21-28 Phalanx CIWS is an autonomous combat system that searches, detects, tracks (radar and electro-optic), and engages threats with a 20mm Gatling gun capable of firing 4,500 tungsten penetrator rounds per minute. Integral to ship self-defense and the anti-air warfare "defense-in-depth" concept, CIWS provides terminal defense against anti-ship missiles and high-speed aircraft that may penetrate other Fleet defenses. Phalanx CIWS can operate autonomously or be integrated with a ship's combat system.

The Block 1B configuration provides further defense against asymmetric threats such as small, fast surface craft, slow-flying aircraft, and unmanned aerial vehicles through the addition of an integrated Forward Looking Infrared (FLIR) sensor. Block 1B also incorporates an optimized gun barrel (OGB) for tighter ordnance dispersion. Enhanced-lethality cartridges (ELC) can be used with the OGB for improved target penetration.

The Mk 15 Mod 29 CIWS is the Land-based Phalanx Weapon System (LPWS) configuration developed to counter rocket, artillery, and mortar attacks. LPWS uses the inherent capabilities of CIWS Block 1B mounted on a trailer with portable power generation and cooling systems. The LPWS is deployed as part of the Counter-Rocket, Artillery, and Mortar (C-RAM) program by the U.S. Army at several forward operating bases (FOBs), defending U.S. personnel and assets as part of *Operation New Dawn and Operation Enduring Freedom*.

The Mk 15 Mod 31 is the SeaRAM CIWS system. SeaRAM is also based on the Block 1B Phalanx configuration, with the gun subsystem replaced by an 11-round Rolling Airframe Missile (RAM) launcher. SeaRAM can be integrated with ship's combat system, but is capable of autonomously searching, detecting, tracking, and engaging threats with RAM.

Status

More than 250 Mk 15 Phalanx CIWS systems are deployed in the Navy as of early 2011. The Army has procured 45 LPWS systems for FOB defense under the C-RAM program. One SeaRAM CIWS system was delivered for installation on board USS Independence (LCS 2) Littoral Combat Ship. Subsequent SeaRAM CIWS deliveries/installations are dependent on the LCS program acquisition strategy.

Developers

Raytheon	Tucson, Arizona
Raytheon	Louisville, Kentucky

Mk 45 Mod 4 Five-Inch/62-Caliber Gun System Upgrade

Description

The Mk 45 Mod 4 5-inch/62-caliber gun is a modification of the 5-inch/54-caliber gun with higher firing energies to support long-range munitions. The gun retains the functionality of the 5-inch guns, including ability to fire all existing 5-inch rounds. The modified design also improves maintenance procedures and provides enhanced anti-surface and anti-air warfare performance. Modifications include a longer (62-caliber) barrel, an ammunition recognition system, and a digital control system.

Status

The gun was added to the Arleigh Burke-class of destroyers, starting with USS Winston S. Churchill (DDG 81), and is being back-fitted onto Ticonderoga-class cruisers as part of the Cruiser Modernization package. As of September 2010, 28 destroyers and three cruisers were equipped with the 5-inch/62 gun.

Developers

BAE Systems — Minneapolis, Minnesota

Mk 54 Lightweight Torpedo (LWT)

Description

The Mk 54 LWT is a modular upgrade to the lightweight torpedo inventory and adds the capability to counter quiet diesel-electric submarines operating in the littorals. Mk 54 LWT combines existing torpedo hardware and software from Mk 46, Mk 50, and Mk 48 Advanced Capability (ADCAP) programs with advanced digital COTS electronics. The resulting Mk 54 LWT offers significantly improved shallow-water capability at reduced life-cycle costs. The Mk 54 LWT modernization plan will introduce new hardware and software updates providing stepped increases in probability of kill, while reducing life-cycle cost and allowing the torpedo to remain ahead of the evolving littoral submarine threat. Mk 54 will replace the Mk 46 as the payload in the Vertical Launch ASROC (VLA).

Status

Full rate production began in FY 2005 with a procurement of 94 torpedoes. Mk 54 torpedoes are being delivered for fleet use following resolution of production and quality-assurance issues. Mk 46 torpedo maintenance has been augmented to supplement LWT inventory while Mk 54 inventory is built up. The Mk 54 VLA achieved IOC in March 2010.

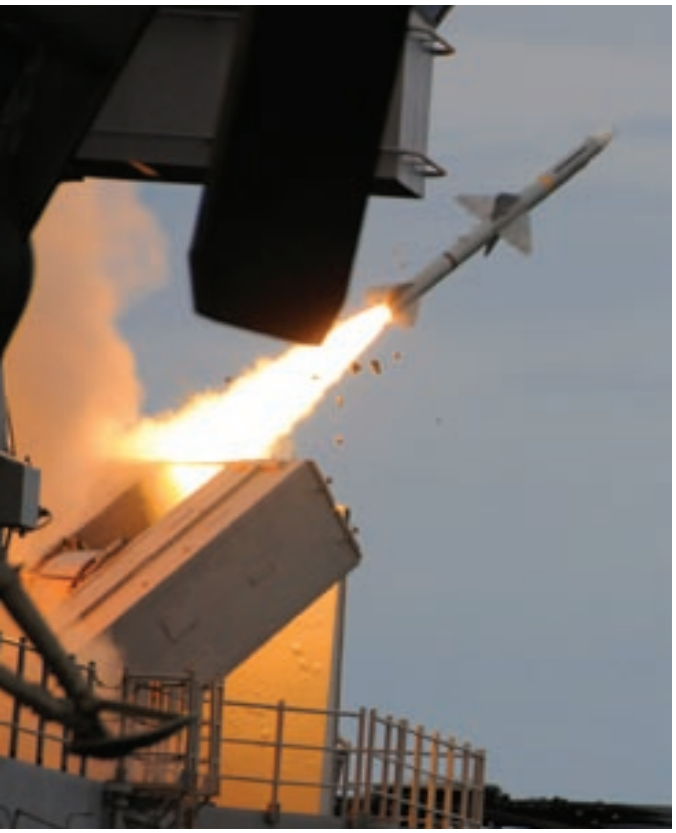
Developers

LWT:

Raytheon — Mukilteo, Washington

VLA:

Lockheed Martin — Akron, Ohio



Mk 57 NATO Sea Sparrow Missile System (NSSMS) / RIM-7P NATO Sea Sparrow Missile (NSSM) / RIM-162 Evolved Sea Sparrow Missile (ESSM)

Description

The Mk 57 NSSMS and its associated RIM-7P NSSM or RIM-162 ESSM serve as the primary surface-to-air ship self-defense missile systems. NSSMS is deployed on aircraft carriers (CVN) and landing helicopter dock (LHD)-class amphibious assault ships, and is being installed on the newest landing helicopter assault (LHA)-class amphibious assault ships. The Mk 57 Target Acquisition System (TAS), engineered to support ships in air defense, is a combined volume-search radar and control element, which determines threat evaluation and weapon assignment for RIM-7 in LHDs and CVNs.

A kinematic upgrade to the RIM-7P missile, ESSM is the next generation of Sea Sparrow missiles and is deployed on Arleigh Burke-class Flight IIA Aegis destroyers. ESSM is also the primary self-defense weapon for DDG 1000, CVN, and LHA 6-class ships, as well as Aegis cruisers and destroyers receiving Aegis Modernization. ESSM upgrades include a more powerful rocket motor, tail control section for quick response on VLS ships, upgraded warhead, and a quick-reaction electronic upgrade. Enhanced ESSM kinematics and warhead lethality leverage the robust RIM-7P guidance capability to provide increased operational effectiveness against high-speed, maneuvering, hardened anti-ship cruise missiles at greater intercept ranges than now possible with RIM-7P. Operational in FY 2004, ESSM is procured as part of the NATO Sea Sparrow Consortium involving ten NATO countries.

Status

ESSM was introduced in Ticonderoga-class cruisers in FY 2009 to improve capability against close-in, highly maneuverable threats. Remaining Arleigh Burke-class Flight I/II Aegis destroyers will be upgraded to ESSM in conjunction with Aegis Modernization Program. Future upgrades to ESSM are being explored.

Developers

Raytheon — Tucson, Arizona

Naval Surface Fire Support (NSFS)

Description

The extended-range munitions program was terminated in early 2008 as a result of technical issues. Subsequently, the Navy conducted a Naval Surface Fires Analysis of Alternatives to determine potential NSFS materiel solutions to address validated naval fire support to Marine Corps ground operations capabilities gaps. The Navy and Marine Corps are working closely to examine systems that meet fires mission requirements in the most cost-effective manner.

Status

AoA started in November 2008 and was submitted to the Secretary of the Navy in May 2010.

Developers

To be determined.

RIM-66C SM-2 Standard Missile-2 Blocks III/IIIA/IIIB

Description

The SM-2 is Navy's primary area air-defense surface-to-air missile. SM-2 Block III/IIIA/IIIB configurations are all-weather, ship-launched, medium-range SAMs in service with the U.S. Navy and nine allied navies. SM-2 enables forward naval presence, littoral operations, and projecting and sustaining U.S. forces in anti-access or area-denial environments. SM-2 Block III/IIIA/IIIB missiles are launched from the Mk 41 VLS installed in Aegis cruisers and destroyers. Block III features improved performance against low-altitude threats and optimizes trajectory-shaping within the Aegis command guidance system by implementing shaping and fuse altimeter improvements. Block IIIA features improved performance and lethality against sea-skimming threats resulting from a new directional warhead and addition of a moving-target indicator fuse design. Block IIIB adds an infrared-guidance mode capability developed in the Missile Homing Improvement Program (MHIP) to improve performance in a stressing ECM environment. Blocks IIIA/IIIB will be the heart of the SM-2 inventory for the next 20 years. The latest generation of Block IIIB missiles includes a maneuverability upgrade (SM-2 Block IIIBw/MU2) to enhance IIIB performance against low-altitude, supersonic maneuvering threats.

Status

Block IIIB MU2 is the only variant in production for the U.S. Navy, although Block IIIA is still produced for foreign military sales. Block IIIB MU2s are being produced as new all-up rounds and as upgrades from older Block III and IIIA missiles through a service life extension program.

Developers

Raytheon — Tucson, Arizona

RIM-116A Rolling Airframe Missile (RAM)

Description

RAM is a high-firepower, low-cost system based on the AIM-9 Sidewinder, designed to engage anti-ship cruise missiles (ASCMs). RAM is a 5-inch diameter surface-to-air missile with passive dual-mode radio frequency/infrared (RF/IR) guidance and an active-optical proximity and contact fuse. RAM has minimal shipboard control systems and is autonomous after launch. Effective against a wide spectrum of existing threats, RAM Block 1 IR upgrade incorporates IR "all-the-way-homing" to improve performance against evolving passive and active ASCMs. Plans are for RAM to evolve and keep pace with emerging threats. RAM Block 2, in the system development and demonstration phase, will provide increased kinematic capability against maneuvering threats and improved RF detection against low probability of intercept threats.

The RAM program is a cooperative partnership with Germany, and the Block 2 missile is being developed jointly (50/50) with Bonn.

Status
RAM is installed in USS Tarawa (LHA 1) and USS Wasp (LHD 1) amphibious assault ships; USS Whidbey Island (LSD 41) and USS Harpers Ferry (LSD 49) dock landing ships; aircraft carriers (CVNs); and USS San Antonio (LPD 17) landing platform dock ships. RAM is also installed on USS Freedom (LCS 1), the Lockheed Martin variant of the Littoral Combat Ship.

In 2001, an engineering change proposal was submitted to develop a SeaRAM configuration. SeaRAM removes the Phalanx Gun System from the Close-In Weapon System and incorporates an 11-round RAM missile launcher system. The battlespace was increased by modifying the Phalanx radar to detect low-elevation, low-radar cross-section threats at an increased range. No missile modifications were required. SeaRAM was selected by General Dynamics as part of the combat system for USS Independence (LCS 2).

Block 1A is at full-rate production. The Block 2 missile is in development and scheduled for first delivery in FY 2013.

Developers

Raytheon	Tucson, Arizona
RAMSYS	Germany

Photo courtesy of Raytheon

SM-6 Standard Missile-6 Extended-Range Active Missile (ERAM) Block I/II

Description
The SM-6 is the Navy's next-generation extended-range anti-air warfare interceptor. The introduction of active-seeker technology to air defense in the surface fleet reduces Aegis Weapon System's reliance on radar illuminators, and provides improved performance against stream raids and targets by employing advanced characteristics such as enhanced maneuverability, low-radar cross-section, improved kinematics, and advanced electronic countermeasures. The SM-6 ERAM acquisition strategy is characterized as a low-risk development approach which leverages SM-2 Block IV/IVA program non-developmental items and Raytheon's Advanced Medium Range Air-to-Air Missile (AMRAAM) Phase 3 active seeker program led by the Naval Air Systems Command. The SM-6 missile will be fielded in Arleigh Burke-class destroyers and Ticonderoga-class cruisers as well as future surface combatants.

Status
Navy established the SM-6 Extended-Range Air Defense program in FY 2004, with an FY 2011 IOC. SM-6 entered the first increment of LRIP in FY 2009. Three successful live-fire tests of the SM-6 were conducted at White Sands Missile Range. The first test flight, conducted in June 2008, resulted in a skin-to-skin intercept. The second test, conducted in September 2008, also resulted in a skin-to-skin intercept of the target. The third test flight, conducted August 2009, successfully stressed the kinematics limits of the missile.

Developers

Raytheon	Tucson, Arizona

Stabilized 25-mm Machine Gun System (MGS)

Description

The Mod 2 program upgrades the Mk 38 Mod 1 25mm chain gun by adding stabilization, remote operation, fire control, and an electro-optical sensor. These additions significantly expand the effective range, lethality, and nighttime capability of the weapon. The MGS program reduces risk for surface ship self-defense by engaging asymmetric surface and airborne threats to ships at close range. It provides the capability to bridge current and future targeting and weapons technology in a close range force protection environment, including protection in port, at anchor, transiting choke points, or while operating in restricted waters.

Status

The Mk 38 Mod 2 was initiated in 2003 to improve ship self defense by developing and fielding a mid-term capability for surface ships that was simple, stabilized, and affordable. The program in late 2010 had fielded 51% of the planned total of gun upgrades. The Mk 38 Mod 2 MGS is being permanently installed on a broad spectrum of U.S. Navy and Coast Guard ships and cutters (e.g., CG 47, DDG 51, FFG 7, PC 1, LHA 1, LHD 1, LPD 17, LSD 41/49, and LCC 19-class ships).

Developers

BAE	Louisville, Kentucky
Rafael USA, Inc.	Haifa, Israel

SURFACE SENSORS AND COMBAT SYSTEMS

Aegis Ashore

Description

On September 17, 2009, the President announced an overarching plan to provide regional ballistic missile defense to U.S. deployed forces and allies, called the European Phased Adaptive Approach (PAA). The PAA envisions tailoring U.S. BMD capabilities to specific theater needs to enhance integrated regional missile defenses to protect against medium-, intermediate-, and ultimately intercontinental-range ballistic missiles. Aegis Ashore is a bold and innovative adaptation of Navy's proven and flexible Aegis ballistic missile defense capability. Repackaging components of the Aegis Weapons System (AWS) into modular containers and deploying them to pre-prepared sites in host nations to constitute a BMD capability is an elegantly simple concept but not without its unique challenges. As the Aegis Ashore material developer, the DoD Missile Defense Agency funds development, procurement, and installation of BMD systems, peripherals, and SM-3 missiles. The Missile Defense Agency Director is designated the Acquisition Executive for the U.S. Ballistic Missile Defense System. In this capacity, the Agency exercises all source-selection and milestone decision authorities for all elements of the BMDS up to, but not including, production issues.

Status

At this early stage in 2011, engineering level details on Aegis Ashore have not been fully developed. For example, the first Aegis Ashore site, known as the Aegis Ashore Missile Defense Test Complex (AAMDTC) at Pacific Missile Range Facility (PMRF), Kauai, Hawaii, is under development. The first forward operating site in Eastern Europe is scheduled to be operational in 2015. Detailed radar deckhouse design is ongoing. The Naval Sea Systems Command and Missile Defense Agency had already established the Aegis BMD Directorate as a Hybrid Program Office, which, in addition to managing ship-based Aegis BDM programs, will closely coordinate efforts with the Navy's Program Executive Office for Integrated Warfare Systems (PEO IWS) to oversee Aegis Ashore development and deployment.

Developers

Black & Veatch Corporation	Overland Park, Kansas
Carlson Technology, Inc.	Livonia, Michigan
Gibbs & Cox, Inc.	Arlington, Virginia
Lockheed Martin	Moorestown, New Jersey

Aegis Ballistic Missile Defense (ABMD)

Description

Aegis BMD includes modifications to the Aegis Weapons System and development and upgrade of the Standard Missile 3 (SM-3) with its hit-to-kill kinetic warhead. The SM-2 Block IV surface-to-air missile has also been modified for the terminal BMD mission. Aegis BMD also provides long-range surveillance and tracking (LRS&T) capability against long-range ballistic missile threats. ABMD ships thus have the capability to provide cueing in defense of the homeland and BMD engagement to defend against short- and intermediate-range ballistic missiles. This combination gives select Aegis cruisers and destroyers the capability to intercept short- and intermediate-range ballistic missiles in the ascent, mid-course, and descent phases of their exo-atmospheric trajectories. This capability also provides an endo-atmospheric "lower-tier" capability, including terminal self-defense of forces at sea, resulting in a more lethal, layered defense against enemy ballistic missiles. At the same time, Aegis BMD warships remain able to carry out all general-purpose naval missions, such as long-range precision strike with Tomahawk Land-Attack Missiles (TLAMs).

Together, these capabilities contribute to robust defense-in-depth for U.S. and allied forces at sea and on land, vital political and military assets, population centers, and large geographic regions against the threat of ballistic missile attack. In early 2011, Aegis BMD is the only integrated upper- and lower-tier capability in the national Ballistic Missile Defense System (BMDS).

Status

The Missile Defense Agency and Navy deployed the Aegis BMD LSR&T capability as an element of the national BMDS in October 2004. The Aegis BMD short- and intermediate-range ballistic

missile engagement capability was certified for operational use in August 2006. Through the end of 2010, 21 cruisers and destroyers had been modified to conduct BMD missions, with additional ships to be modified in the future. To facilitate terminal defense, the Aegis BMD 3.6.1 program capability has been installed in 20 BMD-capable Aegis warships. The ongoing Aegis Modernization (CG/DDG MOD) program will eventually provide BMD capability to all Aegis destroyers and selected Aegis cruisers beginning in 2012.

Developers

Lockheed Martin	Moorestown, New Jersey
Raytheon	Tucson, Arizona

Aegis Combat System (ACS)

Description

The Aegis Combat System is a centralized, automated, command-and-control (C2) and weapons control system. ACS integrates combat capabilities developed in other Navy programs into the Ticonderoga (CG 47) and Arleigh Burke (DDG 51)-class ships, providing effective capability to counter current and future air, surface, and sub-surface threats. ACS is not a separate ACAT program; it is part of the Aegis Shipbuilding (ACAT 1) Program.

Status

ACS has been in the Fleet since the 1980s and continues to serve as the platform for new capabilities, weapons and sensor systems. Aegis Modernization (AMOD) program is producing system upgrades via the advanced capability build (ACB) process for CG and DDG modernization, and DDG Restart to keep pace with evolving threats and the challenging littoral environment.

The first iteration of this process, ACB-08 / Technical Insertion (TI) 08, brings CGs 52-58 increased warfighting capabilities during the CG Modernizations which began in 2008. ACB-08 separates hardware from software, allowing for COTS computer processors, and re-uses elements of the Aegis Baseline 7.1R computer program code, while integrating improved system capabilities.

ACB-12 will bring increased warfighting capabilities, including the SM-6 missile and Multi-Mission Signal Processor, during CG/DDG MOD availabilities beginning in 2012. ACB-12 initiates a common computer program library for Aegis and brings in the first third-party developed software element—Track Manager/Track Server—as well as the competitively awarded Common Display System (CDS) and Common Processor System (CPS).

Future ACBs will continue to bring new capabilities to existing ships in a single package vice the legacy method of installing capability improvements through multiple, individualized deliveries.

Developers

Lockheed Martin	Moorestown, New Jersey
Naval Surface Warfare Center	Dahlgren, Virginia
Naval Surface Warfare Center	Port Hueneme, California

Air and Missile Defense Radar (AMDR)

Description

The AMDR advanced radar system is being developed to fill capability gaps identified by the Maritime Air and Missile Defense of Joint Forces (MAMDJF) Initial Capabilities Document. AMDR is a multi-function, active-phased array radar capable of search, detection, and tracking of airborne and ballistic missile targets, and missile engagement support. AMDR consists of an S-band radar (AMDR-S), an X-band radar (AMDR-X), and a Radar Suite Controller (RSC). The radar will be developed to support multiple ship classes with the first increment of development in support of DDG-51 FLT III. AMDR critical technology elements that will enable multi-mission performance in stressing theater air and missile defense environments include high-power amplifiers and transmit/receive modules and power supplies, active array physical architecture scalability, large-aperture digital beam-forming and calibration, distributed receivers/exciters, multi-beam signal processing, and multi-mission scheduling and discrimination. The multi-mission capability will be effective in both air dominance of the battle space (area air defense) and in ballistic missile defense.

Status

AMDR is a Pre-ACAT-1D program with Milestone A approval. The Technology Development (TD) phase commenced in early FY 2011.

Developers

To be determined. Lockheed Martin, Northrop Grumman and Raytheon were awarded TD contracts to produce small-scale active phased array (S-band) prototypes during TD, scheduled to complete in fall 2012.

Cooperative Engagement Capability (CEC)

Description

CEC provides improved battle force air defense capabilities by integrating sensor data of each cooperating ship and aircraft into a single, real-time, fire-control-quality, composite track picture. CEC is a critical pillar of Naval Integrated Fire Control-Counter Air (NIFC-CA) capability and will provide a significant contribution to the Joint Integrated Fire Control (JIFC) operational architecture. CEC interfaces the weapons capabilities of each CEC-equipped ship and aircraft in the strike group to support integrated engagement capability. By simultaneously distributing sensor data on airborne threats to each ship within a strike group, CEC extends the range at which a ship can engage hostile tracks to beyond the radar horizon, significantly improving area, local, and self-defense capabilities. CEC enables a strike group or joint task force to act as a single, geographically distributed combat system. CEC provides the fleet with greater defense in-depth and the mutual support required to confront evolving threats of anti-ship cruise missiles and theater ballistic missiles.

Status

IOC for the shipboard CEC system (USG-2) was declared in FY 1996. USG-2 Technical Evaluation (TECHEVAL) and OPEVAL were successfully completed between 1998-2001, following extensive development and testing of shipboard combat systems with which CEC interfaces. At that point, Commander Operational Test and Evaluation Force declared shipboard CEC ready for fleet use. In April 2002, the Defense Acquisition Board (DAB) approved full rate production for USG-2 shipboard and low-rate initial production for E-2C *Hawkeye* (USG-3) airborne equipment sets. In September 2003, USD (AT&L) approved FY 2004/05 follow on production for the USG-3.

In early 2011, CEC systems are at sea in 57 ships (Aegis CGs and DDGs, carriers, and amphibious ships) and 26 E-2C *Hawkeye 2000* aircraft. The total future CEC installation is planned in approximately 275 ships, aircraft and land units. The current acquisition strategy, dated 19 January 2010, implements a pre-planned product improvement (P3I) program incorporating open architecture-based hardware with re-hosted existing software. The P3I hardware supports reduced cost, weight, cooling, and power objectives and is more extensible to the other Services. This initiative culminated in the competitive design and production of the CEC Signal Data Processor (SDP), which is installed on several land-based test sites, DDGs and the E-2D Hawkeye and is proceeding through testing. The Navy has coordinated with the Joint Staff, OSD, and other Services to explore potential multi-Service avenues for CEC capability implementation that will expand sensor netting track data availability to meet a variety of warfighting requirements across various platforms. This effort has resulted in the implementation of CEC into ground mobile systems including the Marine Corps' Composite Tracking Network (CTN), Army's Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS), and work to create a bridge to the Army Integrated Fire Control (IFC) program. The SDP has been re-designed to incorporate National Security Agency (NSA)-mandated cryptologic modernization changes. The crypto-modified SDP (SDP-S) hardware and software have passed Critical Design Review and NSA certification. The SDP-S has been integrated into the E-2D *Advanced Hawkeye* and will undergo FOT&E during the E-2D OPEVAL in 2012. The crypto modernization strategy for fielded CEC platforms is to back-fit them with the crypto-modified SDP upon completion of the FOT&E.

Developers

Johns Hopkins University, Applied Physics Laboratory	Laurel, Maryland
Raytheon Systems Company	St. Petersburg, Florida

Photo courtesy of Idaho Technology.

Sechan Electronics Inc. Lititz, Pennsylvania

Joint Biological Agent Identification and Diagnostic System (JBAIDS)

Description

The Joint Biological Agent Identification and Diagnostic System is an integrated system for rapid identification and diagnostic confirmation of biological agent exposure or infection. Based on commercially available technology, JBAIDS is portable and reusable and will be capable of the simultaneous identification of biological warfare agents, H1N1 influenza, and other pathogens of operational concern. The system includes sampling and analysis equipment, a laptop computer for testing result readout display, and assay reagent test kits. JBAIDS will replace the current Light Cycler PCR (Polymerase Chain Reaction) system in the medical spaces of all aircraft carriers and large-deck amphibious ships (LHA/LHDs).

Status

JBAIDS was installed on 19 large-deck ships in late 2010, with five remaining for ships in extended maintenance periods and new construction. Remaining installs to large decks are planned for FY2013-2015. In FY 2011, Navy will field 15 additional units in support of ashore medical facilities (e.g., Forward Deployed Preventive Medical Units).

Developers

Idaho Technologies, Inc Salt Lake City, Utah
Joint Program Manager Chemical Fort Detrick, Maryland

Maritime Integrated Air and Missile Defense Planning System (MIPS)

Description

The Maritime Integrated Air and Missile Defense Planning System is an operational-level Integrated Air and Missile Defense (IAMD) planning tool that supports the Joint Force Maritime Component Commander (JFMCC) staff in rapidly developing optimized courses of action for the deployment of Navy air- and missile-defense assets. MIPS allows the commander and staff to visualize an end-state and determine the most effective way to reach that end-state. MIPS provides the JFMCC a tool to allocate resources and assess risks in a timely manner. The product is an operational-level plan detailing the optimized use of forces developed with the warfighter's knowledge and judgment. The combined warfighter and MIPS product promotes an orderly handover of a maritime integrated air and missile defense plan to those tasked with execution of an operation. MIPS has been deployed in the

Maritime Operations Centers MOC of all numbered fleet commanders likely to be assigned as JFMCC, as well as in selected higher headquarters.

Status

MIPS Increment 0 was formerly known as the Area Air Defense Commander Capability System. MIPS Increment 1, envisioned as a replacement of legacy hardware, maintains functionality and capability in Increment 0 and will include enhanced planning capacity for ballistic missile defense as well as an interface between the Aegis BMD mission planner and the Missile Defense Agency's Command, Control, Battle Management, and Communications (C2BMC) System. Increment 2 will be a software application in Consolidated Afloat Network Enterprise System (CANES) architecture and is planned to incorporate new IAMD capability comprising Naval Integrated Fire Control–Counter Air, Standard Missile (SM)-6, and BMD Engage-on-Remote.

Developers

General Dynamics Advance Information Systems	Fairfax, Virginia
Lockheed Martin	Moorestown, New Jersey

Naval Fires Control System (NFCS)

Description

Naval Fires Control System allows surface ships to directly communicate with ground forces that operating within the Advanced Field Artillery Tactical Data System (AFATDS), a digital fire-support command and control network used by the Army and Marine Corps. NFCS is interoperable with joint C4ISR systems, providing the mission-planning and fire-support coordination functions required to support expanded naval surface fire support (NSFS) mission capability.

Status

The system achieved IOC in April 2006 with 28 systems installed at the end of 2010. A total of 32 systems will be fielded by the end of FY 2011.

Developers

GEC-Marconi Electronics Systems	Wayne, New Jersey

General Dynamics Information Systems	Arlington, Virginia
Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia
Naval Undersea Warfare Center	Keyport, Washington
Space and Naval Warfare Systems Center	San Diego, California

Nulka Radar Decoy System

Description

Nulka is an active, off-board, ship-launched decoy developed in cooperation with Australia to counter a wide spectrum of present and future radar-guided anti-ship cruise missiles (ASCMs). The Nulka decoy employs a broadband radio frequency repeater mounted on a hovering rocket platform. After launch, the Nulka decoy radiates a large, ship-like radar cross-section and flies a trajectory that seduces incoming ASCMs away from their intended target. Australia developed the hovering rocket, launcher, and launcher interface unit. The U.S. Navy developed the electronic payload and fire control system. The existing Mk 36 Decoy Launching System (DLS) has been modified to support Nulka decoys and is designated the Mk 53 DLS.

Status

Nulka received Milestone III approval for full-rate production in January 1999. Installation began on U.S. and Australian warships in September 1999. As of late 2010, the system is installed on more 100 U.S. Navy ships.

Developers

BAE Systems	Edinburgh, Australia
Lockheed Martin Sippican	Marion, Massachusetts
SECHAN Electronics Inc.	Lititz, Pennsylvania

S-Band Volume Search Radar (VSR)

Description

VSR is an S-band active phased array radar designed to meet all above-horizon detection and tracking requirements for ships without area air-defense missions, specifically the Ford CVN 78 class. VSR will provide long-range situational awareness with above-horizon detection and air control (marshalling) functionality, replacing in-service SPS-48E and SPS-49 radars. A non-rotating phased-array radar, VSR provides the requisite track revisit times to address fast, low-altitude/small, and high-diving missile threats, and provides cueing for the AN/SPY-3 Multi-Function Radar (MFR) to execute tracking and fire control functions above the horizon.

Status

A VSR engineering development model was completed in 2006 and is installed at the DDG 1000 Wallops Island Engineering Test Center, where, along with the MFR, it has undergone radar test and integration events that completed at the end of FY 2010. VSR will be fielded with MFR as an integrated radar suite-–referred to as the Dual-Band Radar (DBR) on CVN 78—scheduled to deliver

in FY 2015.

Developers

Lockheed Martin Maritime Sensors & Systems	Moorestown, New Jersey
Raytheon Electronic Systems	Sudbury, Massachusetts

SPQ-9B Anti-Ship Cruise Missile (ASCM) Radar

Description

The SPQ-9B is a slotted, phased-array, rotating radar that significantly improves the ability of ships to detect and track low-altitude ASCMs in a heavy-clutter environment. Its high-resolution track-while-scan, X-band, pulse-Doppler radar enables track detection at ranges that allow combat systems to engage subsonic or supersonic sea-skimming missiles at the outer edge of a ship's engagement envelop.

Status

The SPQ-9B is an integral part of the cruiser modernization program, providing an ASCM cue to the Aegis Combat System. SPQ-9B integrates with Ship Self Defense System (SSDS) Mk 2 on aircraft carriers and amphibious assault ships, enabling ASCM defense capabilities to pace the evolving worldwide threat.

Developers

Northrop Grumman	Melville, New York

SPY-1 AEGIS Multi-Function Phased-Array Radar

Description

The AN/SPY-1 S-Band radar system is the primary air and surface radar for the Aegis Combat System installed in Ticonderoga-class and Arleigh Burke-class ships. It is a multi-function, phased-array radar capable of search, automatic detection, transition to track, tracking of air and surface targets, and missile engagement support. The fifth variant of this radar, AN/SPY-1D(V), improves the radar's capability against low-altitude and reduced radar cross-section targets in heavy clutter environments and in the presence of intense electronic countermeasures. The AN/SPY-1 series radars are also used to detect, track, and engage theater ballistic missiles on selected Aegis cruisers and destroyers.

Status

The SPY-1A, SPY-1B, SPY-1D, and SPY-1D(V) radar variants are fielded and supported. The SPY-1D(V) littoral radar upgrade supersedes the SPY-1D in new-construction Flight IIA destroyers that began in FY 1998. Operational testing and evaluation was completed in the fall 2005. SPY-1D(V) is installed in DDGs 91 through 109 and programmed for installation in DDGs 110 through 112. A new Multi-Mission Signal Processor is funded and will deliver SPY-1D (V) capability to SPY-1D DDGs and SPY-1B

CGs. MMSP upgrades will be deployed through the DDG and CG Modernization programs.

Developers

Lockheed Martin	Moorestown, New Jersey
Raytheon	Sudbury, Massachusetts

SPY-3 Advanced Multi-Function Radar (MFR)

Description

The AN/SPY-3 MFR is an X-band active phased-array radar designed to meet all horizon search and fire-control requirements for the 21st Century Fleet. MFR is designed to detect the most advanced anti-ship cruise missile threats and support fire-control illumination requirements for the Evolved Sea Sparrow Missile, the Standard Missile (SM)-2, and future missiles. The MFR also supports the new ship-design requirement for reduced radar cross-section, significantly reduced manning (no operators), and total ownership cost reduction. The MFR is planned for introduction in the next-generation DDG 1000-class destroyers and CVN 78-class aircraft carriers. For DDG 1000, MFR will be modified to provide an above horizon/volume search capability.

Status

Two MFR engineering development model radar arrays were installed and tested at the Wallops Island, Virginia, land-based test facility and on board the Self-Defense Test Ship in 2006. MFR is installed at the DDG 1000 Wallops Island Engineering Test Center along with the S-band Volume Search Radar (VSR). Both have undergone radar test and integration events, which completed at the end of FY 2010. MFR development, testing, and production schedules are planned to support equipment delivery schedules for DDG 1000 and CVN 78 ships. For example, MFR will deliver on DDG 1000 in FY 2015.

