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Source of document:
HQ AMC/A6OBR (FOIA)
203 West Losey St, Rm 3640
Scott AFB IL 62225-5223
618-229-5402 or 618-229-5710
E-Mail: amca6.a6obr@scott.af.mil

HQ AMC/A55PL
402 Scott Drive (Unit 3L3)
Scott AFB IL 62225-5307
Phone: 618-229-4671
Fax: 618 256-4017
E-Mail: amc-a55pl@scott.af.mil


AIR MOBILITY
MASTER PLAN
2004
UPDATE
USAF
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U.S. AIR FORCE

HOW TO USE THE AIR MOBILITY MASTER PLAN

A description of the methodology used to develop the Air Mobility Master Plan (AMMP) is included in the Executive Summary. The following guidance describes specific viewing instructions and an explanation of the deficiency and solution database tracking structure.

Electronic Viewing

This document is designed to be viewed electronically. Subjects and items discussed are hyperlinked for viewing over the World Wide Web and from the presentation software on the CD-ROM. When viewed in a printed format, some information appears duplicative; however, this enables the electronic user to view their area of interest as a stand-alone product.

Deficiency and Solution Tracking

Deficiencies and solutions identified in Volume II of this plan are identified by tracking numbers; i.e., 04CAL050. Tracking numbers are only used to quickly identify deficiency and solution information in our Air Mobility Master Planning Database and to allow linking of deficiency and solution information to specific roadmaps. The tracking number in no way implies a command prioritization of the deficiency and solution. The tracking number is broken down as follows:

04: Year deficiency was identified (2004)
CAL: Roadmap Deficiency is located on (Cargo Air Lift)
050: Roadmap Deficiency Number

INTRODUCTION

The Mobility Air Force's Air Mobility Master Plan (AMMP) 2004 is prepared at the direction of the Commander, Air Mobility Command. It is published as a coordinated plan that reflects two years of concerted effort by all members of the Mobility Air Forces (MAF). AMMP 2004 is a capability-based plan that supports effects-based operations (EBO).

Air Mobility Master Plan 2004 has been updated as a result of lessons learned during the ongoing Global War on Terrorism. First, the Commander's Intent has been revised to show his vision for the future of air mobility. Next, we updated the weapon system roadmaps with the current status of our modernization programs. The proliferation and potential use of weapons of mass destruction is reflected in a complete revision of the Counter-CBRNE Roadmap. Lastly, the Spacelift Roadmap has been revised to better support the Global Mobility CONOPS.

There are three volumes to this plan. Volume I (Air Mobility Future Environment) and Volume II (Air Mobility Capabilities Plan) are published together here and are available on CD-ROM and on the .mil web domain. Volume III (Air Mobility Capabilities Investment Strategy [AMCIS]) is classified SECRET and is published as a stand-alone document; however, unclassified references to AMCIS are provided in this document.

Volume I, *Air Mobility Future Environment*, examines the future environment in which the MAF will conduct mobility operations. The result of this look into the future, when viewed in the context of our National and Military Security Strategies, is the formulation of required capabilities necessary to meet our nation's mobility needs now and in 2029. The foundation of our capabilities-based planning effort found in Volume I is the required mission capabilities statements for airlift, air refueling, and mission support processes. This volume explains the relationship between capabilities-based planning, EBO, and AF CONOPS.

Volume II, *Air Mobility Capabilities Plan*, builds upon the first volume. Volume II includes an overarching capabilities assessment that describes our strengths and emphasizes areas in which we need to improve. This assessment is followed by roadmaps for each mission category and support process. These roadmaps form the core of the volume and serve as long-range plans for each mission area, support process, and MAF weapon system. Each roadmap contains an assessment and milestones for reaching the required capabilities.

Volume III, *Air Mobility Capabilities Investment Strategy*, is Air Mobility Command's input to the *Air Force Capabilities Investment Strategy (AFCIS)*. AFCIS incorporates a capabilities-based approach to the Air Force resource allocation process. It focuses on developing capability options to support the Air Force Concept of Operations (CONOPS). Information gleaned from AFCIS contributes to resource allocation and annual planning program guidance.

COMMANDER'S INTENT

The Mobility Air Forces continue to perform in an outstanding manner as we complete the third year of the Global War on Terrorism (GWOT). It is truly a global war, with operations in Afghanistan, Iraq, the Philippines, and the Horn of Africa. The demands on air mobility are great but you can be rightfully proud of your outstanding efforts since the beginning of this war…the longest sustained air mobility surge since the Berlin Airlift of 1948-49. Since September 11, 2001 we deployed and redeployed nearly two million US personnel, along with their equipment, to fight the war in Southwest Asia. Through the superb partnership of the Active Duty, Air National Guard, Air Force Reserve Command forces and the Civil Reserve Air Fleet, we moved the Nation's troops, equipment, and supplies to the war in Iraq more efficiently than in any past conflict.

During the last 3 years, we were busy flying missions in support of joint operations worldwide. While actively supporting Homeland Defense activities, we also continued to fly the historical "peacetime" missions—Presidential Support, aeromedical evacuation missions, routine channels, Coronets, specialized alerts, and, most recently, hurricane relief operations. Several years ago, we scheduled 250 air mobility missions a day and that was considered a high pace—now it is common to fly over 400 missions a day with occasional spikes of 500 occurring. The air mobility system is stressed, yet it is clear that the Mobility Air Forces will be heavily engaged supporting the war effort in the future. As we do that, we also must continue to improve our mobility capabilities.

My intent remains focused on ensuring the Mobility Air Forces provide the global mobility capabilities our Nation requires today and into the future. We will remain on our established course: take care of our people, modernize our force structure, and transform our air mobility operations.

Mobility Operations in the Future Operating Environment

We have seen great changes in the international security environment since the beginning of this conflict and that trend will continue. We can expect to see rogue states, terrorist organizations, and supranational adversaries hostile to the US use widely available and inexpensive technologies as weapons against us.

Weapons of mass destruction will likely spread beyond the nations possessing them today…we must be capable of conducting mobility operations following enemy employment of chemical, biological, radiological, or nuclear weapons. GWOT highlighted the importance of base defense capabilities and the requirement for cargo-screening equipment at our aerial ports and cargo onload sites.

During the spring 2004 rotation of forces from Iraq and Afghanistan, mobility aircrews reported numerous incidents of anti-aircraft artillery and small arms fire plus the launches of man-portable air defense systems (MANPADS) against our aircraft. MANPADS remain the most serious threat to our aircraft today, and we expect them to be even more common in the future. We have to protect our aircraft and crews from these weapons, from radar-guided threats, and from the directed energy weapons under development. We will continue to equip our aircraft with the Large Aircraft Infrared Countermeasure System to counter the MANPAD threat and we will pursue situational awareness and RF countermeasures. During ground operations, our personnel must be protected from improvised explosive devices, small arms fire, and surface-to-surface rocket and mortar attacks.

We have to be prepared for asymmetrical attacks against our mobility infrastructure, airfields, and aerial ports. Communications and information systems are likely to be attacked with weapons ranging from computer viruses and worms to electromagnetic pulse weapons. Immediate threat recognition and constant Information Operations (IO) threat analysis is critical to assure uninterrupted intelligence, navigation, and communication capabilities. Mobility forces are critical to countering the anti-access and area-denial strategies of our adversaries; long-range and precision airdrops, greater use of air refueling, extended range aircraft, and direct delivery capabilities into austere locations will enable global reach and power operations. Nighttime operations have become the norm, and our aircrews and ground personnel routinely use night vision systems. It is clear that we must be able to conduct global mobility operations unhindered.

The Mobility Capabilities Study (MCS) is ongoing, and we anticipate it will validate our experience in recent years and highlight the risks associated with currently programmed mobility force structure. The world has changed dramatically since the Mobility Requirements Study 2005 was completed in January 2001. Our military strategy has been revised and our forces are much more expeditionary in nature. We are expected to defend the homeland and continuously deter aggression in up to four critical regions around the globe. The metric traditionally used to quantify airlift capacity, million ton miles per day (MTM/D), was an appropriate measurement when looking at a major theater war scenario or when determining the degree to which our Civil Reserve Air Fleet partners could contribute their critical capabilities in traditional deployments. However, the MTM/D metric appears to be less appropriate when the nature of the threat and austere operating conditions seen at forward airfields in the GWOT are considered. Today, the actual numbers of aircraft available and used day-to-day by combatant commanders around the globe gives us better insights on the capabilities required for the warfighters to be effective in their operations. In that regard, it appears that our plan to procure C-17s and modernize the C-5 fleet is the best way ahead. Our tankers were pushed hard during the war with Iraq; virtually all available KC-10s and KC-135s were deployed to the theater or were used to support combat air patrols over the continental US. It appears that the number of aircraft tails available, and the increased flexibility offered by those tails drives today's effectiveness measures for all mobility operations. The MCS should take a fresh look at the mobility challenges and frame it in the context of our operating environment. We look forward to the MCS findings and recommendations.

People

Without question, our people are, and will remain, our #1 asset. Our operations tempo has been very high for the last 3 years and it will continue to challenge us in the foreseeable future. This operations tempo cannot be maintained without the contributions and sacrifices of Active Duty, Air National Guard, Air Force Reserve, Department of Defense civilians, contractor personnel, and their families. We have done well in developing mobility's Total Force to meet the needs of the warfighters and we have established solid programs to develop and sustain our personnel. Our people and their families are vital to the mobility mission and we remain dedicated to providing the right environment in which to live, work, and grow. AMC is focused on recapitalizing and repairing our infrastructure and facilities; we plan investments worth $1.8B through 2010 to replace or renovate operations and maintenance facilities, fitness centers, and dining facilities. Medical care is improving with $30M spent sustaining and upgrading existing medical treatment facilities plus we are programming to replace three aging medical facilities to give you the state of the art medical care you deserve. We will execute three dormitory projects and the AMC family housing program will renovate or replace 6,000 homes to whole-house standards by 2007. Our Family Support Centers will continue to focus on family preparation for a member's deployment, which our high mission rate has made so commonplace. We have developed and implemented programs to better include and inform spouses and also to care for the children whose parents work late, change shifts, work weekends, or support deployments. We must take care of our people.

Modernization

There should be no question that we will continue to provide our people the very best equipment as we send them to war. Our aircraft modernization programs and transformation processes are intertwined and proving effective in improving our mobility capability. Aircraft and equipment must be adaptable, survivable, user-friendly, and efficient, but most importantly, effective. MAF aircraft will have the capability to display real-time information in the cockpit, an advanced situational awareness and countermeasures system, a secure data link, and an advanced flight management system with secure, automatic aircraft position reporting.

We need to stay on course and continue our efforts to procure more C-17s. It is an amazing aircraft, the mainstay of our airlift fleet…an aircraft that excelled in the long-range airlift role as well as in tactical operations where aircrews used night vision goggles to land at isolated landing zones along with C-130s. We have taken delivery of 126 aircraft and during the last year approved C-17 basing at five more locations: Hickam, Travis, Elmendorf, Dover, and March.

The C-130 has been proven in combat since the 1960s; we will continue on the present modernization course—retire the C-130E models and continue with the multi-year program to acquire C-130Js. We will continue to modernize the C-130Hs by completing the Avionics Modernization Program (AMP) that will standardize cockpit configurations, avionics equipment, and bring the aircraft into compliance with Global Air Traffic Management (GATM) communication/navigation and surveillance requirements.