Developers

Raytheon Electronic Systems	Sudbury, Massachusetts

Ship Self-Defense System (SSDS)

Description

SSDS is a centralized, automated, command-and-control system. An upgrade from the Advanced Combat Direction System (ACDS), SSDS provides an integrated combat-direction system for aircraft carriers and all amphibious ships, enabling them to keep pace with evolving ASCM threats. Using an open architecture system, SSDS integrates detection and engagement elements of the combat system with automated weapons control doctrine, Cooperative Engagement Capability, and tactical data links for enhanced battlespace awareness. SSDS provides a robust self-defense capability.

Status

SSDS Mk 1 began full-rate production following operational testing in 1997 and is fielded in all Whidbey Island and Harpers Ferry (LSD 41/49) class ships. SSDS Mk 2 (which provides strike group interoperability via CEC and TADIL J) achieved IOC in 2005 and continues fleet installation. With a federated and technically decoupled architecture, Navy plans to periodically upgrade SSDS via COTS technologies insertion and P3I. SSDS Mk 2 is programmed for all CVNs, LHDs 7 and 8, LHA 6 and 7, and LPD 17-class ships and will complete fielding by 2015. A separate Advanced Capability Build (ACB-12) is planned for technologically refreshing the SSDS Mk 2 on a four-year cycle.

Developers

Raytheon	San Diego, California
Technical support:	
Johns Hopkins University Applied Physics Laboratory	Laurel, Maryland
Naval Surface Warfare Centers	Dahlgren and Dam Neck, Virginia
Naval Surface Warfare Centers	Port Hueneme, California

Surface Electronic Warfare Improvement Program (SEWIP) Block Upgrades

Description

SEWIP is an evolutionary development block upgrade program for the SLQ-32 electronic warfare (EW) system installed on numerous aircraft carrier and surface and amphibious warships (CVN, CG, DDG, FFG, LSD, LPD, LHA, LHD, and LCC) in the U.S. Navy, with total fleet-wide population of 170 systems in late 2010. Block 1A replaces the SLQ-32 processor with an Electronic Surveillance Enhancement processor and the display console with a UYQ-70. Block 1B also improves the human machine interface of the SLQ-32 and adds Specific Emitter Identification (SEI) capability that provides platform identification. The High Gain High Sensitivity (HGHS) Receiver (Block 1B3) provides improved situational awareness through non-cooperative detection and identification of platforms beyond radar horizon. SEWIP will also queue Nulka decoy launch.

Status

SEWIP was established as an ACAT II program in July 2002 after cancellation of Advanced Integrated Electronic Warfare System (AIEWS). SEWIP Block 2 contract was awarded 30 September 2009.

Developers

General Dynamics Advanced Information Systems	Fairfax, Virginia
Lockheed Martin	Eagan, Minnesota
Lockheed Martin	Liverpool, New York
Northrop Grumman PRB Systems	Goleta, California

Surface Ship Torpedo Defense (SSTD)

Description

Surface Ship Torpedo Defense consists of the Anti-Torpedo Torpedo (ATT) Defensive System (ATTDS), the SLQ-25 "Nixie" towed torpedo countermeasure, and expendable acoustic decoys combined with tactical maneuvering. SSTD will provide torpedo protection for all major surface ship types including surface combatants, aircraft carriers, amphibious assault ships, and Military Sealift Command ships.

ATTDS provides torpedo detection, classification, and localization of the incoming threat and provides targeting solutions for the ATT. The ATT is a fast, highly maneuverable, autonomous defensive weapon. ATT will minimize the need for ship evasion tactics, enabling sustained operations to ensure the entire range of missions are carried out without interruption.

The SLQ-25A "Nixie" Countermeasure System is a towed system incorporating acoustic and non-acoustic countermeasures. "Nixie" provides continuous and effective countermeasure protection against most threat torpedo types.

Expendable acoustic countermeasures are designated as Acoustic Decoy Countermeasure or ADC Mk 2. ADC Mk 2 is a hand-deployed acoustic countermeasure used to defend surface ships from acoustic homing torpedoes. These devices, when deployed in accordance with approved tactical maneuvers, have been proven to be highly effective.

Status

A "Nixie upgrade," SLQ-25C, is being installed to improve reliability and acoustic countermeasure capability, provide a new littoral tow cable, and add enhanced non-acoustic capability to combat recent improvements to threat torpedoes. Additional "Nixie" improvements are in development, including a modular winch design (for new installations only), an open architecture improvement, a shock-hardening improvement, a security upgrade, and "Nixie" Enhanced Modes of Operation (NEMO). Fleet upgrades are underway.

The ATT Engineering Development Model One (EDM-1) was successfully tested in several FY 2007-through-FY 2009 at-sea exercises. Technology Readiness Level 6 was accomplished in June 2010, and MS B approval is planned for FY 2011.

In FY 2006 and FY 2007, the Navy funded procurement of Mk 2 Mod 4 ADCs for surface ships. Sufficient quantities of ADC Mk 2 were procured, but an additional buy in FY 2008 was completed to provide all ship fill requirements and usage during fleet exercises for the next several years. In FY 2010 a Non-Nuclear Ordnance Model generated the total munition requirement for the ADC Mk 2 Mod 4, which will shape future acquisition profiles.

Developers

Anti-Torpedo Torpedo:	
Penn State Applied Research Laboratory	State College, Pennsylvania
DCL Systems:	
Advanced Acoustic Concepts	Long Island, New York
Ultra Electronics	Braintree, Massachusetts
Technical Direction Agent:	
Naval Undersea Warfare Center	Newport, Rhode Island
AN/SLQ-25:	
Argon ST	Smithfield, Pennsylvania

SQQ-89 Anti-Submarine Warfare (ASW) Combat System

Description

The SQQ-89 ASW combat system suite provides cruisers and destroyers with an integrated undersea warfare detection, classification, display, and targeting capability. SQQ-89 is the Surface Force ASW "system of systems" that integrates sensors, weapons, and underwater self-defense capabilities. The Aegis Modernization Program upgrades DDG 51 to DDG 78 destroyers and CG 59 to CG 73 cruisers with AN/SQQ-89A(V)15. The A(V)15 program of record upgrades legacy systems on DDG 79 to DDG 112.

AN/SQQ-89 A(V)15 is a modularized, open architecture system using COTS technology to continuously upgrade the following subsystems of the ASW "detect-to-engage" sequence:

- Multi-function towed array (MFTA)
- Continuous active sonar and reduced false alarms algorithms
- ASW combat system interfaces for the Mk 54 digital torpedo and Mk 54 Vertical Launch ASROC (VLA)
- Echo tracker classifier (ETC) and active classification improvements
- Sonar performance and prediction algorithms and environmental models
- Computer-aided dead-reckoning table (CADRT) interfaces
- Torpedo recognition and alertment functions
- Integrated high-fidelity surface ASW synthetic trainer

AN/SQQ-89 A(V)15 provides revolutionary ASW warfighting improvements that include:

- Enhanced capability in the shallow-water littoral environment
- Improved sensor performance for increased detection ranges
- Fire control algorithms for improved weapons performance

Status

The first A(V)15 install was completed in USS Mason (DDG 87) in September 2009. It included the addition of a multi-function towed array and marked the first towed-array installation in a DDG Flight IIA warship. In FY 2010, four additional systems were installed. In February 2009, Surface ASW Synthetic Trainer (SAST), a high-fidelity embedded trainer, modeled after the Submarine Multi-Mission Team Trainer, was completed and in July 2009 delivered to the Fleet ASW Training Center in San Diego, California for testing. SAST is scheduled to begin delivering to ships in 2011 as part of the ASW Advanced Capability Build FY 2011.

Developers

Advanced Acoustic Concepts	Hauppauge, New York
Lockheed Martin	Syracuse, New York
SAIC	Arlington, Virginia

Tactical Tomahawk Weapon Control System (TTWCS)

Description

TTWCS Viability Build is the next significant upgrade to the in-service Tactical Tomahawk Weapon Control System. TTWCS initializes, prepares, and launches Block III and Block IV Tomahawk Land-Attack Missiles. TTWCS also provides capability for firing units to plan Block III and Block IV GPS-only missions, retarget Block IV missiles to alternate targets, and monitor missiles in flight. The initial release of TTWCS reduced equipment racks required on board surface ships, introduced common software for the various Tomahawk-capable platforms (U.S. cruisers, destroyers, attack submarines and guided-missile submarines and U.K. attack submarines), and reduced overall reaction and engagement planning timelines. The Viability Build eliminates obsolete hardware and software, eliminates redundant functionality in favor of already existing Tomahawk Command and Control (TC2S) functionality, maintains interoperability with evolving systems, and modernizes interfaces in accordance with joint mandates (Service Oriented Architecture and Internet Protocol Version 6). The Viability Build also improves operator interaction with the system and provides an integrated training capability at all levels. In addition, the common source code baseline will support DDG 1000 Zumwalt-class guided missile destroyers. TTWCS Viability Build relies on the TTWCS system architecture to maintain existing Tomahawk Weapon System (TWS) functionality, provides for future growth, and enhances command-and-control interoperability.

Status

TTWCS V5 incorporates Tomahawk Integrated Training Architecture, changes for Aegis Cruiser Modernization, and the addition of SSGN guided-missile and SSN Seawolf and Virginia-class attack submarines. The next software build of the weapons system is TTWCS Viability Build, which will improve C4I interoperability, provide compatibility for DDG 1000, update computer hardware and performance, and align TTWCS with DoD mandates.

Developers

Lockheed Martin	Valley Forge, Pennsylvania
Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia
Naval Undersea Warfare Center, Keyport	Keyport, Washington
Naval Undersea Warfare Center	Newport, Rhode Island
Southeastern Computers Consultants Inc.	Austin, Texas

Tomahawk Command and Control System (TC2S)

Description

Tomahawk Command and Control System is the primary strike mission-planning and execution system for the Tomahawk cruise missile. The system is installed ashore at the Cruise Missile Support Activities (CMSA) in Norfolk, Hawaii and Permanent Joint Headquarters (PJHQ) Northwood, United Kingdom. To support the Navy's move to a Maritime Headquarters/Maritime Operating Center (MHQ/MOC) centric operational infrastructure, mission-planning systems along with strike execution components have been installed at Commanders Fifth Fleet (COMFIFTHFLT), Sixth Fleet (COMSIXTHFLT), and Seventh Fleet (COMSEVENTHFLT). Subcomponents of TC2S, including the Mission Distribution System (MDS), Tomahawk Communications System (TCOMMS), and Tomahawk Communications Interface Processor (TCIP), are the primary strike-planning and execution tools installed at all Tomahawk C2 nodes, ashore and afloat, in all aircraft carriers and in all ship and submarine TLAM-launch platforms. TC2S allows planners to exploit the full capabilities Tomahawk in either deliberate planning conditions or for battlefield time-sensitive planning operations, including executing all post-launch missile-control operations.

Status

The latest version, TC2S 4.2, improves joint interoperability and imagery processing. All Tomahawk missiles fired operationally during *Operation Desert Storm and Operation Iraqi Freedom* and in other operations have been planned and executed with TC2S components.

Developers

BAE Systems	San Diego, California
Boeing	St. Louis, Missouri
COMGLOBAL	San Jose, California
SAIC	La Jolla, California

SURFACE EQUIPMENT AND TRAINING SYSTEMS

Battle Force Tactical Trainer (BFTT)

Description

BFTT integrates the family of embedded combat system trainers, providing aircraft carriers, cruisers, destroyers, and amphibious ships the capability to maintain readiness requirements across multiple warfare areas. These areas include air defense, electronic warfare, anti-submarine warfare, and integrated air and ballistic missile defense.

Status

BFTT began full-rate production following operational testing in 1997. BFTT achieved IOC in 1999 and continues with fleet upgrades through 2015. Modernization plans improve interoperability and reliability within the training system through an upgrade program established to field the latest model (BFTT T46D, Build 5.0). In addition to modernizing the BFTT system, the T46D variant will be the key enabler permitting integration of anti-submarine warfare, navigation, and engineering embedded trainers in a first step toward fielding a Total Ship Training Capability (TSTC). In early 2011, BFTT is fielded in all active Nimitz aircraft carrier, Ticonderoga cruiser, Arleigh Burke destroyer, Whidbey Island/Harpers Ferry, and San Antonio-class ships.

Developers

AAI Corp	Timonium, Maryland
AP Labs	San Diego, California
DRS	Parsippany, New Jersey
Electronic Warfare Associates	Chantilly, Virginia
L-3/Unidyne	Norfolk, Virginia
Lockheed Martin	Chesapeake, Virginia
Naval Surface Warfare Center	Dam Neck, Virginia
NOVONICS	Arlington, Virginia
SAIC	San Diego, California
SYS Technologies	San Diego, California
Tri Star	Chesapeake, Virginia
WR Systems	Fairfax, Virginia

Chemical, Biological, Radiological and Nuclear Defense/ Individual Protection Equipment / Readiness Improvement Program (CBRND/IPE/RIP)

Description

The Individual Protective Equipment (IPE) Readiness Improvement Program (RIP) for forces afloat manages millions of individual pieces of equipment for Sailors deploying into potential chemical, biological, and radiological (CBR) threat environments. Through centralized management, this program ensures afloat and deployed expeditionary Sailors are always provided with correctly maintained and properly fitted individual protection ensembles and a chemical protective mask, ready for immediate

retrieval in response to the dictated mission oriented protective posture (MOPP) condition. Historically, the maintenance and logistics functions required to maintain the material readiness of this equipment necessitated an extraordinary number of organizational man hours that could be better used supporting operations and training. Ninety-day pre-deployment readiness visits by the NAVSEA "RIP Team" relieve the ships of this burden. The cornerstone of the RIP is the NAVSEA Consolidated Storage Facility (CSF) located at Fort Worth, Texas.

Status

This program continues to improve fleet CBR readiness. In addition to IPE and gas masks, the Readiness Improvement Program manages interceptor body armor, dorsal auxiliary protective systems, and light-weight helmets for expeditionary forces; provides protective CBR equipment to Navy's individual augmentees as they process through designated Army training centers; manages CBRND IPE for the Military Sealift Command; and manages Navy's afloat anti-terrorism/force protection equipment.

Developers

Battelle Memorial Institute	Columbus, Ohio
General Dynamics-IT	Fairfax, Virginia
Gryphon Technologies	Greenbelt, Maryland
Naval Surface Warfare Center	Panama City, Florida

Navy Ranges Branch / Target Systems

Description

The Navy Target Systems Program (NTSP) assesses foreign threats, identifies fleet requirements, develops targets to adequately represent the threats, and procures those target systems for weapon system test and evaluation and fleet training. The current inventory includes aerial, seaborne, and undersea targets that represent the following types of threats: super sonic sea-skimming cruise missiles (GQM-163A); high-altitude supersonic missiles (AQM-37C/D); subsonic sea-skimming anti-ship cruise missiles (BQM-34, BQM-74E); full-scale fighter aircraft (QF-4); high-speed maneuverable seaborne threats (HSMST); fast attack craft targets (FACT); submarine threats (Mk 30); and undersea tactical targets (Mk 39).

Status

Efforts are underway in early 2011 to modify the GQM-163 to conduct a close-in approach against a manned ship and to fly a high-diver profile so the Navy can fully meet test program requirements against supersonic threats. In 2010, the GQM-163 successfully completed a high-diver profile flight test. Despite production close-out of the legacy BQM-34 and BQM-74, flight survivability procedures were implemented to ensure continued subsonic target support to test programs and fleet operators with the existing inventory until the follow-on subsonic target begins delivery to the Navy in 2015.

Various efforts are underway to field targets with improved fidelity including the following programs: Multi-Stage Supersonic Target (MSST); Subsonic Aerial Target (SSAT); full-scale aerial targets (QF-16); and improved Mk 30 and Mk 39. The SSAT program has a projected IOC in 2015. The U.S. Air Force-led QF-16 program has a projected IOC in 2015.

Developers

HSMST:	
Silver Ships	Theodore, Alabama
GQM-163A:	
Orbital Sciences	Chandler, Arizona
MSST:	
Alliant Techsytems	Woodland Hills, California
Mk30 Mod 2:	
Lockheed Martin Sippican/ Granite State	Marion, Massachusetts

Shipboard Collective Protection System (CPS)

Description

CPS provides a protective environment from CBR threats in ship spaces where personnel can perform their mission-essential operations without the use of individual protective equipment. The system over-pressurizes specified ship spaces with air filtered through an array of housings that contain multiple CBR filter sets preventing the ingress of CBR contaminants. Zone ingress and egress is enabled through a variety of supporting systems including air locks, pressure locks, and decontamination stations located on the zone boundaries that maintain the integrity of clean spaces. Integrated into the heating ventilation and air conditioning (HVAC) systems, shipboard CPS provides continuous protection to personnel and equipment within the zone boundary. On those ships where it is not feasible to provide protection to the entire ship, mission-essential spaces such as medical, command and control, and rest and relief areas are outfitted with CPS.

Status

Shipboard CPS is installed on more than 85 ships in early 2011. CPS coverage varies by ship class and ranges from the entire ship interior (DDG 51 FLT I, DDG 51 FLT II, and T-AOE-6 class) to zone-specific coverage systems (DDG 51 FLT IIA, LSD, LPD 17, LHD, LHA). These systems are a combination of new-construction and back-fit installations, depending on the ship. Plans call for some 100 ships to have CPS by FY 2014.

Developers

Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia

Shipboard Protection System (SPS)

Description

SPS is designed to augment force-protection tactics and doctrine by providing the ability to detect, classify, and engage surface threats at close-range while in port, at anchor, transiting choke points, or operating in restricted waters. The system will integrate COTS systems with current and future force protection initiatives and combat system technologies to provide 360-degree situational awareness. A prototype system installed in USS Ramage (DDG 61) employed COTS-based products interfaced with the ship's existing navigation radar. Key components include electro-optical/infra-red devices, an integrated surveillance system, spotlights, acoustic-hailing devices, and remotely operated stabilized small-arms mounts. Ramage provided valuable integration and component reliability feedback, lessons learned, and integrated logistics support information about SPS capability, and helped define the formal requirements for SPS.

Status

SPS was approved at Milestone C, Capability Production Document (CPD), in August 2009 for low-rate initial production. The SPS Block 0 Acoustic Hailing Device fielding is underway in early 2011. SPS Block 1 installations were completed in FY 2008 to assess the C2 core and EO/IR sensing system. Block 3, which represents the full SPS capability, was deployed in FY 2009 on board USS Donald Cook (DDG 75) for testing and operational evaluation.

Developers

FLIR Systems, Inc.	Wilsonville, Oregon
General Dynamics Armament and Technical Products	Charlotte, North Carolina
IML Corp	Marietta, Georgia
Naval Surface Warfare Centers, Crane	Crane, Indiana
Dahglren	Dahlgren, Virginia

SSQ-130 Ship Signal Exploitation Equipment (SSEE) Increment F

Description

The Shipboard Information Warfare Exploit (SIWE) program provides improved situational awareness and near real-time indications and warnings to the warfighter by improving and increasing tactical cryptologic and IW exploitation capabilities across Navy combatant platforms. The SSQ-130 SSEE Increment F is a shipboard information operations (IO)/EW system that provides commanders with threat, search, and identification information. SSEE provides deployed forces with an afloat IO/IW/EW system/sensor. SSEE is a COTS/NDI program that is easily reconfigured and therefore able to respond rapidly to tasking. The system design permits the rapid insertion of new and emerging technologies

that will integrate capabilities from existing systems and advanced technologies into a single, scalable, spirally developed, interoperable system.

Status

SSEE Increment E is no longer in production and is expected to attain FOC in FY 2011 with the last afloat installation. SSEE Increment F is in production.

Developers

Argon-ST Fairfax, Virginia

SECTION 3

SUBMARINE FORCE

The submarine force, the Navy's "silent service," contributes significantly to many of the Navy's core capabilities. The concealment provided by the sea enables U.S. submarines to conduct undetected and non-provocative operations, to be survivable, and to attack both land and sea targets. Nuclear-powered attack submarines (SSNs) enable sea control, providing unseen surveillance of far-flung regions of ocean along with the ability to attack and sink hostile surface ships and submarines. The power-projection capabilities of nuclear-powered guided-missile submarines (SSGNs) include precision strike from land-attack cruise missiles and insertion of Special Operations Forces (SOF) to conduct reconnaissance and direct-action missions in hostile environments. The Navy's fleet of nuclear-powered ballistic missile submarines (SSBNs) provides the ability to conduct nuclear offensive strike, contributing to the core capability of deterrence at the national strategic level.

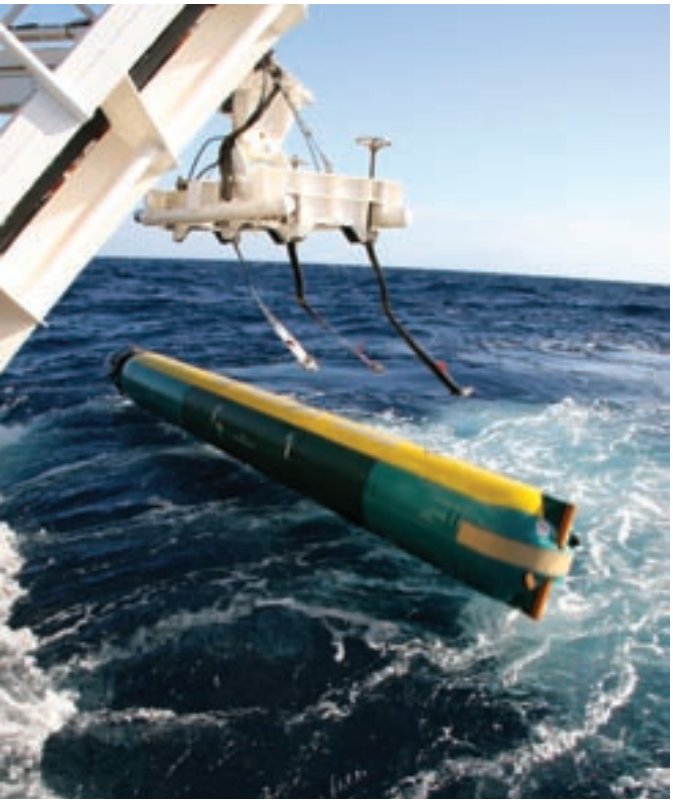


Photo courtesy of Boeing

SUBMARINES AND UNDERSEA VEHICLES

Littoral Battlespace Sensing – Unmanned Undersea Vehicles (LBS-UUV)

Description

The Littoral Battlespace Sensing – Unmanned Undersea Vehicle program of record provides a low-observable, continuous capability to characterize ocean properties that influence sound and light propagation and acoustic and optical weapon and sensor performance predictions within areas of interest. It will deliver undersea gliders (LBS-G) and autonomous undersea vehicles (LBS-AUV) to enable anti-submarine, mine, expeditionary and naval special warfare (ASW/MIW/EXW/NSW) planning and execution and persistent intelligence preparation of the environment (IPE). Launched and recovered from T-AGS oceanographic survey vessels, LBS-G and LBS-AUV will extend the survey capability of survey vessels to denied or contested areas while increasing the spatial and temporal fidelity of the data collected to meet Fleet and COCOM requirements.

LBS-UUV is increment I of Littoral Battlespace Sensing, Fusion, and Integration (LBSF&I), the Department of the Navy's principal IPE programmatic construct for meteorological and oceanographic (METOC) data collection, processing, and data/product dissemination and is considered a key component of battlespace awareness through 2020 and beyond. LBSF&I is a completely integrated end-to-end system of systems capable of measuring a large variety of environmental parameters from the sea floor to the top of the atmosphere, processing, exploiting, and quality controlling that data to produce relevant information for the warfighter, and integrating that information into naval C4ISR systems as part of the Global Information Grid Enterprise Services (GIG ES)/FORCENet infrastructure.

Status

LBS-G reached a favorable Milestone C and LRIP decision in the fourth quarter of FY 2010. LRIP is in progress and will deliver 15 gliders in FY 2011. Full rate production is anticipated by FY 2014, with expected delivery of the 150-glider objective inventory for the Naval Oceanographic Office by FY 2015.

LBS-AUV program office awarded an engineering and manufacturing development contract to Hydroid Inc. in late 2010. Milestone C and LRIP decision are anticipated in FY 2012; production and delivery of 12 AUVs is anticipated between FY 2012 and FY 2017.

Developers

LBS-G:

Teledyne Brown Engineering	Huntsville, Alabama
Teledyne Webb Research	East Falmouth, Massachusetts

LBS-AUV:

Hydroid, Inc.	Pocasset, Massachusetts

Ohio Replacement (OR) Fleet Ballistic-Missile Submarine

Description

The backbone of the Nation's survivable nuclear deterrent will continue to be provided by the fleet ballistic-missile submarine (SSBN). Starting in 2027, the 14 Ohio-class SSBNs will reach the ends of their useful lives at a rate of about one per year. The Navy intends to replace the Ohio-class submarines with a follow-on SSBN, which will have strategic nuclear deterrence as its primary mission. The initial payload will be the Trident II/D5 Life Extension (D5LE) submarine launched ballistic missile (SLBM). The associated missile systems will be developed jointly with the United Kingdom, continuing the long-standing SSBN partnership between the U.S. Navy and the Royal Navy.

The Ohio Replacement must IOC no later than 2029 to ensure the Navy maintains national operational requirements. Concurrently, the United Kingdom will be recapitalizing its sea-based strategic deterrent platforms, Vanguard-class SSBN, which also hosts the Trident II/D5 SLBM. Under cost-sharing agreements, the United States and United Kingdom are developing common missile compartment components to reduce design and construction costs.

Lessons learned from the successful Virginia-class submarine program demonstrate that early and robust investment in design leads to more developed and mature designs and technical specifications prior to construction start. Increased design maturity prior to construction results in lower costs and increased adherence to the scheduled build duration.

Status

The Initial Capabilities Document was approved by the Joint Requirements Oversight Council (JROC) in June 2008. An Analysis of Alternatives for the Ohio Replacement was completed and approved in 2009. Milestone A was completed in December 2010 to approve entry into the technology development phase. Early RDT&E efforts include prototyping and construction technique demonstration for the first SLBM tubes to be built since delivery of USS Louisiana (SSBN 743) in 1997.

Developers

General Dynamics Electric Boat Corporation	Groton, Connecticut
Northrop Grumman	Newport News, Virginia

SSN 774 Virginia-Class Nuclear-Powered Attack Submarine

Description

The Virginia-class submarine is specifically designed for multi-mission operations in the littorals and shallow water while retaining the submarine force's strength in traditional open-ocean anti-submarine and anti-surface missions. These submarines have advanced acoustic technology and are configured to conduct mine reconnaissance, Special Operations Forces (SOF) insertion/extraction, carrier/expeditionary strike group support, intelligence-collection and

surveillance missions, sea-control, and land attack. The Virginia class can serve as host for various SOF delivery methods, including mini-submersibles and raiding craft via an embarked dry-deck shelter to directly to sea via integral lock-out chambers.

The subs are built using a modular construction process that allows construction, assembly, and testing of systems prior to installation in the subs' hulls, thereby reducing costs, minimizing rework, and simplifying system integration. The subs' modular design and extensive use of open architecture electronics systems facilitates technology insertion in future ships during new construction and backfit into ships in the fleet, enabling the each Virginia-class submarine to keep pace with emerging threat capabilities throughout its 30-year service life.

Status

The subs are being built under an innovative teaming arrangement between General Dynamics Electric Boat (EB) and Northrop Grumman Newport News (NGNN). Using a modular construction process, each shipyard builds portions of each ship, with integration and delivery of completed submarines alternating between EB and NGNN. Construction of the USS Virginia (SSN 774) began in FY 1998, and the ship was commissioned in October 2004, with final construction occurring at Electric Boat. USS Texas (SSN 775) began construction in FY 1999 and was commissioned in September 2006, with final construction at Newport News. Follow-on ships continue to alternate between the two shipyards, with both cost and length of construction coming down with each ship. In 2008 Navy negotiated the next multi-year procurement contract for a total of ten subs between 2009-2013 (including procurement of two submarines per year beginning in FY 2011). Seven VIRGINIA-class submarines have been delivered as of the end of CY 2010.

Developers

General Dynamics Electric Boat Corporation	Groton, Connecticut
Northrop Grumman	Newport News, Virginia

Submarine Rescue (SRC, SRDRS)

Description

The Navy's legacy Deep Submergence Rescue Vehicles (DSRVs) have been replaced by the new Submarine Rescue Diving and Recompression System (SRDRS), which provides the Nation's capabilities for submarine rescue, and the existing Submarine Rescue Chamber (SRC). These systems can be quickly deployed in the event of a submarine accident. They are transportable by truck, aircraft, and ship. The SRDRS consists of three distinct systems: (1) Assessment Underwater Work System (AUWS); (2) Pressurized Rescue Module System (PRMS); and (3) Surface Decompression System (SDS). AUWS provides the Atmospheric Diving System (ADS2000), a one-atmosphere, no-decompression manned diving system capable of depths to 2,000 feet for the primary purpose of clearing and preparing a submarine hatch for seating a rescue platform. The PRMS provides a manned, tethered, remotely pi-

loted vehicle capable of rescuing personnel from a stricken submarine to depths of 2,000 feet. The SDS overcomes a significant deficiency of older systems by enabling personnel transfer under pressure for surface decompression following rescue from a pressurized submarine environment. The SRDRS is a government-owned, contractor-operated system, capable of rapid, worldwide deployment and mobilization on vessels of opportunity.

Status

ADS2000 completed operational test and evaluation and was introduced to the Fleet in September 2007. Four ADS2000 suits are maintained at the Navy's Deep Submergence Unit. PRMS was delivered in late 2008, at which time the DSRV program was retired. Development of the SDS transfer-under-pressure capability is ongoing and planned to be introduced in FY 2011. SRC is programmed for continued service to the Fleet.

Developers

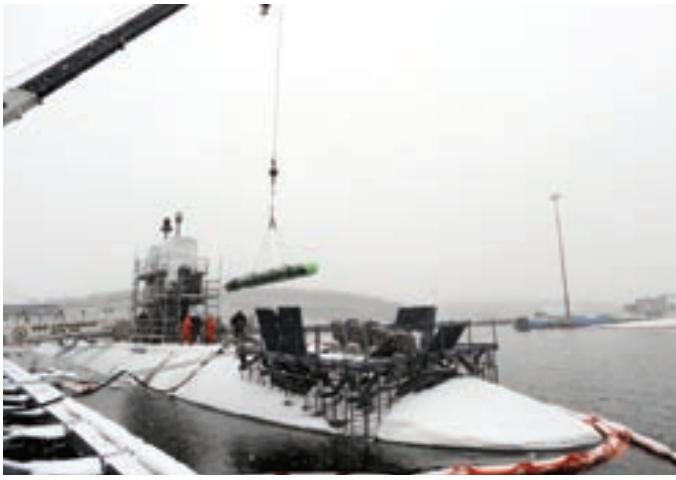
Caley Ocean Systems	Glasgow, Scotland UK
Environmental Tectonics Corporation	Southampton, Pennsylvania
Oceaneering International	Upper Marlboro, Maryland
OceanWorks International	Vancouver, California
Southwest Research Institute	San Antonio, Texas

SUBMARINE WEAPONS

MK-48 Advanced Capability (ADCAP) Common Broadband Advanced Sonar System (CBASS) Torpedo

Description

The MK 48 ADCAP heavyweight torpedo is the Navy's sole submarine-launched weapon for anti-submarine and anti-surface warfare. The ADCAP torpedo was authorized for full-rate production in 1990 and the final production all-up-round torpedo was delivered to the U.S. Navy in 1996. Since then, the Navy has employed an open-architecture model to provide software and hardware improvements to the existing ADCAP torpedo inventory.



The first ADCAP torpedo (Mod 5) featured sophisticated sonar, all-digital guidance and control systems, digital fusing systems, and propulsion improvements to the legacy MK 48 torpedo. The next incremental upgrade to the ADCAP (Mod 6) improved the guidance and control system and improved torpedo acoustic stealth. The latest increment—Mod 7 Common Broadband Advanced Sonar System (CBASS)—includes a new broadband sonar system and shallow water performance improvements. Phase I (of II) of the CBASS program, with the new Broadband Sonar Analog Receiver (BSAR), achieved Initial Operating Capability and was introduced to the Fleet in 2006. The CBASS upgrade to the ADCAP torpedo is part of an ongoing Armaments Cooperative Program with the Royal Australian Navy (RAN). In addition to the RAN, the Canadian and The Netherlands navies also employ

versions of the MK 48 torpedo through the Navy's Foreign Military Sales program.

Status

The Navy continues to procure CBASS hardware for eventual conversion of all ADCAP torpedoes through the life of the program. In parallel, the spiral development program continues to improve torpedo performance through software upgrades in challenging areas, such as the shallow-water diesel and air-independent submarine threats. Phase II of the CBASS program, with APB Spiral 4 software improvements, is expected to achieve FOC in 2011. The MK 48 ADCAP is and will remain the Navy's primary submarine-launched torpedo through 2026.

Developers

Raytheon Systems Corporation — Keyport, Washington

UGM-133A Trident II/D5 Submarine-Launched Ballistic Missile (SLBM)

Description

The Trident II/D5 is the sixth generation of the Navy's Fleet Ballistic Missile (FBM) Program, which started in 1955. The D5 is a three-stage, solid propellant, inertial-guided SLBM, with a range greater than 4,000 NMs and accuracy measured in hundreds of feet. The first eight Ohio-class submarines were configured to carry 24 Trident I/C4 missiles SLBMs. The ninth ship, the USS Tennessee (SSBN 734), and all later ships were armed with the Trident II/D5 missile system. In operation, Trident II/D5 missiles have been declared at eight MIRV warheads under the Strategic Arms Reduction Treaty (START). The Navy continues to address future deterrence requirements against weapons of mass destruction and disruption, and the Trident II/D5 will ensure that the United States has a modern, survivable strategic deterrent. The Navy has embarked on a D5 Life Extension Program (D5LE) which will upgrade missile systems and maintain the D5 in the Fleet into the 2040s, bridging the transition from Ohio-class SSBNs to Ohio Replacement SSBNs.