The C-17 and C-130 have been our airlift workhorses in the GWOT, but the C-5 continues to be a critical component of the airlift fleet. This very capable aircraft plays a key role in the airlift system that we cannot afford to lose—moving large or heavy payloads over very long distances. The C-5 has been hindered by low mission reliability and maintainability rates. Therefore, we must continue efforts to improve the fleet's reliability with two modification initiatives: the AMP and the Reliability Enhancement and Re-engining Program (RERP). A recent C-5A study also suggested that, with the completion of AMP and RERP, as well as the completion of additional avionics upgrades, the C-5A can be a viable contributor towards meeting future airlift needs. Additionally, aircraft defensive systems are required to operate all our mobility aircraft in today's threat environment and will remain a high priority for us. The Nation requires the right mix of C-17s and C-5s to best meet the warfighters' needs. Given our recent combat experience, mostly off the heavily trafficked "air mobility super-highway," the C-17 provides the characteristics necessary—short field operations, survivability, flexibility, and maintainability for the warfighter.

Our tanker fleet is aging and is stretched to meet mission demands. It is clear that we should begin the process of recapitalization to avoid reliance on hundreds of 80+-year old airplanes in the future. We look forward to the results of the ongoing Analysis of Alternatives that considers new, used, commercial and military-derivative aircraft, as well as contracted refueling options. We intend to continue with modernization programs…we will complete the GATM modification program for the KC-135Rs that modifies communications, navigation, and surveillance systems to meet future global airspace requirements. We also have begun a KC-10 Aircraft Modernization Program providing additional capabilities—it will automate tasks and integrate all products and displays into an efficient package that will reduce the crew's workload.

The replacement of our 1960s vintage materials handling equipment (MHE), which is costly to maintain and hard to deploy, with Tunner and Halvorsen loaders is a cornerstone of the air mobility modernization program. Our plan to complete the acquisition of Tunners, complemented with 618 Halvorsens, will give us the right MHE mix to meet present and future global mobility capability needs.

The infrastructure on our bases is critical to the success of the mobility mission…we will continue ongoing efforts to sustain our airbase infrastructure and keep renovation funding intact. Likewise, we must continue our plan to improve the en route system (fuel hydrants, storage tanks, ramps, and runways) to provide the necessary support for the warfighters. The Rhein-Main transition program is progressing well and will result in Ramstein AB becoming the new "Gateway" in Europe. The massive construction programs at Ramstein and Spangdahlem Air Bases, will improve mobility support to Europe, the Middle East, and Central Asia.

Finally, we know global mobility operations require a solid, robust command and control (C2) capability. We continue to work hard to develop secure communications and information systems that are interoperable with all other services and with our coalition partners while integrating air traffic management systems around the world. Our communications capability must link across the Mobility Air Forces and Combat Air Forces, from top to bottom, at the strategic, operational, and tactical levels.

Transformation

As we modernize our aircraft to make them more reliable and protected from enemy threats, we need to continue to improve how we operate and the way we are organized. Information operations and information technology are key enablers but real transformation is about cultural change, not just technological innovation. The early results of our transformation efforts have been promising and there is more to come.

We have learned in the Global War on Terrorism that mission leg distances or aircraft type were not relevant when describing our mission. In Afghanistan and Iraq, we blended strategic and tactical airlift into one mission…and called it “Mobility Operations.” C-17s moved cargo and passengers over long and short distances, but also airdropped rations and landed on short assault zones in hostile territory. Our crews routinely flew with lights turned off and used night vision goggles to operate into landing zones or runways in hostile areas—tactics once used only by special operations forces. Airlift missions are flown directly into the battle area, from onloads outside the theater or from operating bases nearby. The air mobility culture is changing to one focused on warfighting and tactical operations. We have already transformed the way we conduct the Aeromedical Evacuation mission—the introduction of the Patient Support Pallet allows us to use any mobility aircraft to move our wounded or ill; no longer are we dependent on a dedicated airframe to move patients. Additionally, we have programs well underway to allow the use of tanker aircraft as relay platforms for C2, intelligence, surveillance, and reconnaissance data resulting in improved combat capability for our air and surface forces.

This year, AMC activated the 18th Air Force at Scott AFB with a streamlined command structure focused on warfighting and execution of our global mobility mission. The modernized Tanker Airlift Control Center is truly a global air operations center, with flight management systems that provide an unprecedented command and control capability. The 15th and 21st Expeditionary Mobility Task Forces provide the ability to support en route execution of our air mobility mission and allow us to produce mobility effects at the point of delivery more effectively, from airbase assessment and opening to airbase sustainment. We’re also evaluating reachback support for theater mobility operations to further leverage our mobility expertise. Our reorganization has also reformed the headquarters directorates into an A-staff structure that is relieved of working force presentation issues and is refocused on organizing, training, and equipping air mobility forces.

US military forces continue to become more expeditionary, lighter, leaner and more lethal, but also more reliant upon air mobility. In the future, our crews will use autonomous approach and landing systems to permit operations regardless of weather and independent of ground based navigation aids. This capability will dramatically increase the number of landing sites we can use and shorten deployment and sustainment timelines. It makes sense to look at a family of transport category aircraft that could satisfy multiple capability demands...variants of a common airframe could be built to complete a wide range of missions from airlift to ISR. This approach would offer standardized cockpits, engines, and systems to minimize overall developmental and life-cycle costs. Work has also begun on a study to determine the future capabilities, such as payload, range, survivability, short take off and landing, high speed cruise, and off runway operations, that a new mobility aircraft, referred to as the AMC-X, would need to be effective on future battlefields.

Global Mobility CONOPS

As an instrument of national military power, the Global Mobility CONOPS represents a collection of "transformational" Air Force capabilities designed to meet the growing challenge to rapidly deploy US military forces, including space assets. It embodies unique capabilities that support power projection across a full spectrum of political and military operations in a variety of environments while opening a base, sustaining combat needs, and supporting space-based requests. These capabilities are required to mount global mobility operations, independently or in concert with USAF companion CONOPS of Global Strike, Global Persistent Attack, Nuclear Response, Homeland Security, and Space & C4ISR. This transformation will improve the Air Force's ability to put high-quality, timely capabilities into the hands of our warfighters by shortening deployment planning time, permitting the rapid standup of forward operating locations, and seamlessly integrating mobility forces, while collectively yielding superior support to combatant commanders. In the future, these capabilities will be found in Contingency Response Groups postured to support mobility operations on short notice.