Status

Full missile procurement began in FY 2008 ending in FY 2012, with a total acquisition of 108 additional missiles. Additionally, life extension kits and replacement solid rocket motors are procured throughout and past the FYDP to refurbish obsolete electronics and expiring rocket motors on existing missiles.

Developers

Lockheed Martin — Sunnyvale, California

SUBMARINE SENSORS

BQQ-10 Acoustic Rapid COTS Insertion (ARCI)

Description

ARCI replaces existing legacy submarine sonar systems on all classes of submarines with a more capable and flexible COTS-based open systems architecture and provides the submarine force with a common sonar system. It allows development and use of complex algorithms that were previously well beyond the capability of legacy processors. The use of COTS/OSA technologies and systems will enable frequent periodic updates to both software and hardware with little or no impact on submarine scheduling. COTS-based processors allow computer power growth at a rate commensurate with that of commercial industry. Additionally, the open architecture design of the ARCI system allows for the rapid insertion of new sensor systems and processing techniques at minimal cost. New sensor systems in development, such as the low-cost conformal array and follow-on towed arrays, will be incorporated in the ARCI system through biennial advanced processor build software improvements and hardware technical insertions of improved processing power.

Status

BQQ-10 ARCI upgrades from legacy sonar systems remain outstanding for 12 submarines at the end of 2010. Submarines already upgraded receive periodic improvements through technical insertions of hardware and advanced processor builds of software. While TI upgrades are designed for insertion biannually, individual submarines normally receive a TI every other cycle. This nominal four-year refresh of hardware keeps each submarine's processing power inline with the state of the computing industry while ensuring that the COTS components are upgraded before commercial obsolescence. Biannual APBs allows for rapid insertion of improved acoustic processing algorithms and increased capabilities requested by the type commanders to address emerging challenges. Navy RDT&E will continue to develop processing algorithms from the surveillance, tactical and advanced R&D communities as well as perform laboratory and at-sea testing.

Developers

Applied Research Lab, University of Texas at Austin	Austin, Texas
General Dynamics Advanced Information Systems	Fairfax, Virginia
Lockheed Martin	Manassas ,Virginia
Mikel Inc.	Fall River, Massachusetts
Progeny Systems Corporation	Manassas, Virginia
PSI	Fairfax, Virginia
SEDNA Digital Systems	Fairfax, Virginia

TB-33 Submarine Thin-Line Towed Array

Description

The TB-33 submarine thin-line towed array is the follow-on replacement for the TB-29 and TB-29A thin-line towed arrays. These arrays will be backfit on all SSN and SSGN submarines. The TB 33 is a fiber optic array designed to have the same capabilities of the TB-29 and TB-29A towed array with superior reliability.

Status

The TB-33 program is in the final design phase with initial procurement scheduled in FY 2012.

Developers

General Dynamics Advanced Information Systems	Fairfax, Virginia
L-3 Chesapeake Sciences Corporation	Millersville, Maryland
L-3 Communications	Sylmar, California

SUBMARINE EQUIPMENT AND SYSTEMS

BYG-1 Submarine Combat Control System

Description

BYG-1 is the common submarine combat control system across all submarine platforms except Ohio-class fleet ballistic-missile submarines. BYG-1 is a COTS-based open systems architecture (OSA) that incorporates organic sensor fusion, target solution development, combined tactical picture, weapon control, and Tactical Local Area Network (TacLAN) functions into a single procurement program. The use of COTS/OSA technologies and systems enables frequent periodic updates to both software and hardware with little or no impact on submarine scheduling. COTS-based processors allow computer power growth at a rate commensurate with that of commercial industry. Additionally, the open architecture design of the BYG-1 system allows for the rapid integration of new sensors and processing techniques at minimal cost. BYG-1 allows the submarine force to update rapidly the ship safety tactical picture, integrates the common tactical picture into the battle group, improves torpedo interfaces, and provides Tactical Tomahawk (TLAM) capability.

Status

BYG-1 is scheduled to be installed on all attack (SSN) and guided-missile (SSGN) submarines by FY 2013. Submarines already upgraded receive periodic improvements through technical insertions of hardware and advanced processor builds of software. While TI upgrades are designed for insertion biannually, individual submarines normally receive a TI every-other cycle. This nominal four-year refresh of hardware keeps each submarine's processing power inline with the state of the computing industry while ensuring that the COTS components are upgraded before commercial obsolescence. Biannual APBs allows for rapid insertion of improved processing algorithms and increased capabilities requested by Navy type com-

manders to address emerging challenges. Navy research, development, testing, and evaluation will continue to develop processing algorithms from the surveillance, tactical and advanced R&D communities as well as perform laboratory and at-sea testing.

Developers

Applied Research Lab, University of Texas at Austin	Austin, Texas
General Dynamics Advanced Information Systems	Manassas, Virginia
John Hopkins University Applied Physics Laboratory	Laurel, Maryland
Lockheed Martin	Eagan, Minnesota
Progeny	Manassas, Virginia
Raytheon	Portsmouth, Rhode Island

Common Submarine Radio Room (CSRR)

Description

The submarine HDR antenna program is a top-priority submarine C4I initiative and is the Navy's first multi-band dish antenna. The HDR antenna provides the submarine force with worldwide high data-rate satellite communications capability while operating submerged. It enables the submarine to access the secure and survivable Joint MILSTAR Satellite Program in the extremely high frequency (EHF) band, provides subs with the capability to receive time critical tactical information from the Global Broadcast Service (GBS) tailored each sub's mission and requirements, and enables access to the Defense Satellite Communications System (DSCS) in the super high frequency (SHF) band.

Status

The Submarine HDR Mast upgrades the submarine EHF low data-rate (LDR) capability, adds EHF medium data-rate (MDR) and new military SHF capabilities, and enables reception of GBS satellite communications (SATCOM). It has been installed on all classes of submarines, with the final antenna installation occurring in FY 2011 on an SSBN. Upgrades to the SHF and GBS capabilities and the antenna radome will be installed through FY 2017.

Developers

Raytheon	Marlboro, Massachusetts

Submarine Escape (SEIE)

Description

Submarine Escape and Immersion Equipment (SEIE) allows submariners to escape from a stricken submarine at depths down to 600 feet in self-contained immersion suits with integral rafts and safety equipment. All submarines are being outfitted with the Mk-10 SEIE suits, improved air-delivery systems, and improved hatch operating systems. In addition to provide thermal protec-

tion and an integral life raft, these suits allow for escape at greater depth than the older "STEINKE" system that they replaced.

Status
Installation is complete for the Los Angeles, Seawolf, and Ohio-class submarines. Virginia-class submarines are receiving SEIE suits upon initial outfitting after construction.

Developers

General Dynamics Electric Boat	Groton, Connecticut
Hale Hamilton Ltd.	Uxbridge, United Kingdom
RFD Beaufort Survitec Defence and Aerospace	Birkenhead, United Kingdom

Submarine Survivability

Description
Today's submariners use passive means to remove carbon dioxide from a disabled submarine's atmosphere, enabling survival up to seven days. Current developments include improving the passive scrubbing capabilities by the introduction of new Lithium Hydroxide (LiOH) canisters.

Status
Installation of passive scrubbing curtains onboard all submarines is complete. Newly developed flat-sheet LiOH canisters are being phased into the initial outfitting for Virginia-class SSNs.

Developers

Analox Sensor Technology Ltd	Stokesley, United Kingdom
Battelle Memorial Institute	Columbus, Ohio
Micropore, Inc.	Newark, Delaware

UYQ-100 Undersea Warfare – Decision Support System (USW-DSS)

Description
The Undersea Warfare – Decision Support System (USW-DSS) provides capabilities to shorten command and control decision processes from detection-to-engagement, extending unit level ASW combat systems to a fully networked capability at the force and theater levels. USW-DSS is maturing solutions using the incremental acoustic rapid commercial-off-the shelf Insertion (ARCI) process for fulfilling Fleet-prioritized and JROC-approved material requirements that will eventually coordinate all ASW sensors into a single, composite track picture for fire control. These decision support tools use a service oriented architecture with existing computing hardware and communication links comprising sensor data from air, surface, submarine, theater, and surveillance platforms to provide rapid confidence in the decision processes between sensors and weapons. These capabilities provide the Sea Combat Commander (SCC), Theater ASW Commander (TASWC), and Anti-Submarine Warfare Commander (ASWC) an integrated capability to plan, conduct, and coordinate USW opera-

tions across all ASW platforms. USW-DSS will provide common and highly detailed visualization, integrated platform sensor and distributed combat systems, reduced data entry, improved sensor performance predictions, data fusion, while reducing redundancy of USW tactical decision aids.

Status

USW-DSS has delivered a mix of two increments on a total of 25 surface combatants and aircraft carriers through CY 2010. USW-DSS is also operational at three shore commands and at three sites conducting initial and refresher training. These increments include Advanced Capability Build 1 (ACB-1) for mission planning capabilities and ACB-2 for mission planning, mission execution and tactical picture, and tactical execution capabilities. ACB-2 is phasing out all prior increments as an early adopter for Consolidated Afloat Network and Enterprise Services (CANES) by installing as software only with Integrated Shipboard Network Services (ISNS) Increment I as well as software and hardware on forward-deployed naval forces to meet Commander Pacific Fleet fielding requirements. The IOC was fielded in first quarter FY 2010, and operational assessment for ACB-2 was completed in third quarter FY 2010. ACB-2 fielding will continue through FY 2015 on a total of 102 ships and shore sites. Design and task analysis for ACB-3 is continuing, with development scheduled to begin in FY 2012. ACB-3 is scheduled to begin fielding with CANES in FY 2015. ACB-3 will transition an Office of Naval Research project—Decision Support for Dynamic Target Engagement—take the next step in coordinating all ASW sensors for a single, composite track picture, capable of fire control. USW-DSS ACB-3 will deliver software-only solutions on the Navy's Common Computing Environment and Afloat Core Services (CCEACS) provided by the CANES program of record.

Developers

Adaptive Methods Inc.	Centerville, Virginia
DDL Omni Engineering LLC	McLean, Virginia
Progeny Systems Corporation	Manassas, Virginia
QuinetiQ North America	McLean, Virginia

SECTION 4

EXPEDITIONARY FORCES

The Navy's expeditionary forces carry out a wide range of responsibilities and provide a robust set of capabilities. The Navy's vast and geographically dispersed logistics network, including its fleet of amphibious ships—LHA, LHD, LSD, and LPD—enable Navy and Marine Corps forces to sustain forward presence, exert sea control over large areas, and project power ashore. These survivable ships, equipped with aviation and surface-assault capabilities, rapidly close, decisively employ, and sustain Marines from the sea. Their capacity to provide equipment and supplies ashore enables them to respond quickly to world crises. Riverine and expeditionary security forces provide maritime security in coastal and inland waterways, protecting ships and maritime infrastructure. In addition, Joint High-Speed Vessels (JHSVs), hospital ships (T-AHs), and Mobile Construction Battalions (Seabees) provide humanitarian assistance, disaster relief, and build partner-nation capacity.

EXPEDITIONARY FORCES

Explosive Ordnance Disposal / Mobile Diving and Salvage (EOD / MDSU)

Description

The Explosive Ordnance Disposal (EOD) community is operationally organized into two deploying EOD Groups, each headed by a Navy captain. Each group has several EOD Mobile Units, a Mobile Diving and Salvage Unit, a Training Unit, and an Expeditionary Support Unit assigned. EOD units are tasked with providing the Fleet, other Services, and the Interagency with the capability to detect, identify, render safe, recover, evaluate, and dispose of explosive ordnance that has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material. Commonly operating in platoons and smaller elements, these EOD units assure access to battlespace by opening lines of communication in the sea-to-shore interface and beyond. Their missions eliminate hazards that jeopardize operations supporting national military strategy. This may require diving operations, parachute insertion, or helicopter insertion. These mobility skills, along with responsibility for all underwater ordnance, make Navy EOD unique in the joint force. The Secretary of the Navy is the Single Manager for all EOD Technology and Training, carrying out these duties primarily through the Navy EOD Technology Center and Naval School Explosive Ordnance Disposal, where all Military EOD Technicians receive the same initial training to defeat conventional land and air ordnance as well as improvised explosive devices (IED).

Mobile Diving and Salvage Units (MDSU) conduct expeditionary salvage, search and recovery operations both afloat and ashore. They also perform harbor clearance, salvage and de-beaching, underwater cutting and welding, limited underwater ship repair, ship husbandry and force protection dive support for both ships in port, and port facilities.

Status

Both EOD and MDSU are recapitalizing their authorized equipment inventories with new tables of allowance (TOA) approved in 2008. Based on a complete review of their mission requirements, each TOA is being realigned with their force structures and standardized, where possible, across the Navy Expeditionary Combat Enterprise. Specialty equipment—for example, Man-Transportable Robotic Systems, unmanned underwater vehicles, and MK 16 Underwater Breathing Apparatus—are included for EOD units.

Developers

Multiple sources.

Maritime Civil Affairs and Security Training (MCAST)

Description

The Maritime Civil Affairs and Security Training (MCAST) Command is a "soft power" enabling force that works within a combatant commander's area of operations to promote regional security and stability. MCAST delivers critical maritime civil affairs (MCA) and security force assistance (SFA) capabilities by providing increased U.S. presence in the near-coast environment to enhance engagement and deter the root causes of instability. Its mission is to assess, plan, and evaluate civil/military affairs activities in the maritime environment. Its areas of expertise include such traditional civil affairs functions as public education and public health, but it is regionally aligned and focused on three maritime-specific functions: commercial port operations; harbor and channel construction and maintenance; and marine and fisheries resources. It also assists with planning and coordination for U.S. country teams, non-combatant evacuation operations, refugee operations, host-nation interagency support, and restoration of communications and local infrastructures following military operations or natural disasters.

Maritime Civil Affairs Teams (MCATs) work directly with civil authorities and local populations to lessen the impact of military operations imposed during peacetime, contingency operations, and war. Mobile Training Teams (MTTs) deliver timely, focused and customized military-to-military training to partner nations, in the host nation's language. Both MCATs and MTTs are specially trained with cultural and language skills for specific regions.

Status

The MCAST TOA contains the equipment necessary for MCATs and MTTs to deploy in support of field operations. MCAST is located in Little Creek, Virginia but will be moving to Dam Neck, Virginia in FY 2011.

Developers

Multiples sources.

Maritime Expeditionary Security Force (MESF)

Description

Maritime Expeditionary Security Force supplies highly trained, scalable, and sustainable security teams capable of defending mission critical assets in the near-coast environment. Expeditionary Security units provide worldwide maritime and in-shore surveillance, security and anti-terrorism force protection (ATFP), ground defense, afloat defense, airfield/aircraft security, and a wide range of secondary tasks, from detention operations to law enforcement.

Status

The MESF TOA is under review to properly equip the force for expeditionary security requirements in both contingency and major combat operations.

Developers

Multiple sources.

Naval Mobile Construction Battalion (NMCB)

Description

Naval Construction Force (NCF) elements provide engineering and combat construction support to MAGTF and Navy commanders, and other naval and joint forces. In support of Sea Strike and Sea Basing missions, the Navy/Marine Corps Team projects power from the sea with a rapid flow of maneuver forces ashore, using roads, expeditionary airfields, force-protection structures, intermediate staging bases, and advanced logistics bases. Forward deployment of Naval Mobile Construction Battalions—"Seabees"––enables the surge of task-tailored engineer forces and equipment sets to enhance the MAGTF and other naval and joint forces on land. In operations other than war, forward-deployed NMCBs hone construction skills through humanitarian assistance and disaster-recovery operations; participate in foreign engagement exercises; and complete construction projects that support sustainment, restoration, and modernization of the Navy's forward bases and facilities.

Status

The Navy has developed a long-range plan to recapitalize the TOAs of all Seabee units. The initial priority is to correct existing inventory deficiencies and replace aging tools and equipment that are no longer parts supportable. During the next several years, the TOAs will be outfitted with modern and recapitalized tactical vehicles, construction and maintenance equipment, communications gear, infantry items, and field support equipment.

Developers

Multiple sources.

Naval Special Warfare

Description

The Naval Special Warfare (NSW) community is the maritime component of the U.S. Special Operations Command (USSOCOM) and the Special Operations component of the Navy: the Nation's Sea-Air-Land—SEAL—forces. NSW leadership is provided by the Commander, Naval Special Warfare Command, who is responsible for strategic vision; doctrinal, operational, and tactical guidance; and training, organizing, and equipping operational support components of the community.

The community is organized under seven major commands, which include five operational commands, one training command, one tactics and technology development command, and one Reserve Component (RC) command. The major operational components of NSW are Naval Special Warfare Groups (NSWG) ONE, THREE, and ELEVEN in San Diego, California; and NSWGs TWO, FOUR, and TEN in Little Creek, Virginia. The NSWG mission is to equip, support, and provide command and control elements as well as trained and ready SEAL platoons/troops, SEAL delivery vehicle (SDV) platoons, Special Boat Teams (SBT) combatant craft detachments, and other forces to the combatant commanders. Two of the

NSWGs also provide administrative control of a total of four Naval Special Warfare units and one detachment that are homeported forward, and are under operational control of a theater Special Operations Command.

The primary deployable operational component of the community is the NSW Squadron (NSWRON). A NSWRON is a task-organized unit centered on a SEAL Team and led by a SEAL Team commanding officer. When a NSWRON is provisionally established, the deploying SEAL Team will normally be augmented by combatant craft detachments; a support activity troop; an EOD platoon; communications, intelligence, and tactical cryptological support detachments; Navy Seabees; and personnel or other detachments tailored for specific missions.

NSW forces provide a highly effective option across the spectrum of hostilities from peacetime operations to limited and general war. They focus on the conduct of the following principal mission areas of special operations: counter-terrorism; counter-proliferation; unconventional warfare; direct action; special reconnaissance; military information-support operations; and security force assistance and civil affairs. Forces also conduct collateral missions such as counter-drug activities, humanitarian assistance, and personnel recovery.

Status
Resources to support the NSW community are principally provided by USSOCOM, but the Navy retains resourcing of responsibilities for service common capabilities.

Developers
Multiple sources.

Navy Expeditionary Logistics Support Group (NAVELSG)

Description
The Navy Expeditionary Logistics Support Group (NAVELSG) consists of five Navy Expeditionary Logistics Regiments (NELR), 11 Navy Cargo Handling Battalions (NCHB), one Training and Evaluation Unit (TEU), and one Expeditionary Support Unit (ESU). The NELR and NCHBs are capable of rapid, worldwide deployment and are trained and equipped to provide shore-based logistical support to Navy and joint force commanders. NCHBs can assume control of pier and terminal operations, surface or air cargo handling, and ordnance handling and management. Specialized capabilities include expeditionary fuel operations, cargo processing (to include bulk mail), heavy lift crane operations, short-haul trucking and expeditionary warehousing.

Status
The ELSG TOA was approved March, 2010.

Developers
Multiple sources.

Riverine Squadrons

Description

Formally established in May 2006, Riverine Group ONE, a component of the Navy Expeditionary Combat Command (NECC), located at Joint Expeditionary Base (JEB) Little Creek, Virginia, has three component Riverine Squadrons (RIVRONs): RIVRONs ONE and TWO are homeported at JEB Little Creek, Virginia; and RIVRON THREE is homeported in Yorktown, Virginia. Since early in calendar year 2007, all three Riverine Squadrons have been deployed two or more times to Iraq. Riverine Squadron operations can ensure the continuance of legitimate trade, keep open lines of communication (LOCs), establish and maintain control of rivers and other inland waterways for military and civil purposes, deny the use of these LOCs to hostile forces and engage waterborne hostile forces as necessary. Riverine Squadrons can support operations to counter sea and ashore-based terrorism and other illegal activities that could include hijacking, piracy, and human trafficking. They also conduct shaping and stability operations and train coalition partners in riverine operations, tactics, techniques, and procedures. Each Riverine Squadron operates three type of combatant craft: the riverine command boat; riverine patrol boat; and riverine assault boat.

Status

The TOA for the three baseline Riverine Squadrons has been 100-percent resourced and initial outfitting is complete. Introduction of capability improvements and recapitalization of major equipments are contemplated for the future. A fourth Riverine Squadron focused on SFA training was added in PB 2012 and will be commissioned in FY 2012.

Developers

Multiple sources.

EXPEDITIONARY AND SPECIAL-MISSION SHIPS AND CRAFT

Joint High Speed Vessel (JHSV)

Description

JHSV is a high-speed, shallow-draft surface vessel able to transport medium payloads of cargo and personnel rapidly over intra-theater distances and load/offload without reliance on port infrastructure. JHSV is an intra-theater lift capability, not an assault platform. Leased high-speed vessels such as Joint Venture (HSV-X1), Swift (HSV-2), and Westpac Express (HSV 4676) have confirmed during advanced concept technology demonstration testing the ability to embark and transport combat forces rapidly. JHSV will be capable of speeds in excess of 35 knots and ranges of 1,200 NMs fully loaded. In addition, the shallow-draft characteristics will enable the JHSV to operate effectively in littoral areas and access small, austere ports.

Status
The JHSV program was formed by a merger of the Army Theater Support Vessel (TSV) and Navy High-Speed Connector (HSC) programs to maximize common capabilities and form a joint platform solution. Navy has been designated the lead DoD component. The AoA was approved in April 2006 and the CDD was approved by the JROC January 2007. On November 13, 2008 the detail design and sonstruction contract was awarded to Austal, USA. Delivery of the first vessel will be to the Army and is expected in 2011.

Developers
Austal USA Mobile, Alabama

Landing Craft, Air Cushion (LCAC)

Description
This high-speed, fully amphibious landing craft is capable of carrying a 60-ton payload (75 tons in overload) at speeds in excess of 40 knots and a nominal range of 200 NMs. Its ability to ride on a cushion of air allows it to operate directly from the well decks of amphibious warships. Carrying equipment, troops, and supplies, the LCAC launches from the well deck, transits at high speed, traverses the surf zone, and lands at a suitable place ashore where it quickly offloads and returns to amphibious shipping for follow-on sorties. LCACs provide amphibious task force commanders flexibility in selecting landing sites, permitting access to more than 70 percent of the world's shores as compared to 17 percent for conventional landing craft. LCACs deliver vehicles and cargo directly onto dry land rather than in the surf zone and have proved invaluable in support of humanitarian assistance/disaster relief (HA/DR) missions, for example, the Indonesia tsunami relief, Hurricane Katrina, and Operation Unified Response in Haiti. LCACs are multi-mission craft that can also conduct alternate missions when outfitted with appropriate mission packages. A service life extension program to extend hull life from 20 to 30 years for 72 LCACs will be accomplished through FY 2018. Additionally, some of the craft have been outfitted with C4I (radar and radios) system upgrades prior to entry into SLEP. As part of SLEP, the Navy will incorporate the following enhancements:

- An open-architecture concept, relying on modern COTS equipment that will allow much easier incorporation of later technology changes, such as the precision navigation system and communications systems, fully interoperable with in-service and near-term future joint systems now planned
- Engine upgrades (ETF-40B configuration) that will provide additional power and lift, particularly in hot (100° Fahrenheit and higher) environments, and reduce fuel consumption, maintenance needs, and lift footprint
- Refurbishment of the buoyancy box and some of the rotating machinery in order to solve corrosion problems, incorporate hull improvements, and "reset" the fatigue-limit "clock"

- Incorporation of a new (deep) skirt that will reduce drag, increase performance envelope over water and land, and reduce maintenance requirements

Status

IOC was achieved in 1986. Contracts for 91 LCACs were approved through FY 1997, with all 91 craft delivered to the fleet by the end of 2001. Nine that were in deep reduced operating status (03ROS) were terminated in FY 2006 for cost reasons, and two are held for R&D. The LCAC SLEP began in late 2000. Four to six SLEPs are planned each year FY 2006-16.

Developers

Avondale Marine	Gulfport, Mississippi
Textron Marine and Land Systems	New Orleans, Louisiana

LHA(R) General-Purpose Amphibious Assault Ship (Replacement)

Description

The LHA(R) class will provide persistent forward-presence and power-projection capabilities as elements of U.S. expeditionary strike groups and strike forces. With elements of a Marine landing force, the LHA(R) will embark, deploy, land, control, support, and operate helicopters, landing craft, and amphibious vehicles for sustained periods. The LHA(R) will also support contingency-response, forcible-entry, and power-projection operations as an integral part of joint, interagency, and multinational maritime expeditionary forces. The first LHA replacement is being designed as a variant of LHD 8, USS Makin Island. This ship will include LHD 8 enhancements (a gas turbine propulsion plant and all-electric auxiliaries) and a significant increase in aviation lift, sustainment, and maintenance capabilities; space for a Marine expeditionary unit (MEU), amphibious ready group (PHIBGRU), or small-scale joint task force (JTF) staff; a dramatic increase in service life allowances for new-generation Marine Corps systems (e.g., MV-22 and Joint Strike Fighter); and substantial survivability upgrades.

Status

Milestone B was reached in January 2006. The first LHA(R) was designated LHA 6 in August 2005. LHA 6 detail design and construction contract was awarded in FY 2007, and delivery is planned for October 2013. LHA 7 contract was awarded in June 2010 for delivery in FY 2017. LHA 8 will modify the LHA 6 design to incorporate a well deck capable of supporting LCACs.

Developers

Northrop Grumman Ship Systems	
Ingalls Operations	Pascagoula, Mississippi

LHD 1 Wasp-Class Amphibious Assault Ship

Description

The Wasp (LHD 1)-class comprises eight 40,650-ton full-load, multi-purpose amphibious assault ships whose primary mission is to carry out power projection and sea control operations. The Wasp-class also has several secondary missions, including HA/DR tasks. LHD 1-class ships provide embarked commanders with command and control capabilities for sea-based maneuver/assault operations as well as employing elements of a landing force through a combination of helicopters and amphibious vehicles. The LHD 1 ships increase total lift capacity, compared to previous amphibious warships, by providing both a flight deck for helicopters and vertical/short take-off or landing (V/STOL) aircraft, such as the AV-8B *Harrier* and the MV-22 Osprey, and a well deck for air-cushioned (LCAC) and conventional landing craft. Each ship can embark 1,877 troops (surge) and has 125,000 cubic feet of cargo for stores and ammunition and 20,900 square feet for vehicles. Medical facilities include six operating rooms, an intensive-care unit, and a 47-bed ward. LHDs 5-7 are modified variants of the class, and design changes include: increased JP-5 fuel capacity, C4ISR and self-defense improvements, fire-fighting and damage-control enhancements, and Women-at-Sea accommodations. USS Makin Island (LHD 8) incorporates significant design changes, including gas turbine (GT) propulsion, hybrid electric drive, and all-electric equipment. Two GTs, providing 70,000 shaft-horsepower, replace the two steam plants found on earlier ships in the class; the electric drive propels the ship at low speeds to increase fuel efficiency. All ships in the class will be modified to support F-35 Lightening II Joint Strike Fighter operations.

Status

Eight LHDs have been delivered to the Fleet. The eighth and final ship of the class, Makin Island (LHD 8), was commissioned 24 October 2009 in San Diego, CA.

Developers

Northrop Grumman Ship Systems
Ingalls Operations — Pascagoula, Mississippi

LPD 17 San Antonio-Class Amphibious Transport Dock Ship

Description

The San Antonio (LPD 17) class is an amphibious transport dock ship optimized for operational flexibility and designed to meet MAGTF lift requirements in support of the expeditionary maneuver warfare concept of operations. The San Antonio LPDs are 684 feet in length, with a beam of 105 feet, a maximum displacement of 25,000 long tons, and a crew of approximately 360. Four turbocharged diesels with two shafts and two outboard-rotating controllable-pitch propellers generate a sustained speed of 22-plus knots. Other ship characteristics include 25,000 square feet of space for vehicles (more than twice that of the Austin LPD 4 class it replaces), 34,000 cubic feet for cargo, accommodations for approximately 720 troops (800 surge), and a medical facility (24

beds and four operating rooms—two medical and two dental). The aft well deck can launch and recover traditional surface assault craft as well as two LCACs, capable of transporting cargo, personnel, Marine vehicles, and tanks. The LPD 17 aviation facilities include a hangar and flight deck (33 percent larger than the Austin class) in order to operate and maintain a variety of aircraft, including current and future rotary-wing aircraft. Other advanced features include the Advance Enclosed Mast/Sensor (AEM/S) system for reduced signature/sensor maintenance, reduced-signature composite-material enclosed masts, other stealth enhancements, state-of-the-art C4ISR and self-defense systems, a shipboard wide-area network that links shipboard systems and embarked Marine Corps forces and platforms, and significant quality of life improvements.

Reducing Total Ownership Costs (TOC) remains an important factor in the program's efforts. By introducing a variety of new approaches to streamlining the acquisition process and taking advantage of numerous "SmartShip" initiatives to optimize (not simply reduce) manning through focused human-factors engineering and thus enhance operational capabilities, the Navy estimates that it shaved about $4.5 billion from the program's TOC.

Status

The initial contract award to design and build the lead ship of the class was awarded to the Avondale-Bath Alliance in December 1996. LPD 17 class workload was transferred from Bath Iron Works to Northrop Grumman Ship Systems in June 2002. LPDs 17 through 21 have delivered. New York (LPD 21) was commissioned in November 2009. LPDs 22 through 25 are under construction. San Diego (LPD 22) began construction in July 2006 and is expected to deliver in FY 2011.

Developers

Northrop Grumman Ship Systems	
Avondale Operations	New Orleans, Louisiana
Louisiana Ingalls Operations	Pascagoula, Mississippi
Raytheon	San Diego, California

MCM 1 Avenger-Class Mine Countermeasures Ship Modernization

Description

The Avenger (MCM 1) surface mine countermeasures ships detect, classify, neutralize, and sweep mines in sea lines of communication and operating areas. These ships are one part of the mine countermeasures "triad" that includes Airborne MCM helicopters and Explosive Ordnance Disposal (EOD) forces.

The 14-ship MCM class is undergoing a modernization package that commenced in FY 2004. It corrects the most significant maintenance and obsolescence issues in order to maintain the ships through their full 30-year service lives. The MCM 1 modernization package includes a planned product improvement program for the Isotta Fraschini main engines and generators for MCM

3 through MCM 14; upgrading the SLQ-48 Mine Neutralization Vehicle to replace obsolete components; upgrading the existing SQQ-32 Sonar with high-frequency-wide band capabilities; and replacing the existing acoustic sweep system with the advanced acoustic generator/infrasonic advanced acoustic generator. Other major HM&E alterations include upgrades to the 400-Hz distribution system, replacement of aft deck hydraulic equipment with electric equipment, replacement of the diesel generator analog voltage regulators with digital voltage regulators, and upgrading the common navigation system.

Status
The modernization effort is scheduled for completion by 2014.

Developers
Raytheon Portsmouth, Rhode Island

Mobile Landing Platform (MLP)

Description
The Mobile Landing Platform is based on commercial float-on/float-off (FLO/FLO) technology to provide a surface interface between large, medium-speed, roll-on/roll-off (LMSR) prepositioning ships and landing craft surface connectors. The platform will enable two primary capabilities: transfer of equipment, personnel and sustainment at-sea; and delivery of those assets ashore (adding capability not present in today's afloat prepositioning programs).

Perhaps the most flexible platform in the maritime prepositioning ship squadrons, the MLP will provide capability to the joint force for large-scale logistics movements from sea to shore, significantly reducing dependency on foreign ports. It is designed to be a "pier in the ocean."

Status
The Navy intends to procure and build a total of three MLPs within the FYDP. Advanced design and long lead-time material contract was awarded in August 2010. The first ship is expected to deliver in FY 2013, with initial operating capability and incorporation into the Maritime Prepositioning Force (MPF) projected in 2015.

Developers
General Dynamics NASSCO San Diego, California

Maritime Prepositioning Force Utility Boat (MPF UB)

Description
The Maritime Prepositioning Force Utility Boat (MPF UB) is a commercial-design utility craft used to support personnel movement and logistics during MPF offload operations. The MPF UB will replace most of the existing LCM-8s on board MPF ships and at each Navy Assault Craft Unit (ACU). Additionally, the MPF UB can provide waterborne force protection as well as limited medical evacuation support in a protected environment. The craft, powered by twin diesel engines and water jet propulsion, is capable of speeds

in excess of 25 knots over a 300NM range in sea state 2-plus. A bow ramp facilitates embarking and discharging personnel over a ramp, low pier, or quay.

Status
Production on the MPF UB continues in FY 2011. Nineteen craft have been delivered to end users and MPF ships in early 2011. Procurement and production of all 23 craft will be complete in FY 2012.

Developers
Kvichak Marine Seattle, Washington

PC 1 Cyclone-Class Patrol Coastal Service Life Extension Program (PC SLEP)

Description
Cyclone-class Patrol Coastal (PC) ships are essential for conducting theater security cooperation (TSC), maritime security operations (MSO), and ISR. PCs are well-suited to operating with partner navies and coastguards, in the green water/brown water "seam." A total of 14 Cyclone-class ships were built. In early 2011, ten are operating with the U.S. Navy and three with the U.S. Coast Guard. One was transferred to the Philippine Navy in 2004.

The PC SLEP improvements correct the most significant maintenance and obsolescence issues to extend the life of the class to a 30-year expected service life (2023-2026). The program also supports significant alterations, such as a main propulsion diesel engine pool and replacing diesel generators and reverse-osmosis units. A finite element analysis of the hull and subsequent repairs are also planned. Additional HM&E modifications, and updates to the weapons systems and C4ISR suite are also included in the package.

Status
The 13-ship PC class is undergoing a SLEP that commenced in FY 2008. In 2012, the program expands to include the three hulls that will be returned from the U.S. Coast Guard at the end of FY 2011. The modernization effort is scheduled for completion by 2016.

Developers
Various.

Seabase-to-Shore Connector (SSC) / LCAC 100

Description
The SSC is envisioned to provide high-speed, heavy-lift for over-the-horizon maneuver, surface lift, and shipping. The SSC will address the gap in heavy sea-to-shore lift that will emerge as the LCAC SLEP craft reach their ends of service lives and retire beginning in 2014. The SSC payload design will exceed the current LCAC SLEP payload. The SSC will also target reduced manning requirements and the use of enhanced lift fans, propellers and composite materials.