The Way Ahead

The future of air mobility is very bright and gives us the opportunity to build on the capabilities we have today. We will stay on our chosen course—beginning with the recognition that our greatest strength will reside in our magnificent airmen. We must continue to take care of our people and their families and ensure they have the best training and modern equipment to meet our Nation's air mobility needs for the next quarter century.

It is crucial that we continue to improve our combat capability. The Master Plan shows the course that we will follow to provide more effective and efficient air mobility capabilities to the warfighters. It is incumbent for each warrior, in the Mobility Air Forces, to diligently seek innovative ways to improve our support of expeditionary operations around the globe.

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JOHN W. HANDY
General, USAF
Commander

EXECUTIVE SUMMARY

Background

Air Mobility Master Plan (AMMP) 2004 is a strategic plan that is the result of two years of concerted, coordinated effort by all members of the Mobility Air Forces (MAF). This plan has evolved from earlier strategic plans—it takes a longer, and broadened, look into the future. In recognition of extended program acquisition times, this plan looks out 25 years to permit research and development efforts to be based upon the capabilities that the MAF will need to provide in the future operating environment. The plan also recognizes the importance that emerging technologies will have for mobility operations, the long range planning requirements for space mobility conducted by Air Force Space Command, and the criticality of the en route infrastructure to global mobility operations. Importantly, this is a MAF plan written by MAF members; it reflects AMC's responsibility as a lead command for mobility and its role as an advocate in other areas.

The MAF Planning Process

AMMP 2004 is a capability-based strategic plan that supports effects-based operations (EBO). This plan is based on supporting our National Security Objectives, National Military Strategy, and the guidance resulting from the 2001 Quadrennial Defense Review. It is shaped by Joint and Air Force doctrine, US Transportation Command (USTRANSCOM) planning guidance, and ensures that the MAF provides the capabilities called for in the various Air Force Concepts of Operations (CONOPS).

Warfighting commanders put effects-based operations into practice. First, they determine campaign objectives at the strategic, operational, and tactical level. Next, they select the desired effects that will allow them to attain the campaign objectives and, thirdly, employ the right mix of capabilities to create the effects desired. Mobility capabilities are generally viewed as "enabling" the warfighter to create the desired effects—the airdrop of Rangers on Grenada led to attaining the tactical objective of rescuing our medical students as well as the strategic objective of limiting Cuban expansion in the Caribbean. In some cases, mobility can be credited with causing the desired effect—airlift saved Berlin in the 1940's and, at the strategic level, directly contributed to victory in the Cold War. Simply, this plan is aimed towards providing those global mobility capabilities for future commanders to employ to meet their campaign objectives.

The Global Mobility CONOPS is a key driver for the AMMP and lays out the mobility capabilities that the MAF must provide today and into the future. To accomplish that end, the production of AMMP 2004 was based on a three-phased strategy-to-task planning process. During the first phase, or Mission Area Assessment, the MAF planning staff formulated and vetted the required mobility capabilities. This was accomplished through a thorough review of the future operating environment, the guiding documents, and technological opportunities. Next, during the Mission Needs Analysis phase, the planning staffs compared current mobility capabilities with those required to conduct future mobility operations; the shortcomings found in meeting future capability needs were identified during this process and are tracked as MAF capability deficiencies. The staff included the results of the various capabilities review and risk assessments (CRRAs) in this phase of the planning process. Lastly, during the Mission Solutions Analysis phase, the MAF identified solution sets for over 320 capability deficiencies. Today, the status of the capability solution sets can be reviewed in applicable roadmaps; some solutions are identified and are actively being pursued with procurement actions while others solutions require additional research and vetting.

Volume I - Future Operating Environment & Impact on Mobility Air Forces

There have been profound changes in the international security environment over the last two years and it is likely that the trend will continue. Mobility forces have been fully engaged in the War on Terror and played critical roles in the successful outcomes in Afghanistan and Iraq. In the future, we can anticipate that failed states, terrorist organizations, or coalitions hostile to the US will attempt to exploit widely available technologies to develop dangerous capabilities for use against us. Weapons of mass destruction will continue to proliferate beyond the 25 nations that possess them today and man portable surface to air missiles will become commonplace. Mobility aircraft and crews need to be protected from these missiles, as well as from the directed energy weapons that are now under development. The entire mobility system needs to be able to operate following the employment of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) weapons. We expect that our communications and information systems will be subject to attack in a number of ways—weapons could range from computer viruses intended to disrupt databases to electromagnetic pulse weapons that would totally disable computers, radios, and aircraft systems. We should expect asymmetrical attacks; mobility infrastructure, to include major airfields, aerial port facilities, and launch and range facilities will be a tempting target. Mobility forces are key to countering the access denial strategies of our adversaries—greater use of air refueling, extended mission range, and direct delivery capabilities will enable global operations with less dependence upon en route bases.