Status
The initial capabilities document was approved by the JROC in October 2006. An AoA was completed in October 2007 and was approved in early FY 2008. The capabilities development document was approved in June 2010. Delivery of the first craft to the Fleet is scheduled for FY 2016.

Developers
To be determined.

T-AGS 66 Oceanographic Survey Ship

Description
The Pathfinder-class (T-AGS 60) oceanographic survey vessels comprises six 329-foot long, 5,000-ton vessels that provide multipurpose oceanographic capabilities in coastal and deep-ocean areas. These ships perform acoustic, biological, physical, and geophysical surveys, and gather data that provide much of the military's information on the ocean environment as well as mapping of the ocean floor to update nautical charts. The data help to improve technology in undersea warfare and enemy ship detection. The ships are manned and operated for the Oceanographer of the Navy (OPNAV N2/N6F5) by civilian crews provided by the Military Sealift Command (MSC). Mission scientists and technicians are from the Naval Oceanographic Office (NAVOCEANO). T-AGS 60 class ships are designed with a common bus diesel electric propulsion system consisting of twin-screw propellers driven through Z-drives. The Z-drives, with 360-degree direction control, provide for precise position keeping and track line following. In FY 2013, the Navy will deliver the newest vessel to the Fleet, the USNS Maury (T-AGS 39), a modification of the Pathfinder-class. Named after Matthew Fontaine Maury, the father of modern oceanography and naval meteorology, T-AGS 66 will be 24 feet longer than the other Pathfinder T-AGS vessels to accommodate the addition of an 18-foot x 18-foot inboard moon pool. The moon pool will allow access to the water through the ship's hull for the deployment and retrieval of unmanned undersea vehicles (UUVs). The increased ship length will also provide 12 additional permanent berthing accommodations. As on previous vessels, a hull-mounted mission-system gondola will be used to house the multi-beam sonar system.

Status
The construction of Maury (T-AGS 39) is now under contract with VT Halter Marine of Pascagoula, Mississippi. The program is fully funded, and the final design reviews are being completed in early 2011. Ship construction is currently underway, with an anticipated launch in summer 2012 and delivery to the Navy in the spring of 2013.

Developers

Naval Meteorology and Oceanography Command Stennis Space Center	Pascagoula, Mississippi
Office of the Oceanographer of the Navy	Washington, DC
VT Halter Marine	Pascagoula, Mississippi

T-AH 19 Mercy-Class Hospital Ships

Description

The two T-AH 19 Mercy class hospital ships are national strategic assets employed in support of combatant commander (COCOM) requirements. USNS Mercy (T-AH 19) and USNS Comfort (T-AH 20) provide highly capable medical facilities and are configured and equipped to meet their primary mission as a large-scale trauma center for combat operations. Each ship has 12 operating rooms and up to 1,000 beds (100 acute care, 400 intermediate, and 500 minor). Additionally, the hospital ships serve as cornerstones for shaping and stability operations, acting as powerful enablers of stability, security and reconstruction efforts around the globe. Operating from the sea-base, the hospital ships provide a highly visible, engaged, and reassuring presence when deployed for theater security cooperation (TSC) or when called to respond to HA/DR needs.

As part of the Naval Fleet Auxiliary Force (NFAF) under control of the Military Sealift Command, these ships are maintained in either a reduced operating Status (ROS) or full operating status (FOS) depending on mission tasking and COCOM requests. Generally, one hospital ship is scheduled for a 120-to-150-day TSC deployment per year. Periodic maintenance is performed when they are in ROS status to ensure the ships are able to meet full operational capability within a few days of activation. MSC civilian mariner crews with medical staff augmentation man these ships when activated.

Status

USNS Mercy and Comfort have expected service lives to approximately 2020-21. There is no requirement to replace them, although options for future afloat medical support are being evaluated.

Developers

None.

T-AKE 1 Lewis and Clark Class Dry Cargo and Ammunition Ship

Description

The Lewis and Clark (T-AKE 1)-class dry cargo and ammunition ships replace the Kilauea (T-AE 26), Mars (T-AFS 1), and Sirius (T-AFS 8) classes of fleet auxiliaries, all of which are nearing the ends of their service lives. T-AKE ships provide logistic lift from sources of supply and transfers this cargo at sea to station ships, which directly support combat forces, and other naval forces. As a secondary mission, T-AKE may act in concert with a fleet oiler (T-AO) as a substitute station ship. T-AKE ships are built to commercial standards and crewed by Military Sealift Command civilian mariners, augmented by military personnel as required. A Navy aviation detachment or equivalent, using contracted commercial helicopters, provides vertical underway replenishment (VERTREP) capability.

Status
The fixed-price incentive contract with General Dynamics National Steel and Shipbuilding Company (NASSCO) includes option pricing for up to 14 T-AKE hulls to support both Combat Logistics Force (CLF) and Maritime Prepositioning Force program requirements. All 14 T-AKE hulls have been contracted, with delivery of the last hull scheduled for October 2012. The program achieved initial operational capability in May 2007, when T-AKE 1 completed its post-shakedown availability. Ten ships have been delivered through the end of 2010.

Developers
National Steel and Shipbuilding Company San Diego, California

EXPEDITIONARY SYSTEMS

AQS-20A Mine-Hunting Sonar

Description
The AQS-20A is an underwater mine-detection sonar that also employs an electro-optic identification (EOID) sensor capable of locating and identifying bottom, close-tethered, and moored sea mines. The AQS-20A mine-hunting system will be deployed and operated from the MH-60S helicopter as one of four AMCM weapon systems onboard the Littoral Combat Ship. The AQS-20A system will also serve as the mine sensor subsystem of the Remote Mine Hunting System hosted on board LCS.

Status
Milestone C and LRIP I occurred in FY 2005. Improvements to computer-aided detection/classification and environmental data-collection capabilities are being implemented via enhanced research and development efforts. IOC is currently anticipated in FY 2012.

Developers
Raytheon Portsmouth, Rhode Island

Assault Breaching System (ABS)

Description
The ABS program focuses on development of standoff systems to counter mine and obstacle threats in the surf through beach zones. The program uses a "system-of-systems" approach that includes incremental development of the Coastal Battlefield Reconnaissance and Analysis (COBRA) mine/obstacle detection system, Countermine System (CMS), and precision craft navigation and lane marking. A modification of the Joint Direct-Attack Munition (JDAM) for ABS (JABS) provides an interim neutralization capability of surface-laid mines and obstacles in the beach and surf zone, to be extended to the shallow-water regime, as well. CMS will provide neutralization capability for buried and surf-zone mines, with an IOC in FY 2018. The platform for the COBRA system is the Firescout VTUAV. Platforms for employment of the neutralization systems include Navy and Marine Corps strike aircraft and Air Force bombers.

Status

The COBRA Block I system achieved Milestone C in FY 2009; IOC is scheduled for FY 2012. JABS is a currently fielded capability in the beach and surf zone, with an expanded very shallow-water capability planned by FY 2013. The CMS munition will achieve IOC in FY 2018.

Developers

Arete	Tucson, Arizona
Boeing	St. Louis, Missouri
Technology Systems Inc.	Brunswick, Maine

Identity Dominance System (IDS) Biometrics

Description

The Identity Dominance System (IDS) program of record is under development to provide biometric and limited forensic collection capabilities for visit, board, search, and seizure (VBSS) teams conducting expanded maritime interception operations (EMIO). The program expands naval force capabilities by providing VBSS teams with the ability to verify and/or confirm the identities of known or suspected terrorists and persons of interest through the use of facial recognition, iris scan, and fingerprints. Additionally, the system will have the ability to collect documents and media for further exploitation.

Status

Fleet VBSS teams use COTS biometric-collection devices to collect and transmit biometric information to the DoD's authoritative biometric database for "match/no-match" analysis. Approximately 200 of these kits were procured in FY 2006/07 and fielded to VBSS-capable ships. The initial fielding provided stop-gap biometrics capabilities for naval forces. Research and development efforts are underway to develop a more robust multi-modal biometric, document, and media exploitation capability through the Identity Dominance System program of record.

The Identity Dominance System in development will expand current biometrics capabilities through use of a rugged, lightweight system capable of collecting multiple biometric modalities and electronic media for further matching and analysis. The IDS Capabilities Development Document was JROC approved in September 2008 and is scheduled to achieve Milestone B in early FY 2011 and reach Initial Operating Capability in the 4th Qtr FY 2012.

Developers

Naval Surface Warfare Center	Dahlgren, Virginia

Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW / RCEID)

Description

Improvised explosive devices (IEDs) continue to present a significant threat to United States and coalition forces throughout the world and over the full range of military operations. The Counter Radio-Controlled IED Electronic Warfare (CREW) program encompasses all of the mobile and fixed-site protection systems employed to counter IEDs that are either armed or initiated by radio-command signals. Fielded first- and second-generation CREW systems were acquired largely by non-developmental urgent operational need UON) initiatives meant to address immediate warfighter requirements.

Joint CREW (JCREW) is a Navy-led program to develop the next generation of Joint CREW systems. JCREW will deliver capabilities that correct deficiencies in existing CREW systems and address future worldwide RCIED threats. Additionally, JCREW has an open architecture allowing evolution as new threats, advances in technology, and new vehicle requirements are introduced.

Status

JCREW is expected to reach IOC in 2013.

Developers

ITT Electronic Systems — Clifton, New Jersey

Joint Nuclear Biological Chemical Reconnaissance System 2 / Chemical, Biological, Radiological And Nuclear Monitoring And Survey Set, Kits And Outfits (JNBCRS 2 / CBRN)

Description

Joint Nuclear Biological Chemical Reconnaissance System 2 (JNBCRS 2) / Chemical, Biological, Radiological and Nuclear (CBRN) Dismounted Reconnaissance Sets, Kits, and Outfits (DR SKO) is an organic suite of specialized CBRN detection and protection equipment providing Navy VBSS boarding teams with additional CBRN capability to conduct efficient and thorough CBRN reconnaissance survey and monitoring missions on boarded vessels in response to CBRN threats. It provides VBSS forces with the capability to detect or deny the presence of weapons of mass destruction (WMD) in support of WMD interdiction missions. Specifically, the DR SKO provides:

- Detection and Identification capabilities
- Radiological and Nuclear Material
- Chemical Warfare Agents (CWA) and Biological Warfare Agents (BWA)
- Toxic Industrial Chemicals/Materials (TIC/TIM)
- Oxygen levels and combustible gases
- Some explosives and drugs
- Individual Personnel Protective Equipment (IPPE)
- Integrated Radio/Wireless Communications

Status

The Navy's participation in this program is a response to Commander U.S. Naval Forces Central Command's urgent operational need (UON) to provide VBSS teams with the capability to identify and detect CBRNE / WMD material. Approximately 163 radiation detection/hazardous atmospheric kits were procured in FY 2007-08. Each kit consists of:

- Six UDR-15 Personal Radiation Detectors (PRD)
- Six Handheld Radiation Monitors (HRM)
- One Thermo IdentiFinder Ultra NGM (used to identify isotopes)
- TIC vapor and gas detector, GAMIC 4 Gas Analyzer and Drug Testing kit

The Navy is fielding this equipment to deploying VBSS-capable ships to serve as an interim capability until the DR SKO program reaches IOC, planned for FY 2014. To fully meet the UON requirements, Navy is working with the Joint Program Office Chem/Bio Defense (JPEO CBD) to transition full-spectrum CBRNE/WMD detection requirements of the UON into the CBRN DR SKO/MS SKO program of record.

Developers

JPM-NBC CA	Aberdeen Proving Ground, Maryland
Murtech/iCX	Glen Burnie, Maryland

Mk 62/63/65 TDD Mk 71 Naval Quickstrike Mines

Description

The in-service Quickstrike family of aircraft-delivered bottom mines is being enhanced significantly by procurement of the programmable Target Detection Device (TDD) Mk 71. Engineering development efforts include new advanced algorithms for ship detection, classification, and localization against likely threats that include quiet diesel-electric and AIP submarines, mini-subs, fast patrol boats, and air-cushioned vehicles. The Quickstrike mines are the only mines in the Navy's inventory. They include one dedicated thin-wall mine—the 2,300-pound Mk 65 weapon—and two mines converted from bombs: the Mk 62 500-pound and Mk 63 1,000-pound mines.

Status

Limited in-service support continues for current inventories and funding is in place for algorithm development and eventual procurement of the TDD MK-71.

Developers

SECHAN Electronics, Inc.	Lititz, Pennsylvania

Navy Energy Program

Description

The Navy Energy Vision is one that values energy as a strategic resource. The Navy understands how energy security is fundamental to executing our mission afloat and ashore, and how the service must be resilient to any potential energy future. Realizing the Energy Vision will require a comprehensive Navy Department-wide strategy comprising strategic imperatives and goals that align with the Department of Defense and Federal government approach to energy and climate issues. The Navy Energy Strategy guides a strong portfolio of investments in people, technology, and programs across Navy enterprises. In the near term, the Navy will make significant gains by adjusting policies to enable more energy-efficient operations, encouraging awareness and energy-conscious behavior in every Navy setting, optimizing existing technologies to reduce energy consumption, and speeding the implementation of new technologies, all with the intent of enhancing or enabling greater combat readiness.

The resulting program is built on strategic imperatives to assure mobility and protect critical infrastructure, lighten the load and expand tactical reach, and "green" our footprint—imperatives aligned with the Secretary of the Navy's five energy targets. Our goal is not only to increase the use of alternatives both tactically and ashore, but also to invest in efficiency-enhancement and consumption-reduction initiatives that reduce the overall requirement for petroleum. Our energy program will pursue initiatives that advance combat capability and reduce reliance on fossil-based energy. Additionally, this strategy will serve to accomplish the goals set in the legislation and executive orders for our shore infrastructure and advance Navy leadership in energy security.

To that end, the Tactical Navy Energy Program lays out a balanced investment strategy that capitalizes on near-term quick-win gains, mid-term development of efficiency initiatives that can be incorporated into legacy equipment and systems, and long-term science and technology investment to explore game-changing technology. This balance is achieved with investment at the "knee in the curve," where the best return in terms of fuel saved is delivered.

For shore and infrastructure investment, this balance is achieved through a watch, partner, and lead strategy. This approach allows the Navy to watch maturing technology and invest when/where viable (e.g., solar and wind), partner to develop needed technology with other government organizations or industry (e.g., SmartGrid), and lead the development of mission-critical technologies (e.g., ocean energy for island bases). Doing so allows the Navy to invest to achieve our goals on a path that meets legislative requirements and sets the stage to achieve our larger, long-term objectives.

Status

The PB 2011 program was significantly enhanced for POM 12 to include additional investment to address shore energy legislative requirements and further invest in tactical energy initiatives that target energy efficiency, reduce energy consumption, and complete alternative fuel test and certification to lay the foundation for increased alternative fuel use.

Developers

None.

WLD-1 RMS Remote Minehunting System

Description

The AN/WLD-1 RMS consists of a semi-submersible, unmanned vehicle that tows the AQS-20A sonar to conduct minehunting operations. RMS will be operated from LCS-class ships. RMS is designed to be launched with a pre-programmed search pattern and will search, detect, classify, and identify conventional bottom, close-tethered, and moored naval mines. RMS is capable of line-of-sight and over-the-horizon operations while minehunting. Once the mission is completed, RMS will return to the ship and data will be downloaded for post-mission analysis (PMA).

Status

RMS completed a Nunn-McCurdy recertification process on June 1, 2010 and is an ACAT 1D post Milestone B program. The system has begun a robust reliability growth program to improve its operational availability. Milestone C is scheduled for late FY 2014, and IOC is scheduled for FY 2015.

Developers

Lockheed Martin — Riviera Beach, Florida

SECTION 5

INFORMATION DOMINANCE

Information dominance enables end-to-end defense and management of Navy networks and the information and knowledge that is transported by those networks. The Navy's information capabilities and info-centric communities place the Navy in a better position to meet the challenges and threats of the Information Age. Success in the Information Age will require unmatched mastery of the capabilities, tools and techniques that enable us to collect, process, analyze and apply information.

Advanced Tactical Data Link Systems (ATDLS)

Description

The Advanced Tactical Data Link Systems program provides the tactical data link command and control (C2) backbone for U.S. forces and allies and coalition partners. It develops, fields, and supports joint and coalition tactical data link (TDL) capabilities in accordance with the Joint Tactical Data Enterprise Services Migration Plan (JTMP), the DoD roadmap for TDL implementation. The JTMP is a plan to migrate from numerous "stovepipe" non-interoperable tactical data links to a net-centric, open-architecture, internet protocol (IP)-based, low latency, Joint family of TDL message standards providing access to Tactical Data Enterprise Services and the Global Information Grid (GIG).

Joint TDLs (Link-11, Link-16 and Link-22) include terminals, gateways, networks, and support initiatives that improve connectivity, promote equipment interoperability, and provide training and support. Link-11 is used by Navy, Air Force, Army, Marine Corps, and allied ships and aircraft, many of which are also equipped with Link-16. Link-11 is scheduled to be phased out no later than 2015 and replaced with the more capable Link-16. Link-16 is DoD's primary TDL; the Navy is implementing Link-16 in most of its TDL-capable platforms and weapons. Link-22 is a multi-national development effort that will use the same message standard as Link-16, but a less complex waveform, making it more suitable for high frequency transmission and not restricted to line-of-sight communications (LOS), a limitation for Link-16.

ATDLS-supported efforts include:

Terminals: Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System - Low Volume Terminal (MIDS-LVT), MIDS Joint Tactical Radio System (MIDS JTRS) and the Common Shipboard Data Terminal Set (CSDTS).

Gateways: Command and Control Processor (C2P), Common Data Link Management System (CDLMS), and Next-Generation C2P.

Support Initiatives: Joint Interface Control Officer (JICO) Support System (JSS) and Dynamic Network Management (DNM), which initiatives allow more effective employment of fleet units by improving timeliness, accuracy, and content of tactical data transfer.

Status

The program descriptions for C2P, CDLMS, DNM, JTIDS, MIDS- LVT, and MIDS-JTRS in this section provide the status of each program.

Developers

Advanced Programming Concepts	Austin, Texas
BAE Systems	Wayne, New Jersey
Data Link Solutions (DLS)	Cedar Rapids, Iowa
ViaSat Inc.	Carlsbad, California

Automated Digital Network System (ADNS)

Description

ADNS is the shipboard network interface that enables connectivity between the ship's internal network and the outside world via the radio frequency (RF) spectrum and land line when pierside. ADNS is also installed in Navy Network Operations Centers (NOCs), enabling the NOC to transmit and receive voice and data to and from ships underway or pierside. ADNS provides Unclassified, Secret, Top Secret, and various joint, allied, and coalition services to interconnect to the Defense Information Systems Network (DISN). ADNS Increment I combines internet protocol (IP) traffic from different enclaves and transmits across available communications paths. ADNS Increment II added the capability to manage traffic from multiple enclaves simultaneously over multiple transit paths including RF and terrestrial links, but still did not satisfy the Fleet's need for a higher throughput. Increased throughput and converged IP (voice, video, and data) capabilities were delivered to the Fleet with the deployment of Increment IIa/IIb. ADNS Increment III brings a protected core, reducing the exposure to cyber warfare network infiltration. It will support 25 megabits per second (Mbps) aggregate throughput for submarines and unit-level ships and 50 Mbps aggregate throughput for force-level ships. ADNS is the key enabler for delivering net centric capabilities that depend upon a robust, dynamic, adaptable, survivable, secure communications. ADNS Increment III may be considered a key enabler of counter anti access and area denial (A2AD) capability.

Status

In FY 2005, all active ships and ashore Network Operations Centers (NOC) facilities were equipped with either ADNS Increment I or II; additionally, all active submarines and broadcast control authority (BCA) facilities were equipped with Increment I. In FY 2006, ADNS Increment IIa installations began on aircraft carriers, large-deck amphibious assault ships, and fleet commander flagships (force-level ships). Subsequently, in FY 2007, ADNS Increment IIb installations began on unit-level ships. In FY 2008, select airborne platforms were incorporated into ADNS, bringing network connectivity to additional fleet assets. Increment III low-rate initial production began in FY 2009. ADNS Increment III reached IOC in FY 2010. Ashore NOC and BCA installs were completed in FY 2010. Increment III will be installed on all ships and submarines. ADNS Increment III is estimated to reach FOC in FY 2021.

Developers

General Dynamics	Tauton, Massachusetts
PEO C4I	San Diego, California
SPAWAR Systems Center Pacific	San Diego, California
SAIC	Arlington, Virginia

Automatic Identification System (AIS)

Description

The Automatic Identification System (AIS) is a maritime digital broadcast system that continually exchanges voyage and vessel data among network participants over VHF radio frequency. The data include: vessel identity, position, speed, course, destination, and other information of critical interest for navigation safety and maritime security. International commercial vessels greater than a specified gross tonnage (GT), in 2011 300GT, are mandated by the International Maritime Organization (IMO) and the 1974 International Convention for the Safety of Life at Sea (SOLAS) Treaty to use AIS. Warships are exempt. The Navy AIS program collects open-source AIS data that are broadcast from AIS transceivers on commercial shipping vessels. This open-source AIS data (e.g., vessel location, course and speed), combined with other government intelligence and surveillance data, are used on board Navy ships and submarines to improve safety of navigation and is integrated into the common operational picture to enhance situational awareness. The AIS data collected by Navy platforms is also aggregated within the Maritime Domain Awareness (MDA)/AIS, Sensor/Server (MASS), located at several shore sites. The MASS then provides the data to unclassified and classified users in support of MDA efforts, with particular focus on improving the Nation's maritime security.

Status

Initiated as a rapid-deployment capability (RDC), AIS transitioned to a program of record on December 24, 2008 and was designated as an ACAT IVT program. PEO C4I is the milestone decision authority. Increment I AIS systems have been installed on 150 unit-level ships (e.g., cruisers and destroyers) and provide basic AIS capability, including a laptop computer display on the bridge and connectivity to send unclassified AIS data to shore sites. An additional 12 unit-level ships will be backfitted with AIS. The first Increment I AIS systems were installed on two Los Angeles (SSN 688)-class submarines in FY 2010. There is a plan to complete AIS installations on 69 additional submarines. AIS Increment I systems have also been installed on 23 force-level ships (aircraft carriers and amphibious assault ships) that, in addition to the basic capability, allow for the direct transfer of AIS track information to the Global Command and Control System (GCCS). AIS shore sites are currently operational at Second, Third, Fifth and Pacific Fleet.

Developers

L-3 Communications	Orlando, Florida
SPAWAR Systems Center Atlantic	Charleston, South Carolina
Sperry Marine – Northrop Grumman Electronic Systems	Charlottesville, Virginia

Base Level Information Infrastructure (BLII)

Description

Base Level Information Infrastructure modernizes antiquated information technology (IT) and facilities and installs state-of-the-art IT capability where none exists at 14 major outside the continental United States (OCONUS) fleet concentration bases, stations, and other remote locations. BLII is the project that provides the infrastructure, hardware, and software for OCONUS Navy Enterprise Network (ONE-NET). BLII provides a fully integrated, interoperable, and secure IT infrastructure that enables the rapid and reliable transfer of voice, video, and data to our forward -deployed OCONUS bases, stations, homeports, and piers. BLII also sustains OCONUS pier IT infrastructure capability, which includes maintaining pier fiber runs, conduits, junction boxes, brow umbilicals, and associated electronics. Modern pier IT infrastructure enables our forward-deployed ships to maintain situational awareness, receive operational and intelligence traffic, and perform maintenance or training on their radio frequency systems while pier side.

Status

Phase I and II: Migrated legacy networks into the BLII/ONE-NET environment, and now provides IT services to approximately 26,000 BLII/ONE-NET seats, supporting approximately 33,000 forward-deployed OCONUS Navy users.

Developers

The BLII project is under the cognizance of Program Executive Office for Enterprise Information Systems. OPNAV N2/N6 and Navy Cyber Forces Command maintain synchronization in the requirements validations and programming processes.

Battle Force Tactical Network (BFTN)

Description

Battle Force Tactical Network provides high frequency internet protocol (HFIP) and subnet relay (SNR) to allied, coalition, and national maritime units with a direct platform-to-platform tactical networking capability using legacy ultra high frequency (UHF) and high frequency (HF) radios. Since the two technologies operate efficiently with current legacy equipment, they are cost-effective solutions for achieving tactical IP networking at sea. BFTN enables warfighters on Combined Enterprise Regional Information Exchange System-Maritime (CENTRIXS-M) and Secure Internet Protocol Routing Network (SIPRNET) networks to execute and plan in a real-time tactical environment by transporting IP data directly to and from ships, submarines, and aircraft. HFIP operates in the HF spectrum and is capable of data rates of 9.6 kbps in single side band (SSB) and 19.2 kbps in independent side band (ISB). SNR operates in the UHF spectrum and is capable of data rates up to 64 kbps. BFTN allows surface platforms the ability to share a single SATCOM resource for reach-back capability. HFIP also supports the hardware/software upgrade requirements for battle force email (BFEM). BFTN is a key enabler of counter anti-access and area-denial (A2AD) capability.

Status
In 2007, the USS Harry S. Truman (CVN 75) Carrier Strike Group deployed with HFIP and SNR. During the next five years, the Navy plans to install BFTN on approximately 243 ships, submarines, and aircraft. FOC is planned for FY 2016.

Developers

Quatech	Hudson, Ohio
Rockwell-Collins	Cedar Rapids, Iowa
SAIC	San Diego, California

Command and Control Processor/Common Data Link Management System (C2P/CDLMS)

Description
The Command and Control Processor (C2P) is a tactical data link communication processor designed to encapsulate data link protocols, providing a single shipboard system interface for the shipboard combat system. Originally developed in the 1990s, the C2P is associated with host combat systems, such as Aegis or Ship Self-Defense System (SSDS), and is closely tied to the weapons control loop. In the late 1990s, the C2P was "rehosted" to a more modern hardware suite to take advantage of COTS hardware––the UYQ-70 console—which makes the system easier and less expensive to upgrade. Additionally, the rehost effort extended the functionality of the C2P by consolidating functions previously performed by separate systems and subsystems and providing improved human machine interface (HMI) and link maintenance. This became known as the Common Data Link Management System (CDLMS). CDLMS also incorporates the Link Monitoring System (LMS) along with supporting the initial phase of development of the Common Shipboard Data Terminal Set (CSDTS). The CSDTS initiative provides the next-generation Link-11 data terminal that replaces legacy Link-11 terminal hardware incorporates Multi-Frequency Link-11 (MFL), Satellite Link-11 and supports the initial Dual-Net Link-11. The CDLMS integrates the CSDTS and C2P Rehost (C2PR) in a set of Versa Module Eurocard (VME) cards to provide consolidated displays and controls to monitor multi-TDL networks simultaneously. The CDLMS/C2P(R) program has fielded the AN/USQ-86 (V), consisting primarily of an UYQ-70 EPS housing four VME chassis. Three of these are populated with VME card sets C2P(R), CSDTS, and the Link Management/Monitoring Component. This hardware configuration supports the transformation to Next Generation Command and Control Processor (NGC2P), which introduces the Beyond Line of Sight Capability Joint Range Extension (JRE), and is designed to introduce Link-22.

Status
C2P Model 4 successfully completed OPEVAL in 1994; Model 5 completed OPEVAL in 2000. The C2P is fully fielded with the capability of being re-hosted as software within the CDLM and Next-Generation C2P(NGC2P). NGC2P achieved MS C in FY 2005. It completed OPEVAL testing in FY 2007 and was approved for full rate production in FY 2008. Fielding is expected to be completed by the first quarter of FY 2013.

Developers

DRS Inc.	Wyndmoor, Pennsylvania
General Dynamics Information Technology	Fairfax, Virginia

Commercial Satellite Communications (COMSATCOM)

Description

The Commercial Satellite Communications program includes following elements: (1) the Commercial Broadband Satellite Program (CBSP); (2) the Commercial Wideband Satellite Program (CWSP); (3) the Inmarsat B High Speed (HSD) Program; (4) the Television Direct-To-Sailors (TV-DTS) program; and (5) the Iridium Program. The primary purpose of CBSP, CWSP, and Inmarsat B HSD is to provide the terminals and architecture for augmentation of bandwidth requirements in the fleet that are not otherwise available from military satellite communications (MILSATCOM). This includes SATCOM terminals that deliver voice, video, data, and imagery requirements to the warfighter at-sea, e.g., NIPRNET, SIPRNET, JWICS, JCA, telephones, video teleconferencing. The primary purpose of TV-DTS is for enhanced quality of life in the Fleet, which includes video and audio programming. For Navy this includes the top-side antenna only. The space segment is provided by Armed Forces Radio and Television Service (AFRTS), and the below-decks equipment and programming is provided by the DEFMEDIACEN. The primary purpose of Iridium as part of the CNO N6 program of record includes paying Navy's share of the must-pay corporate bill for operations and maintenance (O&M) of the DoD Gateway in Hawaii. Defense Information Systems Agency (DISA) is the program manager for Iridium and is responsible for O&M of the DoD Gateway in Hawaii. A small amount funding is also included to maintain a Help Desk (SPAWAR Atlantic) for new Navy users desiring to acquire Iridium. All users are responsible for paying for the Iridium Handsets, ancillary equipment, and airtime.

Status

Current fielding for CBSP as of the end of FY 2010 includes 60 of 235 ships complete. Ships continuing to operate with legacy CWSP and Inmarsat as of the end of FY 2010 and transitioning to CBSP include: 27 CWSP and 174 Inmarsat. One hundred twenty ships continue to operate with the legacy TV-DTS antenna system. Iridium includes funding Navy's share of the corporate bill to pay for Operations and Maintenance of the DoD Gateway in Hawaii. This supports approximately 3000 Navy users of Iridium.

Developers

CBSP/CWSP:	
Harris Corporation	Melborne, Florida
CBSP:	
CVG, Inc.	Chantilly, Virginia
INMARSAT:	
NERA	London, England
IRIDIUM:	
Iridium, LLC	Bethesda, Maryland
TV-DTS:	
Orbit Technology Group, Ltd.	

Consolidated Afloat Network Enterprise System (CANES)

Description

The CANES program will modernize Navy's afloat environment by consolidating diverse networks and implementing afloat core services (ACS) and cross-domain solutions (CDS). CANES will provide all security domains from Unclassified through Top Secret/Sensitive Compartmented Information (TS/SCI) common computing environment (CCE) for a wide variety of Navy surface combatants, submarines, maritime operations centers (MOCs), and aircraft. CANES will enable more efficient data visibility and flow between operational nodes on the Global Information Grid using an open architecture. Additionally, virtualization on the CCE will enhance the Navy's ability to reduce numerous standalone command and control systems and applications, eliminating the need to field additional or unique hardware (e.g., servers and workstations). Through CCE, CDS and virtualization, CANES will improve the Navy's C4ISR security and agility while reducing total ownership costs.

CANES will serve as the hardware and software platform upon which applications, systems, and services will host or connect. CANES is currently projecting 34 applications from across multiple Navy departments to migrate from redundant, native hardware and host within the CANES domain providing duplicative cost avoidance and return on investment for the navy.

The CANES fielding plan is based on a four-year hardware refresh baseline and a rolling two-year application software upgrade baseline. This approach focuses on cost control rather than acquisition, contracting, testing, and lifecycle sustainment by consolidating configuration-management baselines, logistics, and training into a unified program.

Of note, the existing afloat networks that CANES will replace include Integrated Shipboard Network Systems (ISNS), Combined Enterprise Regional Information Exchange System - Maritime (CENTRIXS-M), SCI Networks, and Submarine Local Area Networks (SubLANs). In addition, CANES will provide functionality currently provided in the Video Information Exchange System (VIXS) and portions of Afloat Computer Network Defense (CND).

Status

The CANES material development decision was approved in November 2008 and the request for proposal (RFP) was released in April 2009. CANES underwent a Milestone B Information Technology Acquisition Board (ITAB) in December 2010 to support IOC in FY 2012. CANES will achieve full deployment on surface ships by FY 2018 and submarines by FY 2021.

Developers

Lockheed Martin MS2 Tactical Systems	San Diego, California
Northrop Grumman Space and Mission Systems Corporation	Reston, Virginia

Defense Messaging System (DMS)

Description

DMS is an OSD-mandated program designed to eliminate the multitude of expensive "stovepipe" legacy record messaging systems and provide organizational message traffic between operational units. DMS architecture was derived from the multi-command required operational capability (MROC) requirements and designed to provide the armed services and agencies with a high assurance messaging capability. DMS provides messaging, directory, and management services.

Status

In 2005, the Assistant Secretary of Defense for Networks and Information Integration (NII) placed DMS in sustainment through FY 2012. Recent DoD Chief Information Officer (CIO) guidance directed the services to find alternate means and technologies to process organizational messages while a post-DMS roadmap is defined. The Navy intends to consolidate and eliminate DMS for organizational messaging using a phased approach.

Starting in FY 2011, the Navy will shut down its unclassified DMS architecture. All unclassified non-C2 related official information (OI) that historically was transmitted via message traffic will be disseminated via command email or via other transport mechanisms such as portals, wikis, and blogs. C2-related OI will continue to be supported via Secret Navy Regional Enterprise Messaging System (NREMS).

Beginning in FY 2012, the Navy will begin transitioning its shore and afloat components to an IP-based interim solution called Command and Control Official Information Exchange (C2OIX). C2OIX is the Navy's transitional official information exchange system that consolidates and eliminates shore and afloat support systems while facilitating message transfer via IP as the primary, plus failover to alternative mechanisms. Message communications with allied, coalition, and other DoD entities will continue to be supported by existing classified messaging systems.

Developers

TELOS Ashburn, Virginia

Defense Red Switch Network (DRSN)

Description

The Department of Defense and select federal agencies have a continuing operational requirement for a separate, controlled, and interoperable secure communications and conferencing network to support command, control, and crisis management activities. The Defense Red Switch Network (DRSN) capability satisfies that requirement. The DRSN is the secure circuit-switched element of the Defense Information System Network (DISN). It is a network of circuit switches interconnected by the DISN backbone and commercial transmission links. The DRSN provides high quality, secure voice communications, secure data communications, and secure conferencing capabilities to senior decision-makers.