Mobility Air Force Capabilities

Air mobility supports the National Security and Military Strategies across the spectrum of conflict, from peacetime operations for American global interests to engagement in major theater wars. The synergy of airlift and air refueling capabilities provide the speed and flexibility in deploying, employing, and sustaining our combat forces. With America's post-Cold War force primarily continental United States (CONUS)-based, rapid power projection is essential to establishing or reinforcing a secure US or multinational presence. Air mobility delivers the bulk of time critical forces and supplies and will remain a cornerstone of America's security strategy for the foreseeable future. Responsive launch will provide the means to replace, sustain, and augment the space systems that are vital to successful military operations. As the lead command for air mobility, AMC coordinates with the other mobility air forces to provide leadership in air mobility force capability and modernization. Air mobility provides two mission areas to support national security needs: Airlift and Air Refueling. These mission areas are further broken down into unique categories of services provided: Aeromedical Evacuation, Combat Delivery, Cargo Airlift, Passenger Airlift, Special Operations, Air Refueling and Operations Plan 8044 Support (formerly addressed under the SIOP Roadmap). Spacelift, performed by Air Force Space Command (AFSPC), is a critical mobility mission and is addressed in the Spacelift Roadmap in this plan. Additional detail on spacelift and all other space-based capabilities can be found in AFSPC's Strategic Master Plan, available through AFSPC/XP, Peterson AFB, CO. Air mobility has 14 support processes that provide a foundation for the successful accomplishment of all mobility missions associated with each mission category. They range from Command and Control and Information Operations to Intelligence and Force Protection. Air mobility relies heavily upon a robust fixed and mobile en route infrastructure to execute the global mission. The en route structure relies upon all the support processes and is used to provide services such as aircraft refueling, command and control, aerial port operations, and maintenance for MAF aircraft. The AMMP recognizes that mobility operations are evolving and the support needed to conduct global operations is increasing as well. Therefore, AMMP 2004 includes Modeling, Simulation, and Analysis (MS&A), Advanced Technology, and Counter-CBRNE Roadmaps.

Volume II – Air Mobility Capability Roadmaps

Air Mobility Master Plan 2004, Volume II, contains a series of roadmaps that provide a strategic view of the steps necessary to improve our mobility capability. Several kinds of roadmaps are used in this Master Plan.

First, there are roadmaps for each mission category that are intended to provide overarching guidance on mission improvements. Roadmaps are published here for the "conventional" air mobility mission areas such as combat delivery, cargo airlift, air refueling, and aeromedical evacuation. One new mission category roadmap on spacelift is included for the first time and reflects the role that space mobility plays in the Global Mobility CONOPS. Each mission category roadmap is based upon an approved mission capability statement and contains a subjective assessment of our ability to accomplish the mission today and in 2029. Most importantly, the mission category roadmaps contain milestones that reflect the steps, organized into short-, mid-, and long-term time periods, which are needed to obtain the required mission capabilities. These roadmaps are written for use by strategic planners, industry partners, and senior leadership. They contain mission category deficiencies that remain open and associated solution sets being pursued to field the required mission capabilities.

Generally, the deficiencies and solution sets, included in the mission category roadmaps are broad in nature. The following are a few of the highlights. Mobility Requirements Study 2005 concluded that we do not have sufficient airlift capacity to meet the warfighters' needs. To satisfy that need, AMC intends to acquire more C-17 aircraft and complete the Avionics Modernization Program (AMP) and Reliability Enhancement and Re-engining Program (RERP) for the C-5. Our tanker fleet is aging and stretched to the limits. We plan on retiring the oldest KC-135Es and look to recapitalizing the fleet. It is clear that we need to modernize the remaining fleet to make it more mission-capable. Avionics upgrades to the KC-10 and KC-135 will bolster worldwide operations. During adverse weather conditions, mobility operations are limited to airfields with ground based navigation aids; autonomous approach and landing systems, using a combination of global space-based systems and on-board systems, are being pursued to permit all weather operations. All mobility aircraft will operate in harm's way thus making robust aircraft defensive systems necessary. Today, programs are established to equip some aircraft with the Large Aircraft Infrared Countermeasures (LAIRCM) system and research is ongoing to equip our aircraft with follow-on systems that will be capable of defeating emerging, even more lethal threat systems.

Next, the AMMP contains weapon system roadmaps intended to provide more detailed guidance for the specific airframe type than is contained in the mission category roadmaps. Weapon system roadmaps support the generalized guidance contained in the various mission category roadmaps and serve as the basis for Aeronautical Systems Center (ASC) developed weapon system capability plans (WSCPs), which contain more detailed information on technical integration. Therefore AMMP weapon system plans are useful for guiding operational programming actions, fleet modernization programs, and acquisition actions by AMC and Air Force Materiel Command (AFMC) headquarters personnel. The roadmaps published in the AMMP contain an assessment of airframe capabilities, applicable force structure charts, weapon system specific deficiencies and solution sets, and a program/modification funding chart. There are a significant number of modernization programs being worked today and they are discussed in these roadmaps. Three significant programs are in place to address the fact that today's C-5, C-130 and KC-10 fleets do not meet Global Air Traffic Management (GATM) requirements; the C-5 and C-130 avionics modernization programs, and KC-10 GATM modification programs are underway to solve the shortfall in capability.

Additionally, Volume II contains a Spacelift Roadmap. This roadmap identifies key space initiatives designed to ensure success of the space mobility mission. Three key space programs include the Evolved Expendable Launch Vehicle (EELV), Global Launch and Test Range (GLTR), and the

Operationally Responsive Spacelift (ORS). The Spacelift Roadmap provides additional information about each.

Volume II also contains roadmaps for fourteen support processes organized in a manner consistent with mission category and weapons system roadmaps. These roadmaps detail functional plans to improve support to mobility operations and include a support mission capability statement, a capability assessment, milestones, capability deficiencies, and specific solution sets for the specific functional area.

All support process roadmaps address key issues—three stand out as absolutely essential to increase air mobility capability for the MAF. First, very significant infrastructure improvements are underway to improve the capability of our en route system; construction projects totaling $421M will bring Ramstein AB and Spangdahlem up to standards for their increased mobility support mission. Global mobility operations require large amounts of fuel; therefore, major improvements are being made to upgrade the fuel hydrant systems and bulk fuel storage capacities at bases throughout the Pacific. Secondly, the AMMP recognizes that air mobility is dependent upon a robust command and control (C2) capability—the C2 Roadmap lays out the programs that will further communications and information technology interoperability with Joint and CAF forces and integration with global air traffic management systems. Network-centric operations, global communications, and enterprise architectures will improve command and control and ensure global tracking of assets and intransit visibility of cargo and passengers.