Status
Naval Network Warfare Command (NNWC) is responsible for facilities, personnel, training, security and accreditation, and command policy for DRSN assets under Navy operational control. NNWC is also responsible for logistics support functions for assigned switches.

Developers
Various.

Deployable Joint Command and Control Capability (DJC2)

Description
The Deployable Joint Command and Control Capability is a standardized, rapidly deployable, scalable, and reconfigurable joint C2 and collaboration combat operations center that can be set up anywhere in the world to support geographic combatant commanders and their joint component commands in the rapid standup of a joint task force headquarters. DJC2 can be employed when executing operations ranging in scale from that of a first responder or small early-entry, forward-component operations center to that of a full JTF combat operation center. It has been used for homeland assistance/disaster relief operations, including: JTF Haiti after the earthquake in Port-au-Prince, Haiti; JTF Caring Response after Cyclone Nargis in Myanmar; and JTF Katrina after Hurricane Katrina in New Orleans, Louisiana. DJC2 supports the Navy Strategic Plan by extending the joint sea base ashore for rapid, dynamic joint operations.

The DJC2 system currently has four modular tent/mobile shelter configurations that iteratively build up C2 capability during the first phases of a joint operation. Configurations include an autonomous Rapid Response Kit (RRK, 5 to 15 seats), En Route (6 to 12 seats carried on board C-130 and C-17 airframes), Early Entry (20 to 40 seats), and Core (60 seats). An Early Entry configuration can be set up and operational with three networks and communications in less than six hours. The fully fielded DJC2 configuration can be set up and operational with five networks in less than 24 hours in a footprint of approximately 40,000 square feet. The fully fielded DJC2 includes self-generated power, environmental control, shelters, infrastructure, limited communications equipment, C2 applications, office automation and collaboration software applications with operator workstations (laptop computers, chairs and tables), displays, intercommunications, local area networks, and access to wide area networks. The DJC2 program has delivered to the COCOMS and Joint Force Commanders an operationally tested C2 system that is:

- Horizontally and vertically integrated across all levels of command
- Interoperable across joint, coalition, interagency, nongovernmental organization/private volunteer organization (NGO/PVO) realms

- Robust, scalable, and rapidly deployable, including autonomous en-route and rapid-response kit capabilities
- Spiraling into the design (through technology insertion) and fielding evolving technology to continuously meet Combatant Commander and JTF emerging requirements

Status

The DJC2 program attained full operational capability with the delivered six operational Core systems to U.S. Southern Command, U.S. European Command, U.S. Pacific Command, U.S. Army South, U.S. Army Africa, and III Marine Expeditionary Force. Current funding supports hardware sustainment, information technology refresh, and technology-insertion efforts (based on warfighter identified needs) across the FYDP. The first cycles of technology insertion have been successfully delivered and included secure wireless networking (with extension of service in excess of 10 miles), software application virtualization, and a new variant of the RRK that is more modular and includes a specialized commander's kit. Follow-on cycles of technology insertion will include such capabilities as a 24-seat core expansion kit, an Early Entry Lite configuration, robust storage architecture, cloud services, voice over secure internet protocol (VoSIP), IPv6, and multi-level security/cross-domain solution.

Developers

ARINC	Panama City, Florida
General Dynamics Information Technology	Panama City, Florida
L-3 Communications	Panama City, Florida
L-3 Communications	Panama City, Florida
NSWC Panama City Division (government system integrator)	Panama City, Florida

Distributed Common Ground System – Navy (DCGS-N)

Description

Distributed Common Ground System-Navy Increment One is the Navy component of the DoD DCGS family of systems. DCGS-N is the Navy's primary ISR and Targeting (ISR&T) support system, providing processing, exploitation, and dissemination services at the operational and tactical levels of war. DCGS-N operates at the General Services (GENSER) and Sensitive Compartmented Information (SCI) security levels. DCGS-N Increment One is replacing all legacy JSIPS-N (Joint Service Imagery Processing System-Navy) and TES-N (Tactical Exploitation System-Navy) systems.

DCGS-N makes maximum use of COTS and mature government-off-the-shelf GOTS), and joint services software, tools, and standards to provide a scalable, modular, and extensible multi-source capability that is interoperable with the other service and agency DCGS systems.

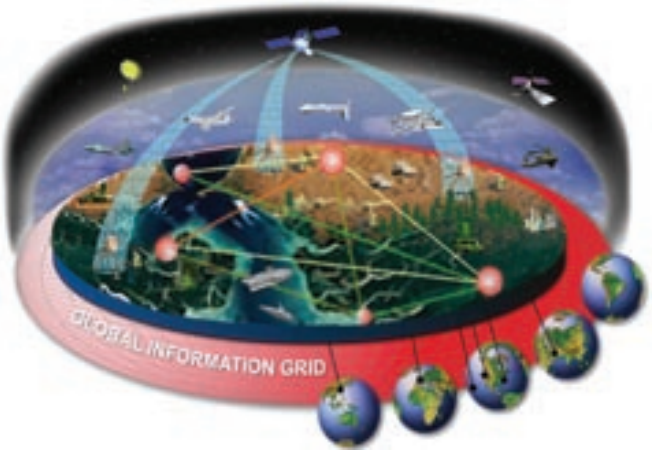
Status

In 2007, the DCGS-N program was realigned to fit into the CANES Common Computing Environment (CCE)/Afloat Core Services (ACS) architecture. The Increment One follow-on system, DCGS-N Increment Two, planned for FY 2015, will be hosted primarily as software within the CANES infrastructure as part of the Navy's long-term vision for consolidation of C4I networks and services.

The DCGS-N Increment One installation plan includes aircraft carriers, large-deck amphibious assault ships, fleet command ships, intelligence training centers and school house facilities, and shore-based numbered fleet Maritime Operations Centers reach-back support sites. Between Milestone C in August 2009 and September 2010, six Increment One exploitation suites were installed with an additional twenty-three (23) scheduled for installation through FY 2014. Increment Two (software) will be tested and fielded in FY 2015 as part of CANES.

Developers

BAE Systems	Rancho Bernardo, California



DoD Teleport

Description

DoD Teleport links the satellite communications space segment with the shore infrastructure and provides tactical users a worldwide communications interface to the Global Information Grid. Through multiple radio frequency media (military and commercial bands), Teleport provides inter-theater reach-back into the Defense Information Systems Network (DISN) and service C4I systems, as well as intra-theater communications support for tactical users. In 2001, DoD designated Navy as the teleport requirements sponsor. Teleports are located at six primary sites and one secondary site. The Navy operates and maintains teleports at Wahiawa, Hawaii; Northwest, Virginia; Lago Patria, Italy; and Bahrain. Non-Navy teleport sites are located at Fort Buckner, Okinawa, Japan; Camp Roberts, California; and Landstuhl/Ramstein, Germany.

Status

GEN I has been completed. GEN II has been commissioned and will reach FOC in FY 2011. GEN III is in-progress and has been broken down into three Phases. Phase 1—AEHF XDR Terminals—reached MS C in Sept 2010, and installs will begin in second quarter of FY 2012, with a fielding decision in the fourth quarter of 2013. Phase 2—WGS X/KA Terminals—CDR planned for FY 2011, with a MS C decision estimated for the third quarter of FY 2012 in order to procure METs terminals. GEN III Phase 3—MUOS-to-legacy interoperability—contract awarded in November 2010, with PDR in the second quarter of FY 2011 and GEN III FOC projected for FY 2015/16.

Developers

Arrowhead	Alexandria, Virginia
ITT	Colorado Springs, Colorado
Raytheon	St. Petersburg, Florida
ViaSat	Carlsbad, California

Dynamic Network Management (DNM)

Description

Dynamic Network Management increases Link 16 network effectiveness and throughput and provides the warfighter greater flexibility in the use of the Link 16 network. DNM will also facilitate automated net entry/exit of additional platforms, and will provide a real-time capability to adjust Link 16 network allocation to meet evolving network changes in the theater. DNM reduces Link 16 network oversubscription and will enable fully ad-hoc, dynamic network operations on Link 16, variable update and throughput rates, and expanded network throughput with sub-net operations. DNM also provides support for networked weapons, sensor networking, time-critical targeting, and time-critical strike. DNM includes the following capabilities: Time Slot Reallocation (TSR), TSR Combined Network Participation Groups (CNPG), expanded stacked netting and multi-netting.

Status

TSR achieved IOC on ships in the C2P and JTIDS programs in FY 2007. TSR was also fielded on Navy E-2C, EA-6B and H-60 platforms in FY 2009, and on other joint platforms (E-3 and E-8), and low-power MIDS on ships (MOS) in FY 2010. CNPG is scheduled for MS C in FY 2012, IOC in FY 2012, and FOC in FY 2014.

Developers

BAE Systems	Wayne, New Jersey
Space and Naval Warfare Systems Center	San Diego, California
Northrop Grumman	San Diego, California
Warner Robins	Robins, Georgia

Enterprise Services

Description

Information is a weapon and our information technology (IT) assets are weapon systems. This, the Navy is changing the way IT is used to manage and protect mission-critical information. Enabling timely access to information provides a significant advantage to Navy warfighters and leads to information dominance. A stepping-stone to reach information domination is establishing Enterprise Services at the Navy's enterprise level to provide opportunities for expanding user capabilities, increasing security and reducing acquisition and maintenance costs.

Enterprise Services will provide the capability to centrally manage and deliver the Navy's IT, enabling us to reduce total ownership costs for IT services, promote information sharing and interoperability in the Department of the Navy and Department of Defense, ensure compliance with DoD and congressional IT mandates, and significantly improve the Navy's information assurance (IA). This allows seamless access to resources, including establishing the capability for the user to access resources no matter where they connect to the Navy or DoD. Initial efforts in Enterprise Services focus on consolidating data centers and portals

and on establishing enterprise software licensing. Managing services at the enterprise level provides an opportunity to eliminate stovepipe systems that do not communicate with each other and limits the Navy warfighters' capability to access mission critical information. Our early success in Enterprise Services comes from the migration of several portals that provide a single sign-on gateway to core enterprise applications, services, and processes. The Navy is intensifying efforts to eliminate legacy networks, servers, systems, applications, and duplicative data environments, transforming proprietary and tightly coupled systems and applications into a set of enterprise services that emphasize loosely coupled systems and processes. These enterprise services will be leveraged across the Department to provide seamless connectivity to mission critical information.

Today's and tomorrow's operational environment necessitates that the Navy expand its scope to operate with a diverse range of mission partners. From maintaining our standing commitments and alliances and responding to unconventional threats overseas to supporting civilian authorities when disaster strikes within our borders, the Navy must be positioned to provide immediate response. This demands dynamic and focused information sharing with a high degree of interoperability and minimum barriers to operational efficiency and success.

Status

A Navy program of record (POR) for Enterprise Information Technology Services (EITS) will be established at the beginning of FY 2012. Funding for the EITS POR was provided in POM12. One of the areas the EITS POR will address is portal consolidation. In FY 2009, the Navy Enterprise Portal (NEP) concept was established. The objective is for commands to migrate from their own portals and consolidate into the NEP. Commands will have two NEP instances to choose from, Oracle and SharePoint. Migrations into NEP will continue beyond FY 2011. The EITS program office will also establish enterprise license agreements with major software manufacturers starting in FY 2012, and will be engaged in Navy data center consolidation initiatives.

Developers

To be determined and will be under the cognizance of Program Executive Office for Enterprise Information System (PEO EIS).

Extremely High Frequency/ Navy Multi-band Terminal (EHF/NMT)

Description

The Navy Multi-band Terminal (NMT) is the future Navy SATCOM terminal that will provide EHF and SHF transport service for Navy ships, submarines, and shore stations. NMT replaces the USC-38 / Follow-on Terminal (FOT) and the WSC-6 terminals. NMT supports a variety of protected and wideband C2 communications applications (e.g., secure voice, imagery, data, and fleet broadcast systems). NMT will allow access to current military SATCOM satellites, including protected EHF SATCOM services available on Milstar, EHF payloads on board ultra high frequency follow-on satellites, and interim Polar EHF payloads and wideband service on the Defense Satellite Communications System satellites and the follow-on Advanced EHF (AEHF) and Wideband Gapfiller Satellites (WGS).

Three international partners—Canada, The Netherlands, and the United Kingdom—plan to procure a variant of the NMT.

Status

NMT achieved MS C on 29 July 2010. Thirty-three terminals were placed under contract on 4 September 2010, in the first years' buy. Installations will occur in FY 2011, and IOC is planned for FY 2012.

Developers

NESP, FOT and NMT:

Raytheon — Marlborough, Massachusetts

Global Broadcast Service (GBS)

Description

The Global Broadcast Service is an extension of the Global Information Grid that provides worldwide, high capacity, one-way transmission of video (especially from unmanned aerial vehicles), imagery and geospatial intelligence products, and other high-bandwidth information supporting the Nation's command centers and joint combat forces in-garrison, in-transit, and deployed to global combat zones. GBS interfaces with other communications systems provide relief to overburdened/saturated satellite networks and provide information services to previously unsupportable (due to low bandwidth) users. GBS is the only MILSATCOM system capable of disseminating large quantities of informational products such as imagery, intelligence, and missile-warning data, as well as weather, joint and service-unique news, education, training, video, homeland defense data, and other desired information to the Fleet. It provides fleet and strike group commanders with real-time, broad-bandwidth satellite receive capability, up to 23.5 Mbps per channel on UHF Follow-On (UFO) satellites and 45Mbps with Wideband Gapfiller Satellite (WGS). GBS provides support to U.S. allies and coalition forces and non-DoD governmental organizations. GBS also supports the range of

warfare command and control (ROWC2) situations and enables delivery of information products while operating in emissions control (EMCON) or data-denied environments.

Status

GBS is installed in aircraft carriers, assault and command ships, submarines, and a limited number of cruisers and destroyers. Architectural enhancements permit improved sharing and reallocation of broadcast coverage and bandwidth between users, information products, media types, and security levels. In FY 2009, Navy GBS began fielding split internet protocol (IP) technology that enables users to request real-time data via an alternate off-ship system for delivery via GBS, which significantly enhances the warfighter's situational awareness. During FY 2010, the Navy GBS program completed fielding to Los Angeles-class submarines, began fielding 26 additional unit-level cruiser/destroyer systems, and started to field the initial system-wide Navy GBS technology refresh.

Developers

Raytheon	El Segundo, California
SPAWAR Systems Center Atlantic	Charleston, South Carolina
SPAWAR Systems Center Pacific	San Diego, California
USAF Space and Missile Systems Center	El Segundo, California

Global Command and Control System – Maritime (GCCS-M)

Description

Global Command and Control System – Maritime is the maritime implementation of the GCCS family of systems. It supports decision making at all echelons of command with a single, integrated, scalable C4I system that fuses, correlates, filters, maintains, and displays location and attribute information on friendly, hostile, and neutral land, sea, and air forces, integrated with available intelligence and environmental information. It operates in near real-time and constantly updates unit positions and other situational awareness data. GCCS-M also records data in appropriate databases and maintains a history of changes to those records. System users can then use the data to construct relevant tactical pictures using maps, charts, topography overlays, oceanographic overlays, meteorological overlays, imagery, and all-source intelligence information coordinated into a common operational picture that can be shared locally and with other sites. Navy commanders review and evaluate the general tactical situation, plan actions and operations, direct forces, synchronize tactical movements, and integrate force maneuver with firepower. The system operates in a variety of environments and supports joint, coalition, allied and multinational forces. GCCS-M is implemented afloat and at ashore fixed command centers.

Status

The GCCS-M program is designated ACAT IAC with the Assistant Secretary of the Navy for Research, Development, and Acquisition

(ASN(RD&A) designated as the milestone decision authority. GCCS-M is an evolutionary acquisition program with development and implementation progressing in increments. In keeping with DoD regulations for evolutionary acquisition programs, the acquisition strategy calls for each GCCS-M increment (major release) to proceed through acquisition milestone reviews prior to fielding. The program is operating in two simultaneous acquisition increments: GCCS-M Increment 1, formerly known as GCCS-M Version 4.0 and prior, is post-full rate production; and Increment 2, formerly known as GCCS-M Version 4, successfully achieved Milestone C on June 15, 2010 to pursue a phased approach for testing and implementation. USS Tempest (PC 2) and USS Boxer (LHD 4) received Increment 2 in FY 2010. GCCS-M includes efforts necessary to ensure synchronization and interoperability with the GCCS family of systems.

Developers

SPAWAR Systems Center San Diego, California

Information Systems Security Program (ISSP)

Description

Information Systems Security Program (ISSP) supports both information assurance (IA) and computer network defense (CND), enhancing Navy's information dominance in cyberspace. IA is defined as measures that ensure the availability, integrity, authentication, confidentiality, and non-repudiation of information systems, while CND provides application tools to protect, monitor, detect, analyze, and respond to computer network threats. The ISSP is the Navy's primary IA program responsible for the management of DON information security (INFOSEC) and communications security (COMSEC) research and development. ISSP provides systems security engineering to Navy information systems, secure-voice devices for secure communication capability between shore and sea, and products that secure electronic transactions to provide data integrity and confidentiality for sensitive information used by Navy and joint warfighters afloat and ashore. The Navy has embraced a "defense-in-depth" strategy employed by Navy Cyber Defense Operations Command (NCDOC) to protect Navy networks. NCDOC deploys a comprehensive sensor grid, with CND tools such as Prometheus providing multiple layers of protection from the perimeter down to the desktop. The CND suite provides Tier 3 Security Incident management with Vulnerability Discovery Secure Configuration Compliance Validation Initiative (SCCVI) and Remediation Secure Configuration Remediation Initiative (SCRI), Antivirus, and Host Based Intrusion Prevention (HBSS). Naval Information Operations Command (NIOC) provides red/blue team support visits to afloat and ashore units enhancing security readiness. IA Technical Framework (IATF) has been adopted and divides ISSP resources into three fundamental categories: technology, operations, and people. IATF provides a documented source of technical solutions and guidance mapped to the defense-in-depth goals. Selection, training, and retention of network-security specialists are vital elements of our ISSP. ISSP technology focuses on development, acquisition, implementation,

upgrade of the IA products and services such as firewalls, guards, virtual private networks (VPN), intrusion detection systems, electronic key management systems (EKMS), key management infrastructure (KMI), public key onfrastructure (PKI), and common access cards (CAC). The ISSP also develops, resources, and acquires new modern cryptographic equipment and technology necessary to support Navy and joint service high-performance systems and system applications.

Status
The Navy's ISSP is in service and is a collection of related non-ACAT programs that address the full spectrum of information assurance and computer network defense. These programs are in various phases of the acquisition process, from concept development through capability sustainment. The Navy's ISSP will continue to provide CND tools, technology, national cryptographic equipment, products, operations, people, and services in alignment with the Department of Defense Cyber Defense Program.

Developers
Various.

Integrated Broadcast Service/ Joint Tactical Terminal (IBS/JTT)

Description
Integrated Broadcast Service (IBS) is a system-of-systems that will migrate the Tactical Receive Equipment (TRE) and Related Applications Data Dissemination System (TDDS), Tactical Information Broadcast Service (TIBS), Tactical Reconnaissance Intelligence Exchange System (TRIXS), and Near-Real-Time Dissemination (NRTD) System into an integrated service with a common message format. The IBS will send data via communications paths such as UHF SATCOM and via networks over SHF, EHF), and Global Broadcast Service. This program supports indications and warning, surveillance, and targeting data requirements of tactical and operational commanders and targeting staffs across all warfare areas. The Joint Tactical Terminal (JTT) is being upgraded to become interoperable with the new Common Interactive Broadcast (CIB) UHF that employs the new common message format (CMF) and demand assigned multiple access (DAMA) integrated waveform (IW).

Status
The Navy commenced shipboard installations of JTT in FY 2001 and 83 JTTs have been fielded as of late 2010. The transition to the next-generation broadcast services is expected to begin in FY 2012 with the delivery of upgrade kits from the manufacturer.

Developers
IBS:
L-3 Communications — Fairfax, Virginia
JTT:
Raytheon Systems — St. Petersburg, Florida

Joint Milli-Arcsecond Pathfinder Survey (JMAPS)

Description

The Joint Milli-Arcsecond Pathfinder Survey (JMAPS) mission is designed to provide an updated "bright star" catalog that meets future national security space needs and requirements. Stars in the 1st through 10th magnitude brightness range will be mapped to a position accuracy of 1 milli-arcseconds (mas). JMAPS will derive dedicated astrometry (star position), photometry (star brightness and color), and parallax (apparent movement) measurements. This data will allow more accurate navigation and orientation of national assets, including high-altitude ISR platforms to determine their orientation with sufficient accuracy to support anticipated targeting accuracy for future warfighting capabilities. JMAPS is baselined as a three-year space mission with a concurrent data processing effort continuing for an additional year beyond the space mission.

Status

JMAPS commenced as a formal program in January 2010 and is a pre-milestone B program. This program schedule includes launch of the data-collection satellite in 2014, with star catalog completion in 2018.

Developers

Comtech AeroAstro	Ashburn, Virginia
L-3 Communications	Wilmington, Massachusetts
Naval Research Laboratory	Washington, DC
Teledyne Scientific and Imaging, LLC	Camarillo, California
U.S. Naval Observatory	Washington, DC

Joint Tactical Information Distribution System (JTIDS)

Description

The Joint Tactical Information Distribution System Class 2 Terminal and MIDS on ships (MOS) provide a Link 16 capability for C2 aircraft, ships, and ground sites. JTIDS/MOS terminals transmit and receive secure, high-capacity, and jam-resistant digital data and voice employing spread spectrum, time division multiple access (TDMA), and National Security Agency (NSA) approved encryption. Joint and coalition forces use JTIDS/MOS to maintain a fused, comprehensive, timely, and consistent common tactical picture. JTIDS/MOS employs the Link 16 (TDL-16) message standard.

Status

JTIDS/MOS terminals will be updated for cryptographic modernization and frequency remapping to address NSA and DoD/DoT mandates, with an IOC of FY 2016. Program management and acquisition authority for JTIDS/MOS is under the Link 16 Network Program in PEO C4I.

Developers

DLS Solutions	Wayne, New Jersey

Joint Tactical Radio System (JTRS)

Description

Joint Tactical Radio System will be a software-programmable, multi-band, multi-mode family of networked radios capable of simultaneous voice, data, and video communications. The program will migrate more than 25 radio families, encompassing thousands of radio systems, to the JTRS family of radio systems. All radios will be compliant with software communications architecture (SCA), a single, open-system architecture. JTRS will be developed with a focus toward integrated Global Information Grid transformational capabilities and will be backward-compatible with selected legacy radio systems.

Status

The Navy is principally involved with the JTRS Airborne, Maritime/Fixed Station (AMF) program. In March 2008, the AMF program received Milestone B approval and awarded its contract. The AMF program will deliver two form factors: AMF—Small Airborne (AMF-SA); and AMF—Maritime/Fixed Station (AMF-M/F). The AMF-M/F will be installed on ships, submarines, and shore stations throughout the Navy. The AMF-M/F Increment 1 capabilities are UHF DAMA SATCOM and Mobile User Objective System Satellite Communications (MUOS). Milestone C and concurrent low-rate initial production approval is anticipated in FY 2012.

Developers

Lockheed Martin — Chantilly, Virginia

Maritime Domain Awareness (MDA)

Description

The National Plan to Achieve Maritime Domain Awareness defines MDA as the "effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment of the United States." MDA facilitates timely decision-making that enables actions to neutralize threats to U.S. national security interests. MDA results from the discovery, collection, sharing, fusion, analysis, and dissemination of mission-relevant data, information, and intelligence when considered in context of maritime political, social, economic, and environmental trends within geographic regions. No nation, let alone a single agency, can achieve MDA unilaterally. Global MDA can be achieved only through the seamless collaboration of the entire maritime community. Therefore, key to improving MDA is a collaborative and comprehensive information and intelligence-sharing environment.

Status

The first spiral of an operational MDA capability achieved initial operational capability in August 2008. Subsequently, Navy completed a multi-phase capabilities-based assessment (CBA) that identified fleet MDA requirements to improve information access, analysis and sharing to the wide range of partners. The CBA findings are in the process of Joint validation and will guide further capability enhancements.

MDA Spiral 1 capabilities are fielded at Office of Naval Intelligence (ONI), Navy Maritime Operations Centers (MOCs) and Coast Guard Maritime Intelligence Fusion Centers (MIFCs). Analysts at U.S. Northern Command and Joint Interagency Task Force–South (JIATF-S) have web-based access to the tools.

Future MDA tools development will be guided by the Navy MDA Data Fusion and Analysis Functions of Navy MDA initial capabilities Document. They will reside within Increment 2 of the DCGS-N program. MDA Spiral 1 is in sustainment and will be maintained until DCGS-N Increment 2 capabilities are available by FY 2015; there will be no capability gap for fleet users.

Also, International Seapower Symposium (ISS) 19 in September 2009 focused heavily on MDA and drew attendance from 102 nations, 90 of which were represented at the head-of-service level. Following the symposium, the CNO obtained consensus that a game with international participation, informed by the results of the panel discussions, would help guide the synchronized way ahead. Thus, the CNO sponsored two games beginning with the MDA Operational Game, followed by the Global Maritime Partnerships Game. These built upon the mutual trust and cooperation we share with international partners. The results of these games inform evolving MDA capability and provide input for International Seapower Symposium 20 in 2011. The findings will guide the development of an unclassified information-sharing environment.

Developers

PMW-120 San Diego, California

Maritime Operations Center (MOC)

Description

The tri-service *Cooperative Strategy for 21st Century Seapower* states "at all echelons of command, we must enhance our ability to conduct integrated planning, execution, and assessment." The maritime operations centers advance the Navy toward this end state at the operational level of war.

MOCs enhance the Navy's command and control capabilities at the operational level through headquarters manned by individuals proficient in joint and Navy operational-level staff processes and equipped to provide globally networked, scalable, and flexible capability across the spectrum of conflict. MOCs provide organizational consistency, the scalability and flexibility to transition between various command roles, and enhanced global networking among Navy-maritime organizations. The MOC construct achieves effective, agile, networked, and scalable staffs, employing standardized doctrine, processes, and C4I systems. Each will be able to operate in diverse organizational constructs and in various joint, interagency, and combined roles. The global network and commonality enable both reach-back and load-sharing across all MOCs.

Status
MOC is designated as a system-of-systems (SoS) project and as such does not have a single RDT&E budget line to support development. The MOC SoS Project is responsible for communicating MOC C4I SoS requirements and capability gaps to existing or planned C4I Systems in order to become an integrated C4I SoS required to support the MOC C4I SoS capability.

Education provided via the Maritime Staff Operators Course provides foundational knowledge in joint and Navy operational-level processes. Eight established headquarters are equipped with the initial configuration. Ongoing assessment of Commander Tenth Fleet requirements will ensure installation of appropriate standardized capabilities from MOC initial configuration. A revised systems baseline configuration, prioritized by operational need, will complete fielding by the end of FY 2011. This includes MOC systems requirement for the 10th Fleet. Training and assist teams, from U.S. Fleet Forces and the Naval War College, provide MOCs on-site training and assessment in order to maintain proficiency in doctrine, execute critical staff processes, and share best practices.

Developers
Various.

Meteorological Mobile Facility Replacement Next Generation (METMF(R) NEXGEN)

Description
Meteorological Mobile Facility Replacement Next Generation system provides meteorological and oceanographic (METOC) support to the U.S. Marine Corps and joint forces. The main functions of the system are to collect, process and exploit, interpret, produce, and disseminate METOC data. Following evolutionary acquisition, METMF(R) NEXGEN is a single-increment replacement of the Meteorological Mobile Facility Replacement (METMF(R)) that provides greater mobility and operational flexibility in response to identified METMF(R) capability gaps. The required capabilities for the METMF(R) are defined in two operational requirements documents. METMF(R) reached FOC in July 2002. METMF(R) deployed in support of U.S. Marine Corps operational forces during *Operation Iraqi Freedom*, during which "operational deficiencies" were identified and subsequently validated in several studies.

Status
On 31 May 2006, Marine Corps Combat Development Command (MCCDC) approved a universal need statement for a "METOC Environmental Support System." The UNS identified a need for an expeditionary system with a smaller footprint than METMF(R), as well as upgraded sensing, fusing, and communications capabilities in accordance with technological advances. The Program Executive Office

(PEO), Command, Control, Communications, Computers and Intelligence (C4I/Program Manager, Warfare PMW-120) performed an "alternatives study" to analyze U.S. Marine Corps METOC capabilities and gaps, and determined the most effective course of action for best satisfying Marine Corps METOC requirements to be an upgraded or next-generation METMF(R). Two METMF(R) NEXGEN prototypes have been developed, and the Capability Production Document was approved July 2010. Initial Operational Test and Evaluation is scheduled for second quarter 2011.

Developers

Smiths Detection	Edgewood, Maryland

Mk XIIA Mode 5 Identification Friend or Foe (IFF)

Description

The Mark XIIA Mode 5 Identification Friend or Foe is a secure, real-time, cooperative "blue-force" combat identification system designed to inform commanders' "shoot/no-shoot" decisions. Advanced technology, coding, and cryptographic techniques are incorporated into the IFF Mode 5 to provide reliable, secure, and improved equipment performance, compared to Mode 4. The Mode 5 waveform is defined in NATO STANAG 4193 and is compatible with all U.S. and international civil IFF requirements. This Navy ACAT II program is based on the improved Mark XII Cooperative IFF Operational Requirements Document, dated April 27, 2001. Transponders will be installed on more than 3,000 ships and Navy/Marine Corps aircraft. Mode 5 Interrogator equipment will be fielded on select ships and aircraft, including MH-60R, E-2D, F/A-18 C/D and F/A-18E/F/G fixed- and rotary-wing aircraft.

Status

Navy IOT&E is scheduled for September 2011, and Navy IOC is scheduled for FY 2011, with FOC expected in 2019. Additionally, the Navy is the lead service for Mode 5 cryptographic modernization and is synchronizing fielding with the other services. The joint-service IOC is 2014 and joint FOC is 2020.

Developers

BAE Systems	Greenlawn, New York
General Dynamics Decision Systems	Scottsdale, Arizona

Mobile User Objective System (MUOS)

Description

The Mobile User Objective System (MUOS) is the next generation UHF satellite constellation. MUOS has both a legacy UHF payload that provides the same capability as one satellite in the current UHF constellation (Ultra High Frequency Follow-On satellites), as well as a new MUOS waveform payload that will provide a significant improvement in the number of user accesses and the data rate available to users. The MUOS constellation will consist of five geo-synchronous satellites, one of which will be an on-orbit spare. The MUOS design concept is to leverage commercial technology to the greatest degree possible, providing worldwide netted, point-to-point, and broadcast services of voice, video, and data. MUOS has been designated a DoD Space Major Defense Acquisition Program (MDAP). Target users are unified commands and joint task force components, DoD and non-DoD agencies, and allied and coalition mobile users who require communications on-the-move.

Status

Preliminary Design Review and Critical Design Review are completed. Key Decision Point-C occurred in Aug 2006 and Build Approval was granted in Feb 2008. The first MUOS satellite is scheduled to reach on-orbit capability in December 2011.

Developers

Boeing	El Segundo, California
General Dynamics	Scottsdale, Arizona
Lockheed Martin	Sunnyvale, California

Multi-functional Information Distribution System Lightweight (MIDS-LVT)

Description

MIDS-LVT is a joint and multi-national cooperative program to design, develop, produce, and support a Link-16 tactical information distribution system similar to Joint Tactical Information Distribution System (JTIDS), but in a more lightweight, compact terminal designed for fighter aircraft, helicopters, ships, and ground sites. MIDS-LVT is the most widely employed Link-16 terminal in the DoD and NATO. The United States serves as the MIDS-LVT program leader, with Germany, Spain, Italy, and France as partners in all program phases. A P3I of the JTIDS Class 2 Terminal, the MIDS-LVT employs the Link-16 (TADL-J) message standard of Navy/NATO publications. MIDS-LVT is interoperable with JTIDS and MIDS Joint Tactical Radios System (JTRS) and was designed in response to current aircraft, surface ship, submarine, and ground-host volume and weight constraints. The solution variants—MIDS-LVT(1) through LVT(11)—support Navy, Marine Corps, and Air Force aircraft; Navy ships; Army Pa-

triot, THAAD, MEADS, and other mobile ground-based defense systems; Air Force and Marine Corps ground-based command and control platforms; and potentially other tactical aircraft and ground-based systems. As of 2010, more than 5,800 MIDS LVTs has been delivered and integrated in 76 platforms within the five partners and 39 Foreign Military Sales customer countries.

Status

The program entered the EMD phase in December 1993. MIDS was approved for LRIP in FY 2000 and reached IOC on the F/A-18C/D *Hornet* in FY 2003. Within the Navy, MIDS is being procured through the FYDP for F/A-18 C/D/E/F, E/A-18/GMH-60R/S and CH-53K aircraft. The Air Force F-15 fighter variant, MIDS-LVT(3), is fully fielded and the Army variant, LVT(2), is deployed with all designated Army units. All MIDS-LVTs will be updated to incorporate cryptographic modernization and frequency remapping to address NSA and DoD/DoT mandates, with a planned IOC in FY 2015.

Developers

Data Link Solutions	Wayne, New Jersey
EUROMIDS	Paris, France
Rockwell-Collins	Cedar Rapids, Iowa
ViaSat	Carlsbad, California

Multi-functional Information Distribution System Joint Tactical Radio System (MIDS-JTRS)

Description

MIDS JTRS is an engineering change proposal to the MIDS Low Volume Terminal (LVT) that migrates the capabilities to a Joint Tactical Radio System Software Communication Architecture-compliant terminal. The MIDS JTRS will provide Link-16, TACAN, and J Voice, and three additional channels for future growth to JTRS waveforms. The terminal will incorporate the NSA and DoT/DoD Link-16 cryptographic modernization and frequency remapping mandates. Additionally, MIDS JTRS Link-16 capabilities include enhanced throughput (providing data rates up to 1.1 Mbps) and Time Slot Reallocation.

Status

In late 2010, MIDS JTRS was in operational testing on its lead platform, the F/A-18 E/F. The MIDS JTRS full production and fielding are planned for February 2011, with IOC in the F/A-18 planned for FY 2011.

Developers

Data Link Solutions	Cedar Rapids, Iowa
ViaSat	Carlsbad, California

NATO Improved Link-11 / Link-22

Description

NATO Improved Link Eleven (NILE)/Link-22, fulfills a NATO operational staff requirement to develop a digital data link with the aim of increasing the timeliness of tactical information transfer even in a dense and hostile communications threat environment. The system is capable of using both fixed-frequency and frequency-hopping waveforms in both the UHF and HF bands. While designed to replace Link-11 on these media and to provide a more robust tactical beyond line-of-sight capability, the Link-22 message set is also more aligned with and to complement Link-16, easing multi-link operations. Modern automated network management capabilities minimize the pre-planning requirements associated with Link-16 networks. Link-22 has been developed to fulfill the operational requirement to exchange tactical data between tactical data systems and to exchange necessary network management data. Link-22 incorporates F-series and J-series message standards, using a DTDMA protocol that automates the network congestion management to ensure message traffic flow. Additional capabilities—e.g., late network entry, strong waveforms and error correction, automatic message relay, distributed protocols, and secure communications—enhance Link-22 system robustness.

Status

NILE partner nations have fielded Link-22 on limited ship and shore sites. NILE/Link-22 could be an incremental change in the Next-Generation Command and Control Processor (NGC2P) program.

Developers

Northrop Grumman	San Diego, California
Space and Naval Warfare Systems Center	San Diego, California
VIASAT Inc.	Carlsbad, California

NAVSTAR Global Positioning System (GPS)

Description

The NAVSTAR GPS is a space-based, satellite radio navigation system that provides authorized users with 24/7 worldwide, all-weather, three-dimensional positioning, velocity, and precise time data. Navy requirements include the integration of GPS in more than 300 surface ships and submarines and 5,100 aircraft, integration of shipboard combat systems with the Navigation Sensor System Interface (NAVSSI), the follow-on GPS Positioning, Navigation and Timing System (G-PNTS) and anti-jam protection for high-priority combat platforms through the navigation warfare (NAVWAR) program. GPS plays an important role not only in precise navigation, but also in providing precise time to precision strike weapons, naval surface fire support systems, and ship C4I systems. NAVSSI is the shipboard system that collects, processes, and disseminates position, velocity, and timing data to weapons systems and C4I and combat support systems on board surface warships. It hosts embedded card-based GPS receivers. G-PNTS

is currently under development as a replacement to NAVSSI. G-PNTS will use next-generation GPS receivers—initially the Selective Availability Anti-Spoofing Module (SAASM) to be followed by M-code—to ensure the U.S. Navy ships will be capable of using improved GPS signals being broadcast from the latest GPS satellites. NAVWAR provides anti-jam antennas to protect both air and sea naval platforms against GPS interference in order to ensure a continued high level of mission effectiveness in a GPS jamming environment.

Status

Initial naval platform GPS installations are complete. The program is completing its initial development and integration of conformal anti-jam antennas into F/A-18E/F/G series aircraft. The Navy continues the installation of NAVSSIs on select Navy surface combatants with an expected FOC in FY 2015. Milestone B for G-PNTS was held in October 2010 and approved by the MDA. Testing was completed by COMOPTEVFOR on October 14, 2010. Operational suitability and effectiveness will be declared by early 2011.

Developers

Litton Data Systems	San Diego, California
Raytheon	Los Angeles, California
Rockwell-Collins	Cedar Rapids, Iowa
Trimble Navigation	Sunnyvale, California

Navy Air Operations Command and Control (NAOC2)

Description

Navy Air Operations Command and Control—also known as Theater Battle Management Core System (TBMCS) in the joint environment––is providing the naval warfighter with the ability to plan, disseminate, monitor, and execute theater air battles in support of the task force commanders' objectives.

NAOC2 is an Air Force ACA) III program of record with joint interest. The Navy program office is responsible for integrating NAOC2 into the Navy environment, providing support for system upgrades joint testing, and performing installation and maintenance, and support training. NAOC2 is an integrated C2 system that provides standardized, secure, automated decision support for joint and allied commanders worldwide. NAOC2 supports a full range of functions, including air tasking order (ATO), airspace control order (ACO) production and preplanning, threat assessment, target selection, mission execution, battle damage assessment, and a variety of other functions. It is currently the only authorized system for producing ATO/ACO products.

Status

In February 2009, the Air Force signed an acquisition decision memorandum placing TBMCS/NAOC2 in sustainment. Several maintenance release packages (MR1 and MR2) will be fielded until the follow-on NAOC2 programs of record are introduced to the fleet. NAOC2 will be replaced by Command and Control Air and Space Operations Suite

(C2AOS) and Command, Control and Information Services (C2IS) programs of record starting in the FY 2014/15 timeframe. C2IS/C2AOS is designed to function in a service oriented architecture environment and will be hosted on the CANES system.

Developers

Lockheed Martin	Colorado Springs, Colorado

Navy Enterprise Resource Planning (Navy ERP)

Description

Enterprise Resource Planning is a generic name for comprehensive management systems used to power an organization's crucial business functions. The Navy ERP Solution allows the Navy to unify, standardize, and streamline all its business activities into one system that will deliver information transparency that is secure, reliable, accessible, and current. The solution enables sustained Navy compliance with the Chief Financial Officers Act of 1990 and the DoD Information Assurance Certification and Accreditation Process. Navy ERP is being delivered in two releases. Finance/Acquisition Solution (Release 1.0) provides the Navy with unprecedented financial transparency that can be leveraged across the Navy as a common cost-management framework. This release provides the Navy with an enterprise solution supporting budgeting, billing, external procurement, period close, business warehousing, and cost planning. The Single Supply Solution (Release 1.1) delivers enterprise visibility and process standardization of the Navy supply chain. More specifically, the Single Supply Solution supports such functions as order fulfillment, inventory management, consignment, warehouse management, provisioning, carcass tracking, supply outfitting, and supply and demand planning. Navy ERP combines business process reengineering and industry best practices, supported by commercial off-the-shelf software (e.g., SAP), and integrates all facets of Navy business operations, using a single database to manage shared common data.

Status

Navy ERP financial solution has been deployed to the following commands: NAVAIR (2007), NAVSUP (2008), SPAWAR (2009), and NAVSEA General Fund (2010). The Navy ERP Single Supply Solution deployment started in February 2010. Remaining implementations include NAVSEA Working Capital Fund (2011), ONR and SSP (2012). IOC was achieved in May 2008. In October 2008 the Assistant Secretary of the Navy (Financial Management and Comptroller) designated Navy ERP the Navy's financial system of record. Navy ERP will serve over 66,000 users, managing approximately 50% of the Navy's total obligation authority (TOA).

Developers

Deloitte Consulting	Alexandria, Virginia
GDIT	Fairfax, Virginia
IBM	Armonk, New York
SAP America, Inc.	Newtown Square, Pennsylvania

Next-Generation Enterprise Network (NGEN)

Description

The Next-Generation Enterprise Network will be the follow-on to the Navy and Marine Corps Intranet (NMCI). NGEN is the first step towards achieving the Department of the Navy's future vision of a fully integrated naval networking environment (NNE), enabling government ownership and operation of the network. NGEN will provide a secure and reliable enterprise-wide voice, video, and data networking environment that meets the warfighter's needs, enabling C2 in conjunction with Consolidated Afloat Network Enterprise Services (CANES), and providing a capability to access data, services, and applications anywhere worldwide. NGEN will arm the warfighter for success on the network-centric battlefield by enabling secure, reliable, and adaptable global information exchange across the full spectrum of operations. For the Marine Corps, the joint task force concept extends to critical infrastructure and warfighting services needed to conduct DoD land component C2 functions and will be supported by MAGTF Information Technology Centers.

Status

NGEN has completed Gate 4 and will enter Gate 5 in FY 2011 and is seeking acquisition authority for the "Transport Services" contract, to be awarded in the first quarter of FY 2011. The milestone decision authority was approved May 2010, the acquisition strategy was approved June 2010, and the continuity of services contract was awarded July 2010. A phased NGEN implementation is planned. NGEN will provide the DoN with C2 of the network, it will pace the non-classified Internet Protocol Router Network (NIPRNET) threat, and it will lead the Secret Internet Protocol Router Network (SIPRNET) threat. In addition, the DoN will work toward subsequent increments that will add increased warfighting capabilities, adaptability, and reliability.

Developers

Major Contractors:	
EMC	Hopkinton, Massachusetts
Harris (formerly Multimax)	Melbourne, Florida
HP Enterprise Services	Plato, Texas
Oracle (formerly Sun)	Redwood Shores, California
Additional Major Subcontractors:	
Cisco (routers and switches)	San Jose, California
NetApp (data storage)	Sunnyvale, California
DLT Solutions (software)	Herndon, Virginia
HP Company (desktops, laptops, servers, printers)	Santa Clara, California
Microsoft (client and server software)	Redmond, Washington
Wildflower International	Santa Fe, New Mexico
Government Activities:	
PEO-EIS (Program Executive)	Arlington, Virginia
PM, NGEN (Program Manager)	Arlington, Virginia
SPAWAR-055 (Technical Support)	San Diego, California
USMC PMO (Program Management)	Quantico, Virginia

Naval Tactical Command Support System (NTCSS)

Description

Naval Tactical Command Support System is the combat logistics support information system used by Navy and Marine Corps commanders to manage and assess unit and group material and personnel readiness. As the logistics management cornerstone of the Sea Basing pillar of Sea Power 21, NTCSS provides intermediate and organizational maintenance, supply, and personnel administration management capabilities to surface, sub-surface, and aviation operational commanders in peacetime and during war. NTCSS also supports network-centric warfare by integrating logistics information to complement the tactical readiness picture for operational commanders.

Through an evolutionary acquisition strategy, NTCSS replaced, merged, and optimized legacy Shipboard Non-tactical ADP Program (SNAP), Naval Aviation Logistics Command Management Information System (NALCOMIS), Maintenance Resource Management System (MRMS), and several smaller logistics applications into an integrated and modernized capability. The first stage of the strategy included hardware modernization and network installations using open system architectures and operating environments common with shipboard tactical programs. The second stage optimized the functional applications using modern software development tools, relational databases, and data replication. Going forward, business process improvements will be developed and implemented under sponsorship of functional and fleet managers. Such planned initiatives include: migration to an open service oriented architecture, data center hosting, implementation of web services, transfer of shipboard logistics data ashore as part of a broader initiative to Move Workload Ashore and reduce shipboard manpower, making NTCSS data accessible via the common operational picture to enable operational decisions based on near-real-time readiness data, and merging systems such as NTCSS, GCSS-MC, and GCSS-M into a common/shared capability that exchanges data with Naval Enterprise Resource Planning (ERP). As a result, the Navy and Marine Corps will realize greater operational efficiency and lower total ownership costs.

Status

NTCSS is a mature program in full rate production and continues to be the warfighter's production system to maintain fleet readiness. Full operational capability at naval air stations, Marine air logistics squadrons, and ship and submarines was achieved in FY 2010. An optimized NTCSS capability, targeted for aircraft squadrons, began full rate production in FY 2007 and will achieve FOC in FY 2011. The Tech Refresh to replace antiquated NTCSS hardware/software and maintain compliance with DoD/DoN information assurance and baseline reduction mandates commenced in FY 2010. Current schedule has completion of deployment cycle in FY 2015.

Developers
The COTS hardware is being procured through indefinite delivery/indefinite quantity government contracts with numerous sources. Engineering, development, integration, installation, training, and life cycle support will be accomplished through Navy and Defense Department activities, with additional support from industry partners.

OCONUS Navy Enterprise Network (ONE-Net)

Description
The outside the continental United States (OCONUS) Navy Enterprise-Network (ONE-NET) is a fully complemented, integrated, and interoperable network that consists of standard hardware, software, and information-assurance suites governed by operational and administrative policies and procedures. It is the medium that enables the rapid and reliable transfer of official classified and unclassified messages, collaboration, e-mail, and data. ONE-NET provides e-mail, print, storage, directory, and internet services, as well as help desk and enterprise management, for a projected 26,000 seats, meeting fleet commanders' requirements and achieving vast performance and security improvements compared to legacy networks. Theater Network Operation and Security Centers (TNOSCs) at Yokosuka, Naples, and Bahrain are the Network Operations Centers (NOCs) for their respective regions.

Status
Naval Network Warfare Command (NNWC) owns and operates the three TNOSCs and 11 local NOCs servicing ONE-NET customers. Requisite staffing with the necessary skill sets are in place and currently providing critical network service: Non-classified Internet Protocol Router Network (NIPRNET), Secret Internet Protocol Router Network (SIPRNET), web/portal access, e-mail, help desk support, and network security to OCONUS fleet and regional commanders and subordinate commands at 14 OCONUS locations.

Developers
Numerous sources. All hardware and software procured and installed in conjunction with the Base Level Information Infrastructure (BLII) program of record is under the cognizance of PEO EIS.

Open Architecture OA

Description

Open architecture is a business strategy for rapidly fielding superior, cost-effective warfighting systems. Naval OA is the confluence of business and technical practices yielding modular, interoperable systems that adhere to open standards with published interfaces. This approach increases opportunities for competitive innovation, enables re-use of components, facilitates rapid technology insertion, and reduces testing and maintenance constraints.

Status

The Navy's Surface Force has programmed funding for OA since 2003. The Aegis Combat System Modernization plan started with a technical undertaking to implement an open-architecture design by de-coupling hardware from software for cost-effective COTS sustainment. All modern surface combat systems (Aegis, SSDS, LCS, and DDG 1000) are being coordinated to ensure development of scalable, modular software application components, and to provide greater business opportunities for competitive alternatives. A request for proposals, which is the first competition since 1969, has been issued for the Aegis Prime System Engineering Agent (PSEA) starting with subsequent advanced capability builds (ACBs). The acquisition-led OA Enterprise Team (OAET) is adopting broader business aspects of open architecture for more collaborative competition within and across programs, including small business involvement through the ONR-led Small Business Innovative Research (SBIR) program, to deliver cost-effective, common capability quickly and more efficiently to the Fleet.

Developers

More than 80 companies and government entities nationwide, including:

Advanced Acoustic Concepts	Hauppauge, New York
BAE Systems	Arlington, Virginia
General Dynamics Advanced Information Systems	Fairfax and Arlington, Virginia
General Dynamics Bath Iron Works	Bath, Maine
Integrated Combat Systems Test Facility	Dam Neck, Virginia
Johns Hopkins University Applied Physics Laboratory	Laurel, Maryland
Lockheed Martin	Eagan, Minnesota Moorestown, New Jersey Syracuse, New York
Naval Surface Warfare Center	Dahlgren, Virginia USA
Naval Surface Warfare Center	Port Hueneme, California USA
Naval Undersea Warfare Center	Keyport, Washington Newport, Rhode Island USA
Northrop Grumman PRB Systems	Goleta, California
Northrop Grumman Ship Systems	Pascagoula, Mississippi
Raytheon	San Diego, California USA St. Petersburg, Florida Sudbury, Massachusetts
Raytheon Missile Systems	Tucson, Arizona
SECHAN Electronics	Lititz, Pennsylvania
Sippican	Marion, Massachusetts
Space and Naval Warfare Systems Center	San Diego, California

SCI Networks Program

Description

Intelligence analysts' on board ships and submarines utilize Sensitive Compartmented Information (SCI) networks to access national and service strategic/tactical databases for critical Special Intelligence (SI) needed to execute their indications-and-warning role in the kill-chain process. The SCI Networks program, along with the Integrated Shipboard Network System (ISNS), Combined Enterprise Regional Information Exchange System Maritime (CENTRIXS-M), and Submarine Local Area Network (SubLAN) will transition to the Consolidated Afloat Network and Enterprise Services (CANES) program. CANES will provide the network infrastructure and core services using service oriented architecture and multi-level security environment. SCI Networks (previously known as TACINTELII/SCI ADNS) is a system of internet protocol-capable, network-centric, automated, communication capabilities that meet established information assurance computer security criteria while providing real-time receipt and transmission of SI and SCI data. The SCI Networks program provides hardware infrastructure and core enterprise services to exchange time-sensitive cryptologic sensor and intelligence data with national and tactical commanders as well as afloat and shore-based units. The SCI Networks program uses open-architecture standards as a critical element in Navy's evolving concept of network-centric warfare. The full SI capability under CANES will include voice and data transfer among SCI-capable ships and submarines, with gateways to shore nodes. Under the submarine phase of the program, the SCI Networks program brought the SCI enclave and SI access to Joint Worldwide Intelligence Communications System (JWICS) enclave. SCI Networks interface with Distributed Common Ground System-Navy (DCGS-N), Global Command and Control System-Maritime (GCCS-M) SI, Tactical Cryptologic Systems (TCS), and other SI systems.

Status

SCI Networks is at FOC and is deploying an SCI Enclave Common Computing Environment (CCE) risk-mitigation variant for the CANES program in FY 2011. This variant will maximize hardware efficiency through virtualization and application hosting. SCI Networks will complete Windows NT (WinNT) surface replacement in FY 2011 with submarine WinNT replacement installations beginning in October 2010 through the first quarter of FY 2013. Implementation of the Shore Network Operations Center (SNOC) facilities' defense in depth is complete. A Network Operations Center (NOC) End of Life (EOL) upgrade is planned for FY 2011 as well as access to National Security Agency Network (NSAnet). Software release 5.0 will begin fielding in FY 2011. SCI Networks transition to CANES will begin in FY 2013. Legacy surface systems will be deployed until FY 2017 and legacy subsurface systems will be deployed until FY 2021.

Developers

SAIC — Arlington, Virginia

Super High-Frequency (SHF) Satellite Communications (SATCOM)

Description

The Super High Frequency Satellite Communications Program includes the WSC-6(V)5,7,9 terminal, the X-Band Kit Upgrade to the EHF Follow On Terminal (FOT) installed on submarines, and the Enhanced Bandwidth Efficient Modem (EBEM). The SHF SATCOM WSC-6 terminal is the primary SATCOM terminal in the Fleet, providing the bandwidth for voice, video, data, and imagery requirements for the warfighter, including NIPRNET, SIPRNET, JWICS, JCA, video teleconferencing, and telephones. This terminal has been in the Fleet since the early 1990s. The Navy Multiband Terminal (NMT) WSC-9 will begin replacing the WSC-6 terminal in the FY 2012 timeframe.

Status

As of the end of FY 2010, there were 121 AN/WSC-6 terminals installed in the Fleet. They are expected to continue in operation until FY 2017 when replaced by the next-generation Navy Multiband Terminal (WSC-9). The X-band upgrade to the EHF FOT (USC-38) terminals on 61 of 64 submarines was completed in 2010. EBEM is the current modem used in the Fleet for static point–to-point operations in conjunction with the WSC-6 terminal, the WSC-8 terminal, the next-generation Navy Multiband Terminal (WSC-9), and the next-generation Commercial Broadband Satellite Program (CBSP) terminal (USC-69). As of late 2010, 235 EBEM modems have been installed in the Fleet.

Developers

WSC-6(V)5,7:	
Raytheon	Marlborough, Massachusetts
WSC-6(V)9:	
Harris	Melbourne, Florida
X-Band Kit Upgrade:	
Raytheon	Marlborough, Massachusetts
EBEM:	
Viasat	Carlsbad, California

Tactical Mobile

Description

The Navy Tactical/Mobile (TacMobile) Program provides systems to support maritime commanders with the capability to plan, direct, and control the tactical operations of maritime patrol and reconnaissance forces (MPRF), joint and naval expeditionary forces, and other assigned units within their respective area of responsibility. The TacMobile systems that support these missions are Tactical Operations Centers (TOCs), Mobile Tactical Operations Centers (MTOCs) and Joint Mobile Ashore Support Terminals (JMASTs).

TOCs and MTOCs provide MPRF operational support ashore at main operating bases, primary deployment sites, and forward operating bases, similar to support provided on board an aircraft carrier to embarked tactical airwings. Support includes persistent situational operational and tactical awareness, MPRA pre-mission coordination and planning, mission and target briefings, tactical in-flight support, post-mission analysis of collected sensor data, data dissemination, and feedback to aircraft sensor operators and supported commanders. Services provided include analysis and correlation of diverse sensor information, data management support, command decision aids, data communication, mission planning, and evaluation and dissemination of surveillance data and threat alerts to operational users ashore and afloat. As advances in sensor technology are fielded on MPRA, the TOC and MTOC sensor analysis equipment will evolve to support the new sensor capabilities.

JMAST provides a robust and transportable C4ISR capability to a navy component commander or other staff. In recent world events, JMAST systems have supported overseas operations, humanitarian-assistance and disaster-relief (HA/DR) efforts, non-combatant evacuation operations (NEO), and other current operations.

Status

TacMobile Increment 2.0 FRP and fielding were authorized in June 2009 to field new capabilities such as CENTRIXS, GBS, and HF-IP without eliminating existing C4I capabilities. Increment 2.0 incorporates warfighter interface capabilities for TOC/MTOC activities plus communication upgrades needed for MTOCs to support P-3C Orion operations. Increment 2.1 is in development and will incorporate P-8A Poseidon Multi-mission Maritime Aircraft (MMA) mission support and systems interfaces as well as critical communications upgrades. Increment 2.1 Milestone C is scheduled for the third quarter of FY 2011 to support a concurrent OT&E with the P-8A. Requirements gathering, review, and analysis are underway to support P-8A Increment 2 engineering change proposals and Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS), to achieve more efficient information flow across the Navy's sensor grid through implementation of tactical service oriented architecture enabled by the Global Information Grid.

Developers

L-3 Communications	Charleston, South Carolina
Northrop Grumman (PRB Systems)	Hollywood, Maryland
MANTECH	Charleston, South Carolina
SAIC	Charleston, South Carolina
SRC	Charleston, South Carolina

Telephony

Description

Telephony suite replacement and modernization funding ensures that all telephony equipment under Navy's purview in the CONUS and OCONUS are replaced in accordance with industry life cycle standards and that software is upgraded in a systemic manner to ensure compatibility with DoD and commercial telephone systems. The telephony project replaces obsolete telephony suite hardware and maintains currency of firmware and software in accordance with policy and procedures set forth in DoD Instruction 8100.3, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6212.01, and CJCSI 6215.01B. The majority of the Navy's telephone switches are Defense Switched Network (DSN) switches. These switches provide on-base Federal Telephone System (FTS) local and long distance calling service as well as worldwide DSN connectivity.

Status

Telephony hardware and software procurement and installation is under the cognizance of PEO C4I. However, Navy policy states that procurement of hardware and software can be executed only through the Defense Information Systems Agency Joint Interoperability Test Command (DISA JITC).

Developers

Navy policy is to procure only hardware and software from the DISA JITC tested/certified/interoperable Approved Products List (APL).

Trusted Information Systems (TIS)

Description

The Trusted Information Systems (TIS) program facilitates sharing of critical information across security domains and among allied, coalition and interagency partners. The TIS program funds Radiant Mercury (RM)—the DoD and Intelligence Community's most widely deployed cross-domain transfer solution. RM provides cross-domain information sharing capabilities from Top Secret/Sensitive Compartmented Information (TS/SCI) to General Service (GENSER) and GENSER to Unclassified.

RM provides a fully-automated, bi-directional, multiple input/output channel capability, that can be serial or network connected, to sanitize, transliterate, downgrade, and guard classified, formatted information to users at lower classification levels. RM also processes unformatted message types and imagery utilizing reliable human review (semi-automated). In early 2011, RM was deployed to more than 330 sites worldwide, including all combatant commands, aircraft carriers and large-deck amphibious warships, Shared Early Warning and Blue Force Tracking (SEWBFT) commands, and numerous Air Force and Army sites, in addition to national agencies.

Status

RM continues to move forward and has recently migrated to a new secure operating system to ensure its long-term viability within the Fleet and Do). Activity is focused on migrating RM's certified multi-level security capabilities into a service oriented architecture and integrating additional afloat, joint, and coalition-network architectures. As the Executive Agent of the multi-service RM program, the Navy will continue to oversee RM support to its widely deployed and diverse customer base.

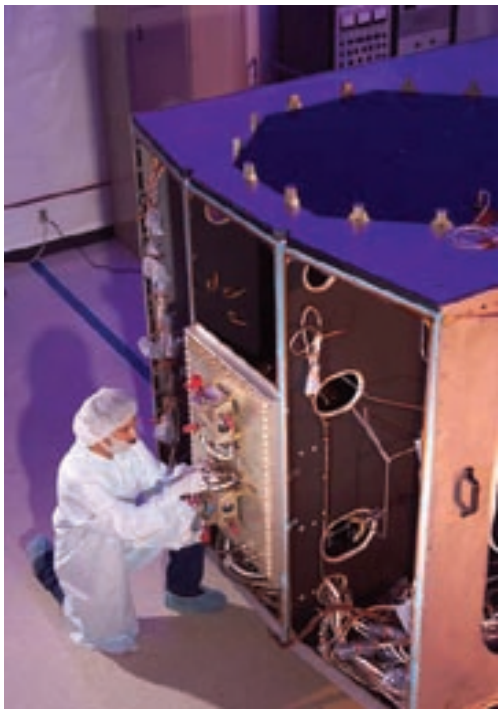
Developers

Accenture	San Diego, California
Booz-Allen-Hamilton	Chantilly, Colorado
Lockheed Martin	Denver, Colorado

UHF Satellite Communications Follow-On (UFO)

Description

The Ultra High Frequency Follow-On constellation consists of eight satellites that replaced the Fleet Satellite (FLTSAT), Gapfiller and Leased Satellite (LEASAT) UHF constellations. UFO provides worldwide, narrowband, unprotected netted, point-to-point and broadcast service of voice, video, and data using 5 and 25 kHz UHF channels. UFO also provides a protected fleet broadcast using an EHF uplink and UHF downlink to provide an anti-jam capability on the uplink. UFO satellites F4 through F11 carry an EHF payload that provides anti-jam capability on the uplink and downlink. Protected services include netted, point-to-point, and broadcast service of voice and data. The EHF payload also provides an anti-jam telemetry tracking and control (TT&C) uplink capability. UFOs F8 through F10 include a Global Broadcast Service payload that uses direct broadcast technology to provide a very high data rate to many users via small terminals. UFO F11 includes a Dual Digital Receive Unit (DRU). The activation of UFO F11's Dual DRU at the beginning of FY 2009 has effectively increased the number of available 25kHz channels by nine (from 24 to 33) and increased the number of available 5kHz channels by one (from 20 to 21).



Status

Of the 11 UFO satellites that have been launched, eight were operational in late 2010. UFO F11 was launched in December 2003 to extend the life of the constellation until the first Mobile User Objective System (MUOS) satellite becomes operational. Due to MUOS program delays, risk exists that a single UFO satellite or multiple UFO satellites may fail before the first MUOS satellite becomes operational. The loss of any number of UFO satellites would reduce constellation size to less than eight satellites, the minimum UFO program requirement.

Developers

Boeing Satellite Systems (BSS)	Los Angeles, California
SPAWAR Systems Command	San Diego, California

UQQ-2 Surveillance Towed Array Sensor System (SURTASS)

Description

The Surveillance Towed Array Sensor System (SURTASS) capability consists of a mobile fleet of five ships that employ highly capable deep and shallow-water (littoral zone) passive-acoustic towed-array sonar systems. These ships provide passive detection of quiet nuclear and diesel submarines and real-time reporting of surveillance information to theater commanders and operational units. SURTASS ships employ the TL-29A twin-line passive-sonar acoustic arrays that are towed side-by-side from a SURTASS ship. The TL-29A offers significant performance improvements for undersea surveillance operations both in deep-ocean and shallow-water littoral environments. It can be towed in water as shallow as 180 feet and provides significant directional noise rejection and bearing ambiguity resolution capability without having to without having to turn the ship and possibly destabilizing the array.

Status

Five SURTASS vessels are operational in the Pacific fleet. The first production model TL-29A twin-line SURTASS array was installed in FY 2005, and all SURTASS vessels currently have TL-29A twin line arrays. SURTASS is also being upgraded with the Integrated Common Processor that will result in increased operator proficiency, increased functionality, and savings in logistics support and software maintenance.

Developers

Lockheed Martin	Manassas, Virginia
Lockheed Martin	Syracuse, New York
Sechan	Lititz, Pennsylvania

WQT-2 SURTASS/Low Frequency Active (LFA) Sonar

Description

The LFA system, the active adjunct to the Surveillance Towed Array Sensor System (SURTASS) sonar system, is capable of long-range detections of submarine and surface ship contacts. It comprises a low-frequency active sonar transmitter deployed below a SURTASS ship, with the SURTASS passive towed array acting as the receiver. Other Navy ships with towed arrays and compatible processing systems can also process the LFA signal returns, using what is called a "bi-static" mode. As a mobile system, SURTASS/LFA can be employed as a force-protection sensor wherever the force commander directs, including in forward operating areas or in support of carrier strike group and expeditionary group operations. A UHF SATCOM communication system provides direct voice and data connectivity between the SURTASS/LFA ship and tactical platforms.

Status

One LFA system is installed on board the USNS Impeccable (T-AGOS 23) in early 2011. The Compact LFA (CLFA) system, employing smaller and lighter sources, has been installed on USNS

Able (T-AGOS 20) and will be installed on two additional SURTASS ships by FY 2012.