Lastly, air mobility must be prepared for operations following the use of CBRNE weapons. Consequently, significant effort is focused on training to conduct mobility operations in CBRNE contaminated environments, developing reliable detection equipment, protective clothing, antidotes, laser eye protection, and hardening our systems against electromagnetic pulse weapons. Advanced technology offers to significantly improve our mobility capability; AMC is working closely with the Air Force Research Laboratory (AFRL) and industry on advance propulsion systems, improved air vehicle structures, short field performance, synthetic vision techniques and autonomous approach and landing systems for mobility aircraft.

Volume III – Air Mobility Capabilities Investment Strategy

Volume III of this Master Plan contains Air Mobility Command's input to the Air Force Capabilities Investment Strategy (AFCIS) and is published separately. AFCIS incorporates a capabilities-based approach to the Air Force resource allocation process and looks out 18 years. This volume translates long-range planning objectives into funded mobility programs necessary to ensure that the MAF provides the required mobility capabilities.

1 VOLUME I: AIR MOBILITY FUTURE ENVIRONMENT

General Hap Arnold, in the years following World War II, is rightfully credited with leading the revolution in military thinking that brought air power to the forefront. His vision resulted in an Air Force that was second to none and one that served as the corner stone of our national security strategy throughout the cold war period. We still heed his guidance; today's air and space force dominates every adversary to a degree not envisioned 50 years ago. Our nation relies upon air mobility to maintain this overwhelming asymmetrical dominance over potential foes. Our challenge is to ensure we continue this dominance into the twenty-first century.

Figure 1 illustrates the integration of the Mobility Air Forces (MAF) planning process with higher-level guidance. Where possible, links to higher-level guidance used to develop this volume are provided at the end of this introduction.

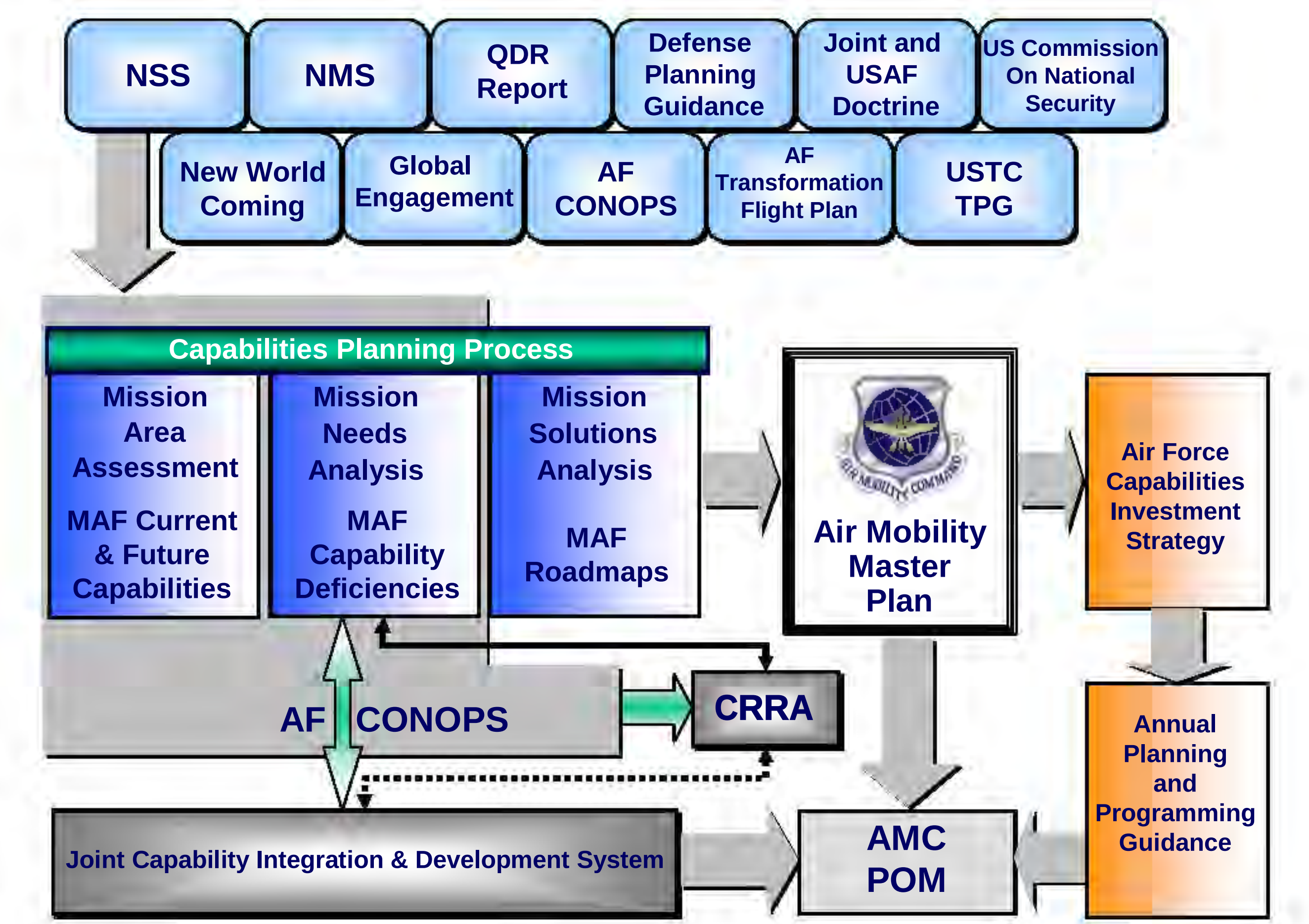

Figure 1. MAF Planning Process

Volume I describes a long-range strategic framework for the planning and programming of future air mobility forces. Based on the delineation of future security challenges found in the National Security Strategy (NSS), National Military Strategy (NMS), joint planning documents, and Air Force Strategic Plan, this volume provides guidance to planners as they chart the future of the MAF.

"Effects" of Air Mobility

We understand that air mobility operations are essential to the successful outcome of military campaigns…air mobility operations are often considered an "enabling" force used by the warfighter in achieving the desired effects. For example, air mobility enables the Global Strike CONOPS to "kick down the door" and overcome anti-access strategies of potential adversaries. Other examples abound…C-130s carry the paratroopers to the drop zones where they assault enemy forces; air refueling extends the range of attack aircraft thus allowing them to strike deep in hostile territory. We are dependent on space as well—communications and navigation satellites are key enablers of global reach and power.

The concept of effects-based airpower is exemplified, however, with the Berlin airlift—air mobility made a most decisive contribution to the Cold War and achieved a profound strategic effect. The Soviets' eventual capitulation and dismantling of the surface blockade represented one of the great Western victories of the Cold War and laid the foundation for the North Atlantic Treaty Organization—without a single bomb having been dropped. Here, airlift capabilities can be credited with actually causing the desired effect rather than being an enabling force.

Effects-Based Operations and Planning

Given the challenge of building a Mobility Air Force that can field the capabilities to meet our nation's security needs, how does effects-based operations fit into the MAF planning process? How does this all relate to the Global Mobility (GM) CONOPS?

Warfighting commanders put effects-based operations into practice: first, they must determine campaign objectives at the strategic, operational, or tactical level. Next, they determine the desired effects that will allow them to attain the campaign objectives. Thirdly, they select and employ the right mix of capabilities necessary to create the desired effects. Figure 2 depicts this relationship.

Figure 2. The Effects-Based Operation Process

First our military's highest priority is to defend the United States. To do so effectively, our military must:

- Dissuade future military competition.
- Deter threats against US interests, allies, and friends.
- Actively defeat any adversary if deterrence fails.
- Assure our allies and friends.

The MAF planning process is designed to provide air mobility capabilities to meet our National Security demands. The plan takes the required air mobility capabilities of the future, assesses our ability to actually accomplish those capabilities today, and then charts a course to solve our deficiencies. The AMMP drives the programming process that ultimately results in fielded capabilities to meet the needs of our combatant commanders. The GM CONOPS takes the fielded capabilities and integrates them into a cohesive concept of operations for global employment.

The air mobility capabilities contained in the AMMP, and employed under the GM CONOPS, serve well to meet the National Security objectives of "deterring threats against US interests, our allies, and friends" or "decisively defeat any adversary when deterrence fails." The goal of the GM CONOPS is straightforward and intended to attain those National Security objectives by providing "rapid global projection and sustainment of combat capability to support Warfighting Commanders."

The rapid projection and application of Joint US military power, via air mobility forces, have been instrumental in many past crises and will continue to be a centerpiece of GM CONOPS capabilities in the years ahead. Historically, the rapid projection of US military power has been central to creating the desired effects necessary to attain our objectives and may be similarly employed in the future. During October and November 1973, airlift delivered over 22,000 tons of war materiel to Israel from 20 different continental locations. The month-long airlift, Operation NICKEL GRASS, gave the Israeli army the means to ensure victory. American ground forces did not engage alongside Israeli troops—airlift of crucial supplies directly contributed to the successful outcome. Interestingly, airlift was the critical factor, as the war ended before the arrival of the first sealift from the United States.

The airborne assault of the island of Grenada was planned to help rescue our medical students held captive…and also effectively prevented the extension of Fidel Castro's Cuban influence in the Western Hemisphere. A decade later, the launch of 60 C-130s, loaded with paratroopers and headed towards drop zones in Haiti, helped "persuade" the corrupt government to capitulate without a shot being fired. Democracy was given a second chance on that impoverished island because of the power projection capabilities provided by our air mobility fleet.

To assist our global power projection capability, the GM CONOPS provides the capabilities necessary to open an air base in any environment, regardless of mission or aircraft types. Air mobility forces have had the capability, since our days in Vietnam, to open air bases for airlift operations. In 1995, a 621st Air Mobility Operations Group (AMOG) Tanker Airlift Control Element (TALCE) was the first Air Force unit into Tuzla Air Base (AB), Bosnia, and opened that base to facilitate the movement of US and allied forces into the Balkans. Air Force Special Operations Command (AFSOC) combat controllers operated the tower, and US Army helicopters flew from the airfield. AMC units turned airfield operations over to US Air Forces, Europe (USAFE) after the deployment was complete; our TALCE then redeployed for reconstitution and follow-on missions. The GM CONOPS will build upon those capabilities and also institutionalize air base seizure operations, command and control for all forces operating from the base, and base opening force reconstitution and redeployment procedures.

Our AMMP calls for the MAF to field improved global projection capabilities over the next 25 years. Improvements will be necessary as our military's reliance on air mobility will increase and as threats become more deadly and proliferate during the period.

There is little prospect that the demands on our air mobility forces will decrease. On the contrary, the demands are likely to increase as our nation faces threats that extend beyond the traditional rivalries of nation-states. Increasingly, nonstate adversaries are gaining the capability to threaten our interests significantly, as economic, political, demographic, and environmental pressures mount and manifest themselves in unexpected turns of events. The rapid movement of information and a ubiquitous media spotlight on events will often result in public demands for quick action. In such an uncertain security environment, flexibility will be the key capability that robust and prepared air mobility forces provide US policymakers. The essence of this flexibility is the wherewithal to move substantial forces and resources rapidly to exactly where they are needed, in response to unforeseen challenges. It is a military capacity that is unique to the US and one that must be sustained and improved upon.