Developers

BAE Systems	Manchester, New Hampshire
Lockheed Martin Naval Electronics & Surveillance Systems	Manassas, Virginia and Syracuse, New York

APPENDIX A
NAVY-MARINE CORPS CRISIS RESPONSE AND COMBAT ACTIONS

Dates	Location/Operation/Mission	U.S. Naval Forces
Jan - Mar 2000	Venezuela Search and rescue and humanitarian assistance after intense storms	II MEF* detachment
Feb 2000	California Coast Search and Recovery Mission for Alaska Air Flight 261	USS Fife (DD 991) USS Jarrett (FFG 33) USS Cleveland (LPD 7) M/V Kellie Chouest Military Sealift Command units Maritime patrol aircraft EODGRU One UCT-2 MDSU SDGO
Feb 2000 - May 2002	East Timor Support of US Support Group East Timor (USGET) and UN Transition Administration - East Timor (UNTAET) Humanitarian Assistance	Medical Support Teams Amphibious Ready Groups Marine Expeditionary Units Helicopter Support Squadron 5 Detachment 1
July 2000	Wildfires in U.S. West Assistance to firefighters	3d Battalion, 11th Marines, I MEF*
Aug 2000	Bahrain Gulf Air Airbus 320 Crash Search and Recovery Mission	USNS Catawba (T-ATF 168) USS Oldendorf (DD 972 USS George Washington (CVN 73) HCSS 2, Det 2
Oct 2000	Yemen Operation Determined Response Support of USS Cole damaged in terrorist attack	USS Tarawa (LHA 1) USS Donald Cook (DDG 75) USS Hawes (FFG 53) USS Duluth (LPD 6) USS Anchorage (LSD 36) USNS Catawba (T-ATF 168) 13th Marine Expeditionary Unit (SOC)* Platoons from 1st and 2nd FASTs*
Feb 2001	India Disaster relief to earthquake victims	USS Cowpens (CG 63)
Aug 2001	Wildfires in U.S. West Assistance to firefighters	II MEF* personnel
Aug - Nov 2001	Hawaii Recovery of Japanese fishing/ training vessel Ehime Maru	Mobile Diving and Salvage Unit 1 Remotely Operated Vehicles

Dates	Location/Operation/Mission	U.S. Naval Forces
Sep 2001 - Ongoing	Operation Noble Eagle Response to terrorist attacks on World Trade Center and Pentagon Homeland Defense	USNS Comfort (T-AH 20) USNS Denebola (T-AKR 289) USS John F. Kennedy (CV 67) CVBG USS George Washington (CVN 73) CVBG USCG Units USS John C. Stennis (CVN 74) CVBG 6 Cyclone-class PCs Aegis cruisers and destroyers
Oct 2001 - Ongoing	Afghanistan and other counterterrorism operation sites around the globe Operation Enduring Freedom Strike and combat operations against terrorist forces Coastal patrol and maritime homeland security	USS Enterprise (CVN 65) Battle Group USS Carl Vinson (CVN 70) Battle Group USS Theodore Roosevelt (CVN 71) Battle Group USS Kitty Hawk (CV 66) Battle Group USS John C. Stennis (CVN 74) Battle Group USS John F. Kennedy (CV 67) Battle Group USS Peleliu (LHA 5) ARG USS Bataan (LHD 5) ARG USS Bonhomme Richard (LHD 6) ARG USS Constellation (CV 64) Battle Group USS Abraham Lincoln (CVN 72) Battle Group USS Harry S. Truman (CVN 75) Battle Group USS Nimitz (CVN 68) USS Mount Whitney (LCC 20) USS George Washington (CVN 73) Battle Group USS Nassau (LHA 4) ARG USS Essex (LHD 2) ARG USS O'Kane (DDG 77) USS Chafee (DDG 90) USS Mount Whitney (LCC 20) USS Dwight D. Eisenhower (CVN 69) Carrier Strike Group USS Chosin (CG 65) USS Ingraham (FFG 61) USS Boxer (LHD 4) Expeditionary Strike Group 15th Marine Expeditionary Unit USS Oak Hill (LSD 51) USS Roosevelt (DDG 80) USS Vicksburg (CG 69) USS Trenton (LPD 14) USS Hue City (CG 66) USS James E. Williams (DDG 95) USS Saipan (LHA 2) USS Taylor (FFG 50) USS Ashland (LSD 48) USS Nassau (LHA 4) Expeditionary Strike Group 22nd Marine Expeditionary Unit USS Ronald Reagan (CVN 76) Carrier Strike Group USS Gonzalez (DDG 66) USS Peleliu (LHA 5) Expeditionary Strike Group 11th Marine Expeditionary Unit USS Iwo Jima (LHD 7) Expeditionary Strike Group 24th Marine Expeditionary Unit USS Wasp (LHD 1) Expeditionary Strike Group USS Ardent (MCM 12) USS Dextrous (MCM 13)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Cardinal (MHC 60) USS Chinook (PC 9) USS Typhoon (PC 5) USS Whirlwind (PC 11) USS Raven (MHC 61) USS Sirocco (PC 6) USS Firebolt (PC 10)
Oct 2001 - Ongoing	Mediterranean Operation Active Endeavour NATO response to 9/11 Monitoring Shipping / Intelligence Exchange	USS Elrod (FFG 55) USS Hawes (FFG 53) USS Underwood (FFG 36) USS Mahan (DDG 72) USS Doyle (FFG 39) USS Dewert (FFG 45) Elements of U.S. 6th Fleet USS Arleigh Burke (DDG 51) USS Simpson (FFG 56) USS Elrod (FFG 55) USS Boone (FFG 28) USS Ross (DDG 71) USS Monterey (CG 61) USS Carr (FFG 52) USS Porter (DDG 78)
Jan - Apr 2002	Strait of Malacca Ship protection	USS Ford (FFG 54) USS Cowpens (CG 63)
Feb - May 2002	El Salvador	NMCB-7
Feb - July 2002	Philippines Joint Task Force 510 Training and support in pursuit of terrorists. Transitioned to Joint Special Ops Task Force - Philippines Conducts humanitarian/ civic action programs	USS Germantown (LSD 42) III MEF* Naval Construction Task Group
Mar 2002	Eastern Afghanistan Operation Anaconda Ground operation against Al Qaida, Taliban strongholds	Navy SEAL Forces Marine Helicopters
June 2002	Rescue of merchant ship crew off coast of Oman	USS Vicksburg (CG 69)
Dec 2002	Assistance to Guam following Super Typhoon Pongsona	Naval Military Construction Battalion 74 USS Frank Cable (AS 40)
Dec 2002 - Ongoing	Horn of Africa/Djibouti Joint Task Force Horn of Africa Detect, disrupt, defeat transnational terrorist groups	Commander, Carrier Strike Group SIX USS Mount Whitney (LCC 20) 24th Marine Expeditionary Unit (SOC)* USS Iwo Jima (LHD 7) ARG USS Peleliu (LHA 5) ESG USS Belleau Wood (LHA 3) ARG USS Nassau (LHA 4) ARG Naval Mobile Construction Battalions Naval Special Warfare units Navy Medical Forces

Dates	Location/Operation/Mission	U.S. Naval Forces
Feb - Mar 2003	Texas Shuttle Columbia Disaster Recovery	Navy Mobile Diving and Salvage Team 2 Mobile Diving and Salvage Unit 2, Det. 409
Mar 2003 - Ongoing	Persian Gulf, Mediterranean Sea Operation Iraqi Freedom	USS Enterprise (CVN 65) Carrier Strike Group USS Theodore Roosevelt (CVN 71) Carrier Strike Group USS Harry S. Truman (CVN 75) Carrier Strike Group USS George Washington (CVN 73) Carrier Strike Group USS Nimitz (CVN 68) Carrier Strike Group USS John F. Kennedy (CV 67) Carrier Strike Group USS Constellation (CV 64) Carrier Strike Group USS Kitty Hawk (CV 63) Carrier Strike Group USS Abraham Lincoln (CVN 72) Carrier Strike Group USS Tarawa (LHA 1) Expeditionary Strike Group USS Wasp (LHD 1) Expeditionary Strike Group USS Essex (LHD 2) Expeditionary Strike Group USS Iwo Jima (LHD 7) Expeditionary Strike Group USS Belleau Wood (LHA 3) Expeditionary Strike Group USS Nassau (LHA 4) Expeditionary Strike Group USS Bataan (LHD 5) USS Bonhomme Richard (LHD 6) USS Boxer (LHD 4) USS Kearsarge (LHD 3) USS Saipan (LHA 2) USS Carter Hall (LSD 50) USS Anchorage (LSD 36) USS Ashland (LSD 48) USS Comstock (LSD 45) USS Pearl Harbor (LSD 52) USS Rushmore (LSD 47) USS Tortuga (LSD 46) USS Gunston Hall (LSD 44) USS Higgins (DDG 76) (w/Task Force 150) USS Fletcher (DD 992) (w/ Task Force 150) USS Rodney Davis (FFG 60) (w/Task Force 150) HSVX-1 Joint Venture USNS Comfort (T-AH 20) Nuclear Attack Submarines EA-6B Expeditionary Aircraft Squadrons P-3C Maritime Patrol Aircraft Squadrons EP-3 Surveillance Aircraft Squadrons Navy Unique Fleet Essential Airlift aircraft Cargo Handling Battalions Naval Coastal Warfare units Naval Mobile Construction Battalions Navy Special Warfare units Navy Medical Forces 1st Marine Expeditionary Force 2nd Marine Expeditionary Brigade 15th Marine Expeditionary Unit 31st Marine Expeditionary Unit USS Mount Whitney (LCC-20) USCG Cutters Fleet Hospital (FH) Dallas USS Dwight D. Eisenhower (CVN 69) Carrier Strike Group USS Ardent (MCM 12)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Dextrous (MCM 13) USS Cardinal (MHC 60) USS Chinook (PC 9) USS Typhoon (PC 5) USS Whirlwind (PC 11) USS Raven (MHC 61) USS Sirocco (PC 6) USS Firebolt (PC 10) USS Oak Hill (LSD 51) USS Roosevelt (DDG 80) USS Vicksburg (CG 69) USS Trenton (LPD 14) USS Hue City (CG 66) USS James E. Williams (DDG 95) USS Taylor (FFG 50) USS Ashland (LSD 48) 13th Marine Expeditionary Unit (MEU) 22nd Marine Expeditionary Unit (MEU) USS Ronald Reagan (CVN 76) Carrier Strike Group USS Gonzalez (DDG 66) USS Peleliu (LHA 5) Expeditionary Strike Group 11th Marine Expeditionary Unit (MEU) 24th Marine Expeditionary Unit (MEU) USS John C. Stennis (CVN 74) Carrier Strike Group USS Bataan (LHD 5) Expeditionary Strike Group USS Bonhomme Richard (LHD 6) Expeditionary Strike Group
July 2003	Liberia	Fleet Antiterrorism Security Team (FAST) Security of American, Allied Citizens
Dec 2004	Humanitarian Assistance and Disaster Relief to Philippines	Joint Task Force 535
Dec 2004 - Mar 2005	Operation Unified Assistance	USS Abraham Lincoln Carrier Strike Group USS Fort McHenry (LSD 43) USS Essex (LHD 2) USS Bonhomme Richard (LHD 6) Expeditionary Strike Group USS Hue City (CG 66) Combined Support Force 536 USNS Mercy (T-AH 19) USNS Tippecanoe (T-AO 199) 15th Marine Expeditionary Unit USMC 9th Engineer Support Battalion Naval Mobile Construction Battalion 7 Environmental/Preventive Medicine Unit 6 USCG personnel Joint POW/MIA forensic team
Aug - Oct 2005	U.S. Gulf Coast Hurricane Relief Effort	USS Harry S. Truman (CVN 75) USS Bataan (LHD 5) USS Iwo Jima (LHD 7) USS Shreveport (LPD 17) USS Tortuga (LSD 46) USS Whidbey Island (LSD 41) USS Grapple (ARS 53) USNS Comfort (T-AH 20) USNS Arctic (T-AOE 8)

Dates	Location/Operation/Mission	U.S. Naval Forces
		Naval Mobile Construction Battalion 40 2nd MEF* Helicopter Sea Combat Squadron 28 22nd Seabee* Readiness Group Beach Master Unit 2 Assault Craft Unit 2 Mobile Diving and Salvage Unit 2 Helicopter Anti-Submarine Squadron Light 43
Oct 2005 - Mar 2006	Pakistan Earthquake Relief Effort	USS Tarawa (LHA 1) USS Pearl Harbor (LSD 52) USS Cleveland (LPD 7) USS Chosin (CG 65) Combined Joint Task Force 76 Commander, Task Force 53 Helicopter Sea Combat Squadron 26 Naval Mobile Construction Battalion 3 Naval Mobile Construction Battalion 4 Naval Mobile Construction Battalion 74 Helicopter Mine Countermeasures 15 Fleet Logistics Support Squadron (VR) 56
Jan 2006 - Ongoing	Extended Maritime Interdiction Operations	USS Pinckney (DDG 91) USS Chung-Hoon (DDG 93) USS Momsen (DDG 92) USS Halsey (DDG 97) USS Rentz (FFG 46)
Jan 2006 - Ongoing	Maritime Counter Terrorism Support to Operation Enduring Freedom – Philippines Support to Joint Special Operations Task Force – Philippines	Combined Joint Task Force 515 Commander, Task Force 75 USNS GySgt Fred W. Stockham (T-AK 3017) HSV 2 Swift USS Rentz (FFG 46) USS Chung Hoon (DDG 93) USS Halsey (DDG 97) USS Pinckney (DDG 91) USS Momsen (DDG 92) USS Lassen (DDG 82) USS Juneau (LPD 10) Helicopter Anti-Submarine Squadron 10 Helicopter Anti-Submarine Squadron Light 37 Helicopter Anti-Submarine Squadron Light 43 Mobile Security Squadron 7
Feb - Mar 2006	Leyte Island Mudslide Relief Effort	Commander, Task Force 76 USS Essex (LHD 2) USS Harpers Ferry (LSD 49) USS Curtis Wilbur (DDG 54) 31st Marine Expeditionary Unit
Feb - Aug 2006	PACOM Presence/RIMPAC	USS Abraham Lincoln (CVN 72) USS Mobile Bay (CG 53) USS Russell (DDG 59) USS Shoup (DDG 86) Carrier Strike Group 9 COMDESRON 9 Helicopter Anti-Submarine Squadron Light 47 Explosive Ordnance Disposal Mobile Unit 11 Det 1

Dates	Location/Operation/Mission	U.S. Naval Forces
Apr - May 2006	Partnership of the Americas	USS George Washington (CVN 73) Carrier Air Wing 17 USS Monterey (CG 61) USS Stout (DDG 55) USS Underwood (FFG 36)
May - Jul 2006	Limited Defense Operations Taepo Dong 2	COMSEVENTHFLT USS Curtis Wilbur (DDG 54) USS Fitzgerald (DDG 62) USS John S McCain (DDG 56) USS Russell (DDG 59)
May - Sep 2006	USNS Mercy Medical Civil Action Program	Commander, Task Force 10 Commander, Task Group 10.1 Commander, Task Group 10.2 Commander, Task Unit 10.1.1 Commander, Task Unit 10.2.1 COMPHIBRON 7 USNS Mercy (T-AH 19) USNS Niagra Falls (T-AFS 3) Medical Treatment Facility MERCY Helicopter Sea Combat Squadron 25 Naval Mobile Construction Battalion 40 Mobile Security Squadron 7 Fleet Logistics Support Squadron 51
Jul - Sep 2006	Joint Task Force Lebanon Operation Strengthen Hope	USS Iwo Jima (LHD 7) USS Wasp (LHD 1) USS Nashville (LPD 13) USS Trenton (LPD 14) USS Whidbey Island (LSD 41) USS Hue City (CG 66) USS Barry (DDG 52) USS Gonzalez (DDG 66) USS Mount Whitney (LCC/JCC 20) HSV Swift (HSV 2) 24th Marine Expeditionary Unit
Mar - Sep 2007	Partnership of the Americas	USS Pearl Harbor (LSD 52) DESRON 40 USS Mitscher (DDG 57) USS Samuel B. Roberts (FFG 58)
May - Sep 2007	Pacific Partnership	USS Peleliu (LHA 5) Naval Mobile Construction Battalion 7/ACB 1
Jun 2007	West African Training Cruise (WATC)	Underwater Construction Team
Jun - Oct 2007	Humanitarian Assistance Deployment	USNS Comfort (T-AH 20) COMDESRON 24 Helicopter Sea Combat Squadron 28 DET 2 Mobile Security Detachment 26 Combat Camera Naval Mobile Construction Battalion 133 Interpreter

Dates	Location/Operation/Mission	U.S. Naval Forces
		USFF Band Oceano Team Medical Staff Augmentation Fleet Public Affairs
Jun - Oct 2007	Global Fleet Station	HSV Swift (HSV 2)
Aug 2007	Minneapolis Bridge Collapse	Mobile Diving and Salvage Unit 2 Combat Camera Underwater Construction Team 1
Aug 2007		Hurricane Dean SEPLOs REPLOs Combat Camera
Sep 2007	Hurricane Felix	USS Wasp (LHD 1) USS Samuel B. Roberts (FFG 58) NEPLO
Oct - Nov 2007	SOCAL Wild Fire Fighting	Combat Camera P-3 W/ Full Mission Video Tactical Common Data Link Det Helicopter Sea Combat Squadron 85 HH-60 Det ACB 1 NEPLOs Fire Trucks W/Fire Fighting Personnel
Nov 2007	Tropical Storm Noel	NEPLOs
Nov 2007	Tropical Cyclone Bangladesh	USS Kearsarge (LHD 3) 22nd Marine Expeditionary Unit (SOC)* USS Essex (LHD 2) USS Tarawa (LHA 1)
Nov 2007 - Feb 08	Africa Partnership Station	USS Fort McHenry (LSD 43) Naval Mobile Construction Battalion 40 USS Annapolis (SSN 760) HSV Swift (HSV 2)
Nov 2007 - Dec 2008	Anti Piracy Operations in the Horn of Africa	Numerous ships assigned to Commander, Task Force 150
Nov 2007- Nov 2008	Development and Reconstruction of Afghanistan	Carrier Airwing 8 USS Theodore Roosevelt (CVN 71) Individual Augmentees / GWOT Support Assignments
Feb 2008	Southern Partnership Station	HSV Swift (HSV 2)
Feb 2008	Rogue Satellite Shoot Down	USS Lake Erie (CG 70)
Apr - Jun 2008	Continuing Promise 2008 Humanitarian Civic Assistance (HCA) U.S. Southern Command (SOUTHCOM)	USS Boxer (LHD 4) COMPHIBRON 5 Fleet Surgical Team 5 U.S. Public Health Service Navy SEABEE Construction Battalion Maintenance Unit 303 Helicopter Mine Countermeasures Squadron 14

Dates	Location/Operation/Mission	U.S. Naval Forces
		Marine Medium Helicopter Squadron 764 Tactical Air Control Squadron 11 Special Marine Air Ground Task Force 24 Helicopter Sea Combat Squadron 23 Assault Craft Unit 1 Fleet Survey Team Maritime Civil Affairs Team 205 Beach Master Unit 1 Fleet Public Affairs
Apr - Oct 2008	Partnership of the Americas 2008 U.S. Southern Command (SOUTHCOM)	USS George Washington (CVN 73) COMDESRON 40 USS Farragut (DDG 99) USS Forrest Sherman (DDG 98) USS Kauffman (FFG 59)
May - June 2008	Pacific Partnership	USNS Mercy (T-AH 19) USS Peleliu (LHA 5)
June, Oct - Nov 2008	Southern California Wildfires	Navy Emergency Preparedness Liaison Officers Helicopter Sea Combat Squadron 85 (HSC-85)
Jun - Sep 2008	Navy Dive Southern Partnership Station 2008 Multinational Maritime Partnership U.S. Southern Command (SOUTHCOM)	USNS Grasp (T-ARS 51)
Aug - Nov 2008	Continuing Promise 2008 Humanitarian Civic Assistance (HCA) U.S. Southern Command (SOUTHCOM)	USS Kearsarge (LHD 3) COMPHIBRON 8 Fleet Surgical Team 4 U.S. Public Health Service Navy SEABEE Construction Battalion Maintenance Unit 202 Air Force Civil Engineering Squadron 5 Navy Assault Craft Unit 2 Naval Beach Group 2 Maritime Civil Affairs Squadron 2 Helicopter Sea Combat Squadron 28 Marine Heavy Helicopter Squadron 464 Fleet Public Affairs
Aug 2008	Russia / Georgia Conflict – Humanitarian Assistance	USS Mount Whitney (LCC 20) USS McFaul (DDG 74)
Aug 2008	Hurricane Gustav Recovery Operations	Naval Facilities Engineering Command Fleet & Family Support Center
Sep 2008	Haiti Disaster Relief (DR) U.S. Southern Command (SOUTHCOM)	USS Kearsarge (LHD 3) COMPHIBRON 8 Fleet Surgical Team 4 U.S. Public Health Service Navy SEABEE Construction Battalion Maintenance Unit 202 Air Force Civil Engineering Squadron 5 Navy Assault Craft Unit 2 Naval Beach Group 2 Maritime Civil Affairs Squadron 2 Helicopter Sea Combat Squadron 28 Marine Heavy Helicopter Squadron 464 Fleet Public Affairs

Dates	Location/Operation/Mission	U.S. Naval Forces
Sep - Oct 2008	Air Force B-52 Salvage & Recovery Ops Guam	USNS Sioux (T-ATF 171)
Oct 2008 - Apr 2009	Counter Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USS Samuel B. Roberts (FFG 58) USS Underwood (FFG 36) USS Rodney M. Davis (FFG 60)
Nov 2008 - Apr 2009	Southern Partnership Station 2008/2009 Multinational Maritime Partnership U.S. Southern Command (SOUTHCOM)	HSV Swift (HSV 2)
Dec 2008 - Feb 2009	Counter Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USNS Saturn (T-AFS 10)
Dec 2008 - Ongoing	Operation Iraqi Freedom CTF-IM	USS Nitze (DDG 94) USS Lake Champlain (CG 57) USS Halyburton (FFG 40) USS Paul Hamilton (DDG 60) USS John Paul Jones (DDG 53) USS Milius (DDG 69) USS Decatur (DDG 73) USS Port Royal (CG 73) USS Hopper (DDG 70) USS Benfold (DDG 65) USS Chinook (PC 9) USS Typhoon (PC 5) USS Whirlwind (PC 11) USS Sirocco (PC 6) USS Firebolt (PC 10)
Dec 2008	WESTPAC / MCPI / UNSCR Operation Enduring Freedom - Afghanistan (Struggle Against Violent Extremism) (Maritime Security Operations) (Partnership, Strength & Presence)	USS The Sullivans (DDG 68) USS Dwight D Eisenhower (CVN-69) Carrier Strike Group USS Ronald Reagan (CVN-76) Carrier Strike Group USS Nimitz (CVN-68) Carrier Strike Group USS Iwo Jima (LHD-7) Expeditionary Strike Group USS Bataan (LHD-5) Expeditionary Strike Group USS Boxer (LHD-4) Expeditionary Strike Group USS Bonhomme Richard (LHD-6) Expeditionary Strike Group 13th Marine Expeditionary Unit (MEU) 22nd Marine Expeditionary Unit (MEU) 11th Marine Expeditionary Unit (MEU) USS San Antonio (LPD 17) USS Carter Hall (LSD 50) USS New Orleans (LPD 18) USS Lake Champlain (CG 57) USS Chung-Hoon (DDG 93) USS Comstock (LSD 45) USS Bataan (LHD 5) USS Ponce (LPD 15) USS Fort McHenry (LSD 43) USS Cleveland (LPD 7)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Rushmore (LSD 47) USS Ramage (DDG 61) USS Monterey (CG 61) USS Mason (DDG 87) USS Nitze (DDG 94) USS Mahan (DDG 72) USS Milius (DDG 69) USS Gettysburg (CG 64) USS Vicksburg (CG 69) USS Vella Gulf (CG 72) USS Chancellorsville (CG 62) USS Howard (DDG 83) USS Rentz (FFG 46) USS Ingraham (FFG 61) USS DeWert (FFG 45) USS Hopper (DDG 70) USS Benfold (DDG 65) USS Ardent (MCM 12) USS Dextrous (MCM 13) USS Gladiator (MCM 11) USS Scout (MCM 8) USS Sampson (DDG 102) USS Gridley (DDG 101) USS James E Williams (DDG 95) USS Thach (FFG 43) USS Decatur (DDG 73) USS Paul Hamilton (DDG 60) USS John Paul Jones (DDG 53) USS Porter (DDG 78) USS Bainbridge (DDG 96) USS Chosin (CG 65) USS Pinckney (DDG 91)
Jan - Dec 2009	Counter-Piracy Operations in the GOA (Gulf of Aden) / HOA (Horn of Africa) Somali Basin / Arabian Sea	Numerous U.S. and Combined Maritime Force ships assigned to CTF-151 USS The Sullivans (DDG 68) USS Lake Champlain (CG 57) USS Chung-Hoon (DDG 93) USS Vicksburg (CG 69) USS James E Williams (DDG 95) USS Thatch (FFG 43) USS Anzio (CG 60) USS Bainbridge (DDG 96) USS Rentz (FFG 46) USS Ingraham (FFG 61) USS Winston S Churchill (DDG 81)
Jan - Dec 2009	Standing NATO Maritime Group (SNMG)	USS Halyburton (FFG 40) USS Donald Cook (DDG 75) USS Stephen W Groves (FFG 29)
15 Feb 2009- 05 Apr 2009	WESTPAC / DYNAMIC SPRING/LDO	COMPACFLT COMSEVENTHFLT CTF 70 DESRON 15 USS Shiloh (CG 67) USS Cowpens (CG 63)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Hopper (DDG 70) USS John S McCain (DDG 56) USS Curtis Wilbur (DDG 54) USS Fitzgerald (DDG 62) USS Stethem (DDG 63)
Apr 2009	Maersk Alabama Piracy/ Rescue	USS Bainbridge (DDG 96) USS Halyburton (FFG 40) USS Boxer (LHD 4)
	Summit of the Americas Support Caribbean	USS Winston S. Churchill (DDG 81) USS Hawes (FFG 53) COMDESRON 26
Apr - Jul 2009	Continuing Promise 2010 Humanitarian Civic Assistance (HCA) U.S. Southern Command (SOUTHCOM)	USNS Comfort (T-AH 20) COMPHIBRON 6 Fleet Surgical Team 4 U.S. Public Health Service Helicopter Sea Combat Squadron 26 Navy SEABEE Construction Maintenance Battalion Unit 202 Maritime Civil Affairs Squadron 2 U.S. Air Force Band Fleet Public Affairs
Apr - May 2009	Unitas Gold 2009 U.S. Southern Command (SOUTHCOM)	COMDESRON 40 USS Mesa Verde (LPD 19) USS Doyle (FFG 39) USS Kauffman (FFG 59) USS Donald Cook (DDG 75) USS Oscar Austin (DDG 79) USS Ashland (LSD 48) USS Winston S. Churchill (DDG 81) USS San Jacinto (CG 56) USS Forrest Sherman (DDG 98) USS John L. Hall (FFG 32)
Apr - Oct 2009	Southern Seas 2009 U.S. Southern Command (SOUTHCOM)	COMDESRON 40 USS Doyle (FFG 39) USS Kauffman (FFG 59) USS Ford (FFG 54)
	Counter Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USS Gary (FFG 51) USS Carr (FFG 52) USS Hawes (FFG 53) USS Simpson (FFG 56) USS Newport News (SSN 750)
May - Oct 2009	Counter Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USS Jarrett (FFG 33) USNS Robert E. Peary (T-AKE 5)
May - 30 Sep 2009	WESTPAC / Pacific Partnership 2009 / FHA & TCP	USNS Richard E Byrd, CDS 21
17 Jun- 07 July 2009	WESTPAC / MCPI / UNSCR	CTF 72 DET USS McCampbell (DDG 85)
Jun - Jul 2009	Air France Flight #447 Recovery OPS South Atlantic	Supervisor of Salvage and Diving (SUPSALV) NAVOCEANO

Dates	Location/Operation/Mission	U.S. Naval Forces
Jun - Aug 2009	Amphibious Southern Partnership Station 2009 Multinational Maritime Partnership U.S. Southern Command (SOUTHCOM)	USS Oak Hill (LSD 51) COMDESRON 2 22nd Marine Expeditionary Unit Navy Combat Camera
Aug 2009	Taiwan / Typhoon Morakot Recovery / FHA	USS Denver (LPD 9), CH-53s
27 Sep -13 Oct 2009	Republic of the Philippines / Tropical Storm Ketsana / FHA	USS Harpers Ferry (LSD 49) USS Tortuga
29 Sep - 4 Oct 2009	America Samoa / Tsunami Relief / HA	USS Ingraham (FFG 61)
02 Oct -17 Oct 2009	Indonesia / FHA	CTF 76 COMPHIBRON 11 USS Denver (LPD 9) USS McCampbell (DDG 85) USNS Richard E Byrd (T-AKE 4) USNS Walter S. Diehl (T-AO 193) CTF 72 DET 31 MEU 11 MEU
30 Oct - 07 Nov 2009	WESTPAC / MCPI / UNSCR	USS Ingraham (FFG 61)
Oct - Dec 2009	Amphibious Southern Partnership Station 2009 Multinational Maritime Partnership U.S. Southern Command (SOUTHCOM)	USS Wasp (LHD 1) COMDESRON 40 Marine Heavy Helicopter Squadron 461 Fox Company 2nd Battalion 9th Marines 8th Communication Battalion 8th Engineering Support Battalion Marine Dental Echelon
Oct 2009 - Apr 2010	Counter Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USS McInerney (FFG 8) USS McClusky (FFG 41)
Oct 2009 - May 2010	Oceanographic Southern Partnership Station 2009/2010	USNS Henson (T-AGS 63)
Nov 2009 - Mar 2010	Oceanographic Southern Partnership Station 2009/2010	USNS Sumner (T-AGS 61)
Nov - Nov 2009	Divi Airlines Plane Crash Recovery OPS Southern Caribbean	USNS Henson (T-AGS 63)
Jan 2010 - Ongoing	Operation Unified Response / Haiti Earthquake Relief	USS Carl Vinson (CVN 70) USS Bataan (LHA 5) USS Gunston Hall (LSD 44) USS Fort McHenry (LSD 43) USS Carter Hall (LSD 50) USS Normandy (CG 60) USS Underwood (FFG 36) 22nd Marine Expeditionary Unit (MEU 22) USS Nassau (LHD 4) USS Mesa Verde (LPD 19) USS Ashland (LSD 48) 24th Marine Expeditionary Unit (MEU 24) USS Higgins (DDG 76)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Bunker Hill (CG 52) USNS Comfort (T-AH 20) USNS Grasp (T-ARS 51) USNS Henson (T-AGS-63) USNS Sacagawea (T-AKE 2) USNS Sumner (T-AGS-61) USNS 1st LT Jack Lummus (T-AK 3011) USNS PFC Dewayne T. Williams (T-AK 3009) USNS Big Horn (T-AO-198)
Jan - Apr 2010	Op UNIFIED Response / Haiti HADR Operations	USS Carl Vinson (CVN 70) USS Bunker Hill (CG 52) USS Bataan (LHD 5) USS Carter Hall (LSD 50) USS Ft McHenry (LSD 43) USNS Grasp (T-ARS 51) USNS Comfort (T-AH 20) USNS Sacagawea (T-AKE 2) USNS Dewayne T Williams (T-AK 3009) USS Higgins (DDG 76) USS Nassau (LHA 4) USS Gunston Hall (LSD 44) USS Mesa Verde (LPD 19) USS Ashland (LSD 48) USNS Lewis and Clark (T-AKE 1) USS Normandy (CG 60) USS Underwood (FFG 36)
Jan - Apr 2010	USS Carl Vinson Southern Seas 2010 U.S. Southern Command (SOUTHCOM)	USS Carl Vinson (CVN 70) COMCARSTRKGRU ONE
Jan - Jun 2010	Africa Partnership Station	USS Gunston Hall (LSD 44) USS Samuel B Roberts (FFG 58) HSV-2 Swift USS Nicholas (FFG 47)
Jan - Dec 2010	Counter-Piracy Operations in the GOA (Gulf of Aden) / HOA (Horn of Africa) Somali Basin / Arabian Sea	Various ships
Jan - Dec 2010	Counter-Illicit Trafficking (CIT) OPS U.S. Southern Command (SOUTHCOM)	USS McClusky (FFG 41) USS McInerney (FFG 8) USS Rodney M Davis (FFG 60) USS Underwood (FFG 36) USS Jarrett (FFG 33) USS Truxtun (DDG 103) USS Doyle (FFG 39)
Feb - Mar 2010	Op PODIUM (Olympics)	USS Cape St George (CG 71) USS Momsen (DDG 92) USS Shoup (DDG 86)
Feb - Mar 2010	Black Sea OPS	USS John L Hall (FFG 32)
Feb - Apr 2010	USS Freedom Early Deployment U.S. Southern Command (SOUTHCOM)	USS Freedom (LCS 1)

Dates	Location/Operation/Mission	U.S. Naval Forces
Apr - Sep 2010	Op SOUTHERN SEAS 2010	USS Klakring (FFG 42)
Apr - Sep 2010	Op DEEPWATER HORIZON	USN Blimp Shallow Water Skimmers x 27 Harbor Buster x 4 Tow Boats x 35
May - Sep	Op SOUTHERN PARTNERSHIP STATION	HSV-2 Swift USS Freedom (LCS 1) USS New Orleans (LPD 18) USNS Grasp (T-ARS 51)
May - Sep 2010	Op PACIFIC PARTNERSHIP 2010	USNS Mercy (T-AH 19)
Jun - July 2010	Ex RIMPAC 2010	USS Ronald Reagan (CVN 76) USS Chancellorsville (CG 62) USS Bonhomme Richard (LHD 6) USS Comstock (LSD 45) USS Freedom (LCS 1) USS Paul Hamilton (DDG 60) USS McClusky (FFG 41) USS Chosin (CG 65) USNS Bridge (T-AOE 10) USNS Guadalupe (T-AO 200) USNS Yukon (T-AO 202) USS Navajo (AT 64) USS Sioux (ATF 75) USS Cleveland (LPD 7) USS Lake Erie (CG 70) USS Hopper (DDR 70) USS Reuben James (FFG 57) USS Sampson (DDG 102) USS Benfold (DDG 65) USS Ford (FFG 54) USS Pioneer (MCM 9) USS Devestator (MCM 6) USS Rushmore (LSD 47) USS Columbia (SSN 771) USS Columbus (SSN 762) USS Bremerton (SSN 698)
Aug - Present	Op Pakistan Flooding HA/DR	USS Peleliu (LHA 5) USS Pearl Harbor (LSD 52) USS Ponce (LPD 15
Jul - Jul 2010	Ex CARAT Singapore 2010	USS Tortuga (LSD 46) USS Chung-Hoon (DDG 93) USS Princeton (CG 59) USS Jacksonville (SSN 699)
Jul - Jul 2010	Op FRUKUS 2010	USS Mount Whitney (LCC 20)
Jul - Nov 2010	Op CONTINUING PROMISE 2010	USS Iwo Jima (LHD 7)
Aug - Aug 2010	Ex PANAMAX 2010	USNS Grasp (T-ARS 51)
Sep - Oct 2010	Op RAZOR II	USS Kearsage (LHD 3) USS Gonzalez (DDG 66)

Dates	Location/Operation/Mission	U.S. Naval Forces
Oct - Oct 2010	Ex JOINT WARRIOR 10-2	USS Bainbridge (DDG 96) USS Nitze (DDG 94) USS Stout (DDG 55)
Oct - Present	Op Philippines Typhoon HA/DR	USS George Washington (CVN 73) USS Cowpens (CG 63) USS John S McCain (DDG 56) USS Fitzgerald (DDG 62) USS Essex (LHD 2) USS Denver (LPD 9) USS Harpers Ferry (LSD 49)

* CJTF-Combined Joint Task Force; CTF-Commander, Task Force; HSC-Helicopter Sea Combat Squadron; HM-Helicopter Mine Countermeasures Squadron; HSL-Helicopter Anti-Submarine Warfare Squadron (Light) SEAL-Sea Air Land Teams; MDSU- Mobile Diving and Salvage Unit; MEU-Marine Expeditionary Unit; MEF-Marine Expeditionary Force; SOC-Special Operations Capable; NSW-Naval Special Warfare; TRAP-Tactical Recovery of Aircraft and Personnel; Seabees-Naval Construction Battalions; FAST-Fleet Antiterrorism Support Team

APPENDIX B
GLOSSARY

AADC	Area Air Defense Commander
AARGM	Advanced Anti-Radiation Guided Missile
AAW	Anti-Air Warfare
ABNCP	Airborne Command Post
ACAT	Acquisition Category
ACAT IAM	Major automated information system acquisition category
ACB	Amphibious Construction Battalion
ACCES	Advanced Cryptologic Carry-on Exploitation System
ACDS	Advanced Combat Direction System
ACS	Aerial Common Sensor
ACTD	Advanced Concept Technology Demonstration
AD	Air Defense
ADCAP	Advanced Capability
ADM	Acquisition Decision Memorandum
ADNS	Automated Digital Network System
ADP	Automated Data Processing
ADS	Advanced Deployable System
AE	Assault Echelons
AEA	Airborne Electronic Attack
AEHF	Advanced Extremely High Frequency
AEM/S	Advanced Enclosed Mast/Sensor
AoA	Analysis of Alternatives
AESA	Active Electronically Scanned Array
AFATDS	Advanced Field Artillery Tactical Data System
AFB	Air Force Base
AFG	Airfoil Group
AFFF	Aqueous Film Forming Foam
AFOE	Assault Follow-On Echelon
AFQT	Armed Forces Qualification Test
AG	Aerographer's Mate (enlisted classification)
AGF/LCC	Amphibious Command Ship
AGS	Advanced Gun System
AIEWS	Advanced Integrated Electronic Warfare System
AIP	Anti-Submarine Warfare Improvement Program
ALCS	Airborne Launch Control System
AHE	Advanced Hawkeye
ALFS	Airborne Low-Frequency Active Sonar
ALMDS	Airborne Laser Mine Detection System
AMCM	Airborne Mine Countermeasures
AMF	Airborne Maritime Fixed
AMNS	Airborne Mine Neutralization System
AMPIR	Airborne Polarmetric Microwave Imaging Radiometer
AMRAAM	Advanced Medium Range Air-to-Air Missile
ANDVT	Advanced Narrow-Band Digital Voice Terminal
AOA	Analysis of Alternatives, also, Amphibious Objective Area
AOE	Fast Combat Support Ship
AOR	Area of Responsibility
APB	Advanced Processor Build, or, Acquisition Program Baseline
APMIR	Airborne Polarmetric Microwave Imaging Radiometer
APS	Air Force Prepositioning Ships
APTS	Afloat Personal Telephone Service
ARCI	Acoustic Rapid COTS Insertion
ARG	Amphibious Ready Group
ARI	Active Reserve Integration
ARM	Anti-Radiation Missile
AS	Submarine Tender, or, Acquisition Strategy
ASDS	Advanced Seal Delivery System
ASCM	Anti-Ship Cruise Missile
ASUW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
ASWC	Anti-Submarine Warfare Commander
AT	Advanced Targeting
ATA	Automatic Target Acquisition
ATC	Air Traffic Control
ATD	Advanced Technology Demonstration, or, Aircrew Training Device
ATDLS	Advanced Tactical Data Link System
AT- FLIR	Advanced Targeting Forward-Looking Infrared
ATM	Asynchronous Transfer Mode
ATT	Anti-Torpedo Torpedo
ATWCS	Advanced Tomahawk Weapon Control
AWACS	Airborne Warning and Control System
AWS	Advanced Wideband System
BAH	Basic Allowance for Housing
BAMS	Broad Area Maritime Surveillance
BDI	Battle Damage Indication
BDII	Battle Damage Indication Imagery
BFCAPP	Battle Force Capability Assessment and Programming Process
BLII	Base-Level Information Infrastructure
BLOS	Basic Line of Sight
BMC4I	Battle Management/ Command, Control, Communications, Computers, and Intelligence
BMD	Ballistic Missile Defense
BMDS	Ballistic Missile Defense System
BMUP	Block Modification Upgrade Program
BPI	Business Process Improvement
BRAC	Base Realignment and Closure
C2(P)	Command and Control Processor
C2(R)	Command and Control Processor (Re-Host)
C3	Command, Control, and Communications
C3I	Command, Control, Communications, and Intelligence
C4I	Command, Control, Communications, Computers, and Intelligence
C4ISR	Command, Control, Communication, Computers, Intelligence, Surveillance, and Reconnaissance
C4N	Command, Control, Communications, Computers, and Navigation
C5F	Commander, Fifth Fleet
CAC	Common-Access Cards
CAD	Component Advanced Development
CADRT	Computer-Aided Dead-Reckoning Table
CAL/VAL	Calibration and Validation
CAS	Close Air Support
CB	Chemical, Biological
CBASS	Common Broadband Advanced Sonar System
CBR	Chemical, Biological, and Radiological
CBRND	Chemical, Biological, Radiological, Nuclear Defense
CCD	Center for Career Development
CCG	Computer Control Group
CCP	Common Configuration Program

CCS	Combat Control System
CDA	Commercially-Derived Aircraft
CDD	Capabilities Development Document
CDHQ	Central Command Deployable Headquarters
CDL-N	Common Data Link, Navy
CDLMS	Common Data Link Management System
CDLS	Common Data Link System
CDR	Critical Design Review
CDS	Combat Direction System
CEB	CNO Executive Board
CEC	Cooperative Engagement Capability
CENTRIXS	Combined Enterprise Regional Information Exchange System
CFFC	Commander, Fleet Forces Command
CG	Guided Missile Cruiser
CG(X)	Next Generation Cruiser
CIE	Collaborative Information Environment
CIO	Chief Information Officer
CIWS	Close-In Weapon System
CJF	Commander, Joint Forces
CLF	Combat Logistics Force
CLIP	Common Link Integration Processing
CM	Cryptographic Modernization
CMCO	Counter Mine Counter Obstacle
CND	Computer Network Defense
CNIC	Commander, Naval Installations Command
CNO	Chief of Naval Operations
CNRC	Commander, Naval Recruiting Command
CNRRR	Commander, Naval Reserve Recruiting Region
CNS	Communication/Navigation System
CNVA	Computer Network Vulnerability Assessment
COE	Common Operating Environment
COLDS	Cargo Offload and Discharge System
COMINT	Communications Intelligence
COMSEC	Communications Security
COMSUBGRU	Commander, Submarine Group
CONOPS	Concept of Operations
CONUS	Continental United States
COP	Common Operational Picture
COS	Class of Service
COTS	Commercial-Off-The-Shelf, also Cargo Offload and Transfer System
CPD	Capabilities Production Document
CSAR	Combat Search and Rescue
CSDTS	Common Shipboard Data Terminal Set
CSG	Carrier Strike Group
CSIT	Combat System Integration and Test
CSRB	Critical Skills Retention Bonus
CSRR	Common Submarine Radio Room
CSWP	Commercial Satellite Wideband Program
CTAPS	Contingency Tactical Automated Planning System (for TACS)
CTF	Component Task Force, or, Commander Task Force
CTOL	Conventional Takeoff and Landing
CTP	Common Tactical Picture
CUP	Common Undersea Program
CV	Conventionally Powered Aircraft Carrier, or, Carrier Variant aircraft
CVBG	Aircraft Carrier Battle Group
CVIC	Carrier Intelligence Center
CVN	Nuclear-Powered Aircraft Carrier
CVN(X)	Next-Generation Nuclear-Powered Aircraft Carrier
D5E	Destruction, degradation, denial, disruption, deceit, and Exploitation
DAB	Defense Acquisition Board
DARPA	Defense Advanced Research Projects Agency
DBRS	Dual-Band Radar Suite
DCA	Defensive Counter-Air
DCGS	Distributed Common Ground System
DCID	Director, Central Intelligence Directive
DCL	Detection, Classification, and Localization
DCMS	Director, Communications Security Material Systems
DCNO	Deputy Chief of Naval Operations
DD	Destroyer
DD 21	21st Land-Attack Destroyer
DD(X)	Next Generation Destroyer
DEM/VAL	Demonstration/Validation
DF	Direction Finding
DDG	Guided Missile Destroyer
DIB	DCGS Integration Backbone
DIF	Database Integration Framework
DII COE	Defense Information Infrastructure Common Operating Environment
DIMHRS	Defense Integrated Military Human Resource System
DIMUS	Digital Multi-beam Steering
DIO	Defensive Information Operations
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DJC2	Deployable Joint Command and Control (program)
DLS	Decoy Launching System
DMR	Digital Modular Radio
DMS	Defense Message System
DMSP	Defense Meteorology Satellite Program
DNM	Dynamic Network Management
DNS	Director, Navy Staff
DiD	Defense-in-Depth
DoD	Department of Defense
DoN	Department of the Navy
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities
DPRIS/ PRS	Defense Personnel Record Imaging System/EM-Electronic Military Personnel Record System
DSCS	Defense Satellite Communications System
DRPM	Direct-Reporting Program Manager
DSMAC	Digital Scene-Matching Area Correlation
DSN	Defense Switching Network
DSRV	Deep-Submergence Rescue Vehicle
DT	Developmental Testing
DTH	DMS Transitional Hubs
EA	Electronic Attack
EAM	Emergency Action Message
EB	Electric Boat
ECM	Electronic Countermeasures
ECCM	Electronic Counter-Countermeasures
ECP	Engineering Change Proposal
ECS	Exterior Communication System
EDS	Electronic Data Systems
EFV	Expeditionary Fighting Vehicle
EHF	Extremely High Frequency
EIS	Environmental Impact Statement
EKMS	Electronic Key Management System
ELINT	Electronic Intelligence
ELC	Enhanced Lethality Cartridge
EMD	Engineering and Manufacturing Development
EMPRS	Electronic Military Personnel Record System
EMW	Expeditionary Maneuver Warfare
EOC	Early Operational Capability
EOD	Explosive Ordnance Disposal

EOID	Electro-Optic Identification
ER	Extended Range
ER AAW	Extended Range Anti-Air Warfare
ERAM	Extended Range Active Missile
ERGM	Extended-Range Guided Munition
ERM	Extended Range Munition
ERNT	CNO Executive Review of Navy Training
ESE	Electronic Surveillance Enhancement
ESG	Expeditionary Strike Group
ESM	Electronic Support Measures
ESSI	Enhanced Special Structural Inspection
ESSM	Evolved Sea Sparrow Missile
ETC	Echo Tracker Classifier
EUCOM	U.S. European Command
EURCENT	European Central (NCTAMS)
EW	Electronic Warfare
EXCEL	Excellence through Commitment to Education and Learning
FARP	Forward Arming and Refueling Point
FBE	Fleet Battle Experiment
FBM	Fleet Ballistic Missile
FDS	Fixed Distributed System
FDS-C	FDS - COTS
FFG	Guided Missile Frigate
FFSP	Fleet and Family Support Program
FHLT	Fleet High-Level Terminal
FIE	Fly-In Echelon
FITC	Fleet Intelligence Training Center
FLIR	Forward-Looking Infrared
FLTSAT	Fleet Satellite
FOC	Full Operational Capability
FORCEnet	Navy web of secure communications and information links
FOT	Follow-On Terminal
FOT&E	Full Operational Test and Evaluation
FP	Full Production
FRP	Full-Rate Production, or, Fleet Response Plan
FTS	Full-Time Support
FUE	First Unit Equipped
FY	Fiscal Year
FYDP	Future Years Defense Plan
GBS	Global Broadcast Service
GBTS	Ground-Based Training System
GCCS	Global Command and Control System
GCS	Ground Control Station
GCSS	Global Command Support System
GDAIS	General Dynamics Advanced Information Systems
GDIS	General Dynamics Information Systems
GENDET	General Detail (personnel)
GENSER	General Service
GFE	Government-Furnished Equipment
GHMD	Global Hawk Maritime Demonstration system
GIG	Global Information Grid
GIG-BE	Global Information Grid - Bandwidth Expansion
GMF	Ground Mobile Force (Air Force)
GOTS	Government-Off-The-Shelf
GPS	Global Positioning System
GT	Gas Turbine
GWOT	Global War on Terror
HARM	High-Speed Anti-Radiation Missile
HD/LD	High-Demand/Low-Density
HDR	High Data-Rate
HF	High Frequency
HGHS	High Gain High Sensitivity
HLCAC	Heavy Lift Landing Craft, Air Cushion
HM&E	Human, Mechanical, and Electrical (systems)
HMI	Human-Machine Interface
HMMWV	High-Mobility Multi-purpose Wheeled Vehicle
HOLC	High Order Language Computer
HPC	Human Performance Center
HSDG	High School Diploma Graduate
HSI	Human Systems Integration
IA	Information Assurance
IATF	IA Technical Framework
IBS	Integrated Broadcast Service
I&W	Indications & Warning
IBS/JTT	Integrated Broadcast Service/ Joint Tactical Terminal
ICAO	International Civil Aviation Organization
ICAP	Improved Capability
ICD	Initial Capabilities Document
ICP	Integrated Common Processor
ICSTF	Integrated Combat Systems Test Facility
IDSN	Integrated Digital Switching Network
IDTC	Inter-Deployment Training Cycle
IETM	Interactive Electronic Technical Manual
IFF	Identification, Friend or Foe
IMINT	Imagery Intelligence
INLS	Improved Navy Lighterage
INS	Inertial Navigation System
IO	Information Operations
IOC	Initial Operational Capability Development
IP	Internet Protocol
IPDS	Improved Point Detector System
IPPD	Integrated Product and Process Development
IPS	Integrated Power System
IPT	Integrated Process Team
IPR	Interim Program Review
IR	Infrared
IRST	Infrared Search and Track
IS	Information Systems
ISDN	Integrated Services Digital Network
ISNS	Integrated Shipboard Network System
ISO	Investment Strategy Options
ISPP	Integrated Sponsor's Program Proposal
ISR	Intelligence, Surveillance, Reconnaissance
ISRT	Intelligence, Surveillance, Reconnaissance, and Targeting
ISS	Installation Subsystem
ISS	Information Superiority/Sensors
ISSP	Information Systems Security Program
IT	Information Technology
IT-21	Information Technology for the 21st Century
ITAB	Information Technology Acquisition Board
IU	Interface Unit
IUSS	Integrated Undersea Surveillance System
IW	Indications and Warning
IWS	Integrated Warfare Systems
J&A	Justification and Approval
JASA	Joint Airborne SIGINT Architecture
JASSM	Joint Air-to-Surface Standoff Missile
JCIDS	Joint Capabilities Integration and Development System
JCM	Joint Common Missile
JCS	Joint Chiefs of Staff
JC2-MA	Joint Command and Control - Maritime Applications
JDAM	Joint Direct Attack Munition

JDISS	Joint Deployable Intelligence Support Service
JDN	Joint Data Network
JFC	Joint Force Commander
JFCOM	Joint Forces Command
JFCOM JPO	Joint Forces Command Joint Program Office
JFMCC	Joint Forces Maritime Component Commander
JHMCS	Joint Helmet Mounted Cueing System
JFN	Joint Fires Network
JFNU	Joint Fires Network Unit
JIC	Joint Intelligence Center
JICO/JSS	Joint Interface Control Officer Support System
JMCIS	Joint Maritime Command Information System
JHDA	Joint Host Demand Algorithm
JMAST	Joint Mobile Ashore Support Terminal
JMCOMS	Joint Maritime Communications Strategy
JMLS	Joint Modular Lighterage System
JMOD	Joint Airborne SIGINT Architecture Modification
JMPS	Joint Mission Planning System
JNIC	Joint National Integration Center
JNMS	Joint Network Management System
JOA	Joint Operations Area
JOTBS	Joint Operational Test Bed System
JPACE	Joint Protective Aircrew Ensemble
JPATS	Joint Primary Aircraft Training System
JROC	Joint Requirements Oversight Council
JSF	Joint Strike Fighter
JSIPS	Joint Service Imagery Processing System
JSMO	Joint Systems Management Office
JSOW	Joint Standoff Weapon
JSPO	Joint System Program Office
JTA	Joint Tactical Architecture
JTAMDO	Joint Theater Air and Missile Defense Organization
JTDLMP	Joint Tactical Data Link Management Plan
JTIDS	Joint Tactical Information Distribution System
JWICS	Joint Worldwide Intelligence Communications System
JTRS	Joint Tactical Radio System
JTT	Joint Tactical Terminal
J-UCAS	Joint Unmanned Combat Air System
KDP	Key Decision Point
KPP	Key Performance Parameter
LAMPS	Light Airborne Multipurpose System
LAN	Local Area Network
LANT	Atlantic
LANTIRN	Low-Altitude Navigation and Targeting Infrared At Night
LCAC	Landing Craft, Air Cushion
LCB	Lateral Conversion Bonus
LCC	Amphibious Command Ship
LCGR	Launch Control Group Replacement
LCS	Littoral Combat Ship
LCU(R)	Landing Craft Utility ship (replacement)
LD/HD	Low-Density/High Demand
LIDAR	Light Detection and Ranging System
LDR	Low Data Rate
LDUUV	Large-Diameter Unmanned Undersea Vehicle
LEAD	Launched Expendable Acoustic Decoy
LEAP	Lightweight Exo-Atmospheric Projectile
LEASAT	Leased Satellite
LFA	Low Frequency Active
LHA-R	Amphibious Assault Ship-Replacement
LGB	Laser-Guided Bomb
LHD	Amphibious Assault Ship
LHT	Lightweight Hybrid Torpedo
LIDAR	Light Detection and Ranging
LMRS	Long-Term Mine Reconnaissance System
LMS	Local Monitor Station
LOS	Line of Sight, or, Length of Service
LOTS	Logistics-Over-The-Shore
LPD	Amphibious Transport Dock [Ship]
LPI	Low-Probability-of-Intercept
LPMP	Launch Platform Mission Planning
LRIP	Low Rate Initial Production
LRLAP	Long-Range Land-Attack Projectile
LSD	Dock Landing Ship
LSS	Littoral Surveillance System
LST	Task Landing Ship
LVT	Low-Volume Terminal
MA	Maritime Applications
MAGTF	Marine Air-Ground Task Force
MARCEMP	Manual Relay Center Modernization Program
MAST	Mobile Ashore Support Terminal
MATT	Multi-mission Airborne Tactical Terminal
MAWS	Missile Approach Warning System
M/BVR	Medium/Beyond Visual Range missile
MCEN	Marine Corps Enterprise Network
MCM	Mine Countermeasures
MCAS	Marine Corps Air Station
MCM	Mine Countermeasures
MCP	Mission Capability Package
MCPON	Master Chief Petty Officer of the Navy
MCS	Mine Countermeasures Command, Control, and Support Ship, or, Mission Computer System
MCS-21	Maritime Cryptologic System for the 21st Century
MCU	Mission Computer Upgrade
MDA	Missile Defense Agency
MDR	Medium Data Rate
MDS	Multi-function Display System
MEB	Marine Expeditionary Brigade
MEDAL	Mine Warfare and Environmental Decision Aids Library
MEF	Marine Expeditionary Force
METOC	Meteorological and Oceanographic Sensors
MEU	Marine Expeditionary Unit
MEU(SOC)	Marine Expeditionary Unit (Special Operations Capable)
MF/HF/ VHF/UHF	Medium/High/ very High/ Ultra High Frequency
MFL	Multi-Frequency Link
MFR	Multi-Function Radar
MFTA	Multi-Function Towed Array
MHC	Coastal Mine Hunter
MHIP	Missile Homing Improvement Program
MICFAC	Mobile Integrated Command Facility
MID	Management Initiative Decision
MIDS	Multi-Function Information Distribution System
MIDS-LVT	Multi-Function Information Distribution System-Low -Volume Terminal
MILSTAR	Military Strategic and Tactical Relay Satellite
MIRV	Multiple Independently Targeted Reentry Vehicle
MIUW	Mobile Inshore Undersea Warfare
MIW	Mine Warfare
MIWC	Mine Warfare Commander
MK	Mark

MLS	Multi-Level Security
MMA	Multi-mission Maritime Aircraft
MMRT	Modified Miniature Receiver Terminal
MNS	Mission Need Statement, also Mine Neutralization System
MOA	Memorandum of Agreement
MOCC	Mobile Operational Command Control Center
MOD	Modification
MOU	Memorandum of Understanding
MPA	Maritime Patrol Aircraft
MPF(F)	Maritime Prepositioning Force(Future)
MPG	Maritime Prepositioning Group
MPS	Maritime Prepositioning Ship, or, Mission Planning System
MRMS	Maintenance Resource Management System
MRUUV	Mission-Reconfigurable Unmanned Undersea Vehicle
MS	Mess Management Specialist (enlisted classification)
MSC	Military Sealift Command
MTI	Moving Target Indicator
MUOS	Mobile User Objective System
MWR	Morale, Welfare, and Recreation
NADEP	Naval Aviation Depot
NAF	Naval Air Facility
NALCOMIS	Naval Aviation Logistics Command Management Information System
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NATOPS	Naval Aviation and Training Operating Procedures Standardization
NAVAIRSYSCOM	Naval Air Systems Command
NAVCENT	U.S. Naval Forces, Central Commmand
NAVFLIR	Navigation, Forward-Looking Infrared [sensor]
NavMPS	Naval Mission Planning System
NAVSSI	Navigation Sensor System Interface
NAVSEA	Naval Sea Systems Command
NAVSECGRU	Naval Security Group
NAVSUP	Naval Supply Systems Command
NAVWAR	Navigation Warfare
NCDP	Naval Capabilities Development Process
NCES	Net-Centric Enterprise Services
NCFS	Naval Fires Control System
NCO	Network-Centric Operations
NCP	Naval Capability Pillar, or, Naval Capability Plan
NCTAMS	Naval Computer and Telecommunications Area Master Stations
NCTF	Naval Component Task Force
NCTS	Naval Computer and Telecommunications Station
NCUSW	Net Centric Undersea Warfare
NCW	Network-Centric Warfare, or, Navy Coastal Warfare
NCWES	Network-Centric Warfare Electronic Support
NDI	Non-Developmental Item
NEC	Naval Enlistment Classification
NEO	Non-Combatant Evacuation Operations
NEP	Navy Enterprise Portal
NEPLO	National Emergency Preparedness Liaison Officer
NESP	Navy Extremely High Frequency (EHF) Satellite Program
NETC	Naval Education and Training Command
NETWARCOM	Network Warfare Command
NFCS	Naval Fires Control System
NFN	Naval Fires Network, and/or Joint Fires Network
NFO	Naval Flight Officer
NFS	Naval Fire Support
NGC2P	Next Generation Command and Control Processor
NGNN	Northrup Grumman Newport News
NGO	Non-Governmental Organization
NGSS	Northrup Grumman Ship Systems
NIFC-CA	Navy Integrated Fire Control - Counter Air
NII	Network Information Integration
NILE	NATO Improved Link Eleven
NIMA	National Imagery and Mapping Agency
NIPRNET	Unclassified-but-Sensitive Internet Protocol Router Network
NITF	National Imagery Transportation Format
N/JCA	Navy/Joint Concentrator Architecture
NMCB	Naval Mobile Construction Battalion
NMCI	Navy Marine Corps Intranet
NMCP	Navy Marine Corps Portal
NMITC	Navy Maritime Intelligence Training Center
NMT	Navy Advanced Extremely High Frequency Multiband Terminal
NNSOC	Naval Network and Space Command
NOAA	National Oceanographic and Atmospheric Administration
NOC	Network Operation Center
NPDC	Naval Personnel Development Command
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
NRF	Naval Reserve Force
NRL	Naval Research Laboratory
NROC	Navy Requirements Oversight Council
NRTD	Near Real-Time Dissemination
NSA	National Security Agency
NSAWC	Naval Strike Air Warfare Center
NSCT	Naval Special Clearance Team
NSFS	Naval Surface Fire Support
NSIPS	Navy Standard Integrated Personnel System
NSPG	Navy Strategic Planning Guidance
NSSMS	NATO Sea Sparrow Missile System
NSSN	New Attack Submarine (Virginia SSN 774 Class)
NSTC	Naval Service Training Command
NSW	Naval Special Warfare
NSWC/DD	Naval Surface Warfare Center/ Dahlgren Division
NSWC/PH	Naval Surface Warfare Center/Port Hueneme
NTCS-A	Naval Tactical Command System - Afloat
NTCSS	Naval Tactical Command Support System
NTDS	Naval Tactical Data System
NUFEA-RA	Navy Unique Fleet Essential Airlift-Replacement Aircraft
NUWC	Naval Underwater Warfare Center
NWDC	Navy Warfare Development Command
OAG	Operational Advisory Group
OAS	Offensive Air Support (USMC)
OASD	Office of the Assistant Secretary of Defense
OASIS	Organic Airborne and Surface Influence Sweep
OBT	On-Board Trainer
OCA	Offensive Counter-Air
OCONUS	Outside Continental United States
OED	OSIS Evolutionary Development

OEF	Operation Enduring Freedom
OEO	Other Expeditionary Operations
OGB	Optimized Gun Barrel
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product Team
OMFTS	Operational Maneuver From The Sea
ONR	Office of Naval Research
OPAREA	Operational Exercise Area
OPEVAL	Operational Evaluation
OPNAV	Office of the Chief of Naval Operations
OPTEMPO	Operating Tempo
OPTEVFOR	Operational Test and Evaluation Force
OR	Operational Requirement
ORD	Operational Requirements Document
OSA	Open System Architecture
OSCAR	Open Systems-Core Avionics Requirements
OSD	Office of the Secretary of Defense
OSIS	Ocean Surveillance Information System
OSS	Operational Support System
OT	Operational Testing
OT&E	Operational Testing and Evaluation
P3I	Pre-Planned Product Improvement
PAC	Pacific
PACE	Program for Afloat College Education
PAS	Processing and Analysis Segment
PEO	Program Executive Office (and Officer)
PERSTEMPO	Personnel Tempo
PDM	Program Decision Memorandum
PDR	Preliminary Design Review
PFPS	Portable Flight-Planning Software
PGM	Precision-Guided Munition
PHIBGRU	Amphibious Group
PIP	Product Improvement Program, or, Pioneer (UAV) Improvement Program
PKI	Public Key Infrastructure
POM	Program Objective Memorandum
POR	Program of Record
PPBE	Planning, Programming, Budgeting, and Execution process
PPBS	Planning, Programming, and Budgeting System
PTAN	Precision Terrain Aided Navigation
PUMA	Precision Underwater Mapping
PVO	Private Volunteer Organization
QDR	Quadrennial Defense Review
QOL	Quality of Life
QOS	Quality of Service
R&D	Research and Development
RAM	Rolling Airframe Missile
RAMICS	Rapid Airborne Mine Clearance System
RC	Reserve Component
RCC	Regional Combatant Commander
RCOH	Nuclear Refueling/Complex Overhaul
RD&A	Research, Development, and Acquisition
RDC	Rapid Deployment Capability
RDT&E	Research, Development, Test and Evaluation
REPLO	Regional Emergency Preparedness Liaison Officer
RF	Radio Frequency
RFP	Request for Proposals
RL	Restricted Line
RM	Radiant Mercury (classified information sanitization program)
RMAST	Reserve Mobile Ashore Support Terminal
RMIG	Radiant Mercury Imagery Guard
RMS	Remote Minehunting System
RNSSMS	Rearchitectured NATO Seasparrow Missile System
RO	Reverse Osmosis
ROS	Reduced Operating Status
RRDD	Risk Reduction and Design Development
RSOC	Regional SIGINT Operations Center
RTC	Remote Terminal Component, or, Recruit Training Command
RWR	Radar Warning Receiver
S&T	Science and Technology
SA	Situational Awareness
SAG	Surface Action Group
SAHRV	Semiautonomous Hydrographic Reconnaissance Vehicle
SAIC	Science Applications International Corporation
SALTS	Streamlined Alternative Logistic Transmission System
SAM	Surface-to-Air Missile
SAML	Security Assertion Markup Language
SATCOM	Satellite Communications
SCA	Software Communications Architecture
SCC	Sea Combat Commander
SCI	Sensitive Compartmented Information
SCN	Shipbuilding and Conversion (Navy) [funding]
SDAP	Special Duty Assignment Pay
SDD	System Development and Demonstration (phase)
SDTS	Self-Defense Test Ship
SDV	Swimmer (or SEAL) Delivery Vehicle
SDVT	Swimmer (or SEAL) Delivery Vehicle Team
SEAD	Suppression of Enemy Air Defense
Seabee	Naval Construction Battalion
SEAL	Sea-Air-Land Naval Special Warfare Forces
SEAPRINT	Systems Engineering, Acquisition, and Personnel Integration
SEI	Specific Emitter Identification
SEIE	Submarine Escape Immersion Equipment
SELRES	Selected Reserve
SEPLO	State Emergency Preparedness Liaison Officer
SEWIP	Surface Electronic Warfare Improvement Program
SHARP	Shared Reconnaissance Pod
SHF	Super High Frequency
SHUMA	Stochastic Unified Multiple Access
SI	Special Intelligence
SIAP	Single Integrated Air Picture
SIGINT	Signals Intelligence
SIMAS	Sonar In-situ Mode Assessment System
SINCGARS	Single Channel Ground and Air Radio System
SIPRNET	Secret Internet Protocol Router Network
SLAD	Slewing-Arm Davit
SLAM	Standoff Land-Attack Missile
SLAM-ER	Standoff Land-Attack Missile-Expanded Response
SLAP	Service Life Assessment Program
SLBM	Submarine-Launched Ballistic Missile
SLEP	Service Life Extension Program
SLR	Side-Looking Radar
SM	Standard Missile
SMCM	Surface Mine Countermeasure
SNAP	Shipboard Non-tactical ADP Program
SOA	Sustained Operations Ashore
SOAD	Standoff Outside Area Defense
SOAP	Simple Object Access Protocol

SOC	Special Operations Cable, also Special Operations Craft
SOF	Special Operations Forces
SOPD	Standoff Outside Point Defense
SOSUS	Sound Surveillance System
SPAWAR	Space and Naval Warfare Systems Command
SPECAT	Special Category
SRB	Selective Reenlistment Bonus
SRC	Submarine Rescue Chamber
SRDRS	Submarine Rescue Diving Recompression System
SS	Sensor Subsystem
SSEE	Ship's Signals Exploitation Equipment
SSI	Special Structural Inspection
SSI-K	Special Structural Inspection-Kit
SSIPS	Shore Signal and Information Processing Segment
SSBN	Nuclear-Powered Ballistic Missile Submarine
SSG	Strategic Studies Group
SSGN	Guided Missile Submarine
SSDS	Ship Self-Defense System
SSK	Diesel-electric/ Advanced Air Independent Submarine
SSMIS	Special Sensor Microwave Imager/Sounder (Air Force)
SSN	Nuclear-Powered Submarine
SSO	Special Security Office
SS-SPY	Solid State- SPY (radar)
SSST	Supersonic Sea-Skimming Target
START	Strategic Arms Reduction Treaty
STEP	Standardized Tactical Entry Point
STOM	Ship-To-Objective Maneuver
STOVL	Short Take-Off and Vertical Landing
STT	Submarine Tactical Terminal
STU-III/R	Secure Telephone Unit, Third Generation, Remote Control Interface
SURTASS	Surveillance Towed Array Sensor System
S-VSR	S-Band Volume Search Radar
SWAN	Shipboard Wide-Area Network
SWATH	Small Waterplane Area, Twin Hull [Ship]
SYSCEN	Systems Center
T-AGOS	Ocean Surveillance Ship (MSC-operated)
T-AGS	Oceanographic Survey Ships (MSC/Civilian Agency-operated)
T-AH	Hospital Ship
T-AKE	Stores/Ammunition Ship
T-AO	Oiler (MSC-operated)
TACAIR	Tactical Aircraft
TACAMO	Take-Charge-and-Move-Out
TACC	Tactical Air Command Centers
TacLAN	Tactical Local Area Network
TACS	Tactical Air Control System
TACTAS	Tactical Towed Array System
TACTOM	Tactical Tomahawk
TADIL-J	Tactical Digital Information Link - Joint Service
TADIRCM	Tactical Aircraft Directed Infra-Red Countermeasure
TADIXS	Tactical Data Information Exchange Systems
TAMD	Theater Air and Missile Defense
TAMPS	Tactical Automated Mission Planning System
TAOC	Tactical Air Operations Center (Marine Corps)
TAP	Tactical Training Theater Assessment Planning
TARPS	Tactical Airborne Reconnaissance Pod System
TCDL	Tactical Common Data Link
TCGR	Track Control Group Replacement
TCP	Transmission Control Protocol
TCS	Tactical Control System, or, Time-Critical Strike
TCT	Time-Critical Targeting
TDA	Tactical Decision Aid
TDD	Target Detection Device
TDLS	Tactical Data Link System
TDMA	Time Division Multiple Access
TDSS	Tactical Display Support System
TECHEVAL	Technical (Developmental) Evaluation
TEMPALT	Temporary Alteration
TERCOM	Terrain Contour Mapping
TES-N	Tactical Exploitation System - Navy
TESS/NITES	Tactical Environmental Support System/Navy Integrated Tactical Environmental Subsystem
TFW	Task Force Web
TI	Tach Insertion
TIBS	Tactical Information Broadcast Service
TIDS	Tactical Integrated Digital System
TIMS	Training Integrated Management System
TIS	Trusted Information System
TIS	Tactical Interface Subsystem
TLAM	Tomahawk Land-Attack Cruise Missile
TLR	Top Level Requirements
TOA	Total Obligational Authority, or, Tables of Allowance (Seabee)
TOC	Total Ownership Costs
TOW	Tube-launched, Optically-tracked, Wire-guided (missile)
TPPU	Task, Post, Process, Use
TRAFS	Torpedo Recognition and Alertment Functional Segment
T-RDF	Transportable - Radio Direction Finding
TRIXS	Tactical Reconnaissance Intelligence Exchange System
TS	Top Secret
TSC	Tactical Support Center
TTWCS	Tactical Tomahawk Weapon Control System
TUSWC	Theater Undersea Warfare Commander
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Air Vehicle
UCT	Underwater Construction Team
UDDI	Universal Description, Discovery, and Integration
UFO	Ultra High Frequency Follow-On
UHF	Ultra High Frequency
UOES	User Operational Evaluation System
UNITAS	Annual US - South American Allied Exercise
UNREP	Underway Replenishment
USD/AT&L	Under Secretary of Defense for Acquisition, Technology, and Logistics
USPACOM	United States. Pacific Command
URL	Unrestricted Line
USS	Undersea Surveillance System, and, United States Ship
USSOCOM	U.S. Special Operations Command
USW	Undersea Warfare
USW-DSS	Undersea Warfare-Decision Support System
UUV	Unmanned Undersea Vehicle
UWS	Underwater Segment
UXO	Unexploded Ordnance
VCNO	Vice Chief of Naval Operations
VERTREP	Vertical (underway) Replenishment

VHA	Variable Housing Allowance
VIXS	Video Information Exchange System
VLF/LF	Very Low Frequency/Low Frequency
VLS	Vertical Launching System
VME	Versa Module Eurocard
VPN	Virtual Private Network
VSR	Volume Search Radar
VSW	Very Shallow Water
V/STOL	Vertical/Short Take-Off and Landing
VTOL	Vertical Take-Off and Landing
VTC	Video Teleconferencing
VTM	Video Tele-Medicine
VTT	Video Tele-Training
VTUAV	Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle
VVD	Voice-Video-Data
WAA	Wide Aperture Array
WAN	Wide Area Network
WDL	Weapons Data Link
WEN	Web-Enabled Navy
WGS	Wideband Gapfiller Satellite
WMD	Weapons of Mass Destruction (nuclear, biological, chemical)
WMP	Wideband Modernization Plan
WPN	Navy Weapons Procurement (appropriation)
WSC	Wideband Satellite Communications
XML	Extensible Markup Language
ZBR	Zero-Based Review

DEPARTMENT OF THE NAVY
WASHINGTON D.C.

http://www.navy.mil/navydata/policy/seapower/npg11/top-npg11.pdf