Toward that end, this assessment of the future security environment highlights significant political, economic, chemical, and biological threats and social trends over the next 25 years that, when combined with military and strategic trends, gives a plausible future context for making air mobility force structure decisions. Given the long lead times for design, funding, and acquisition of weapon systems, an understanding of the future operating environment is an essential reference point for charting the course of air mobility. However, there is no crystal ball that planners can use to predict the future with certainty. Indeed, the only certainty is that there will be unexpected challenges and opportunities. Planners must, therefore, not only provide for an air mobility force that is gauged to meet the demands of specific threats and operations plans, but also one that is robust and flexible enough to be effective in unforeseen circumstances.

This volume contains three sections. The first section, *Demands of the Geo-Strategic Environment*, describes a possible future world environment. Section 2, *Geo-Strategic Impact on Mobility Air Forces*, describes overarching impacts the environment may have on MAF operations and the Air Force CONOPS approach to meeting these challenges. Section 3, *Mobility Air Force Capabilities*, identifies MAF mission areas, mission categories, and support processes. It also provides a brief summary of future environmental issues impacting all MAF operations. Section 3 concludes by identifying capabilities the MAF will need to ensure mission success over the next 25 years, in which the chemical, biological, radiological, nuclear, and high yield explosive (CBRNE) threat becomes omnipresent.

The following source documents were used to develop the AMMP:

National Security Strategy (NSS)
National Military Strategy (NMS)
Defense Planning Guidance (DPG) (Secret Document)
Quadrennial Defense Review (QDR) 2001
New World Coming
US Commission on National Security
USTRANSCOM Transportation Planning Guidance
Global Engagement, A Vision For 21st Century Air Force
AF Transformation Flight Plan
Air Force Strategic Plan, Volume 1 (NOTE: Requires password to gain access.)

1.1 SECTION 1: DEMANDS OF THE GEO-STRATEGIC ENVIRONMENT

The profound changes that have taken place in the international security environment at the beginning of this new century are unprecedented. Our nation must confront an environment that is characterized by an array of adversaries who will employ any means of attack to exploit our weaknesses. Failed states, terrorist organizations, and coalitions hostile to the US will exploit widely available technologies to develop dangerous capabilities to use against us. Of great concern is the threat posed by the proliferation of weapons of mass destruction (WMD), which gives catastrophic power to rogue states or actors bent on inflicting maximum damage to our friends, our allies, and our nation. All of these developments have important implications for the employment of air mobility forces. The fact that new, unforeseen trends will undoubtedly emerge in the coming years requires that our plans be flexible and robust in the face of uncertainty.

To confront these challenges, our National Security Strategy states, "The United States possesses unprecedented—and unequaled—strength and influence in the world. Sustained by faith in the principles of liberty, and the value of a free society, this position comes with unparalleled responsibilities, obligations, and opportunity. The great strength of this nation must be used to promote a balance of power that favors freedom."

To achieve its goals, the National Security Strategy sets forth the following path for the United States to follow:

- Champion aspirations for human dignity.
- Strengthen alliances to defeat global terrorism and work to prevent attacks against our friends and ourselves.
- Work with others to defuse regional conflicts.
- Prevent our enemies from threatening us, our allies, and our friends with weapons of mass destruction.
- Ignite a new era of global economic growth through free markets and free trade.
- Expand the circle of development by opening societies and building the infrastructure of democracy.
- Develop agendas for cooperative action with other main centers of global power.
- Transform America’s national security institutions to meet the challenges and opportunities of the twenty-first century.

To preserve the National Security Strategy, America must maintain certain abilities to respond to world changes. These include the ability to:

- Defend the homeland.
- Promote security and deter aggression.
- Fight and win our nation's wars.

To support the National Security Strategy, the US armed forces must undertake a three-part military strategy:

- Protect the United States, allies, and interests.
- Prevent conflict and deter aggression.
- Prevail in conflicts and set the conditions for security and stability that endure.

To enable the Department of Defense (DOD) to meet its demands, the 2001 Quadrennial Defense Review established the following four goals to guide the development of US forces, their deployment, and use:

- Assure allies and friends of the United States' steadiness of purpose and its capability to fulfill its security commitments.
- Dissuade adversaries from undertaking programs or operations that could threaten US interests or those of our allies and friends.
- Deter aggression and coercion by deploying forward the capacity to swiftly defeat attacks and impose severe penalties for aggression on an adversary's military capability and supporting infrastructure.
- Decisively defeat any adversary if deterrence fails.

Speed, agility, and tailored forces characterize Joint Force capabilities required to achieve the goals outlined in the National Security Strategy, National Military Strategy, and the 2001 Quadrennial Defense Review. These include the capability to:

- Apply force through precise application of military capabilities across the range of military operations.
- Sustain the force including the ability of highly mobile forces to conduct sustained operations from dispersed locations.
- Protect the force by achieving full dimensional protection.
- Achieve decision superiority—making decisions that are better and faster than the adversary.

Building upon the goals and objectives set forth in our National Security Strategy, National Military Strategy, and the Quadrennial Defense Review, this section will examine a number of enduring political, economic, and social trends that have arisen in recent years and which are shaping the international security environment of tomorrow. We will then focus on the military and strategic trends that have grown out of the broader societal trends and their implications on future planning. This section will also describe Air Force CONOPS designed to provide our nation with the airlift and airpower required to meet the challenges of our current and future environments.

1.1.1 Political/Economic/Social/Environmental Trends

This section reviews “external” demands that will affect planning in the first quarter of the new century. How these major trends will unfold and interact cannot be precisely foreseen. Uncertainty, complexity, and danger will continue to characterize the security environment. The US is a nation with worldwide interests, responsibilities, and commitments; and its military forces face an increasing number of diverse challenges. We do not know exactly who will threaten US interests, when they will strike, or what forms those strikes may take. Whatever the future environment holds, the Armed Forces must be prepared for a sordid array of possible threats ranging from conventionally equipped militaries to elusive adversaries who can employ devastating technologies. There will almost surely be surprises. However, the combination of “external” demands will have a pervasive and continuing impact on global developments and shape the future of the strategic environment.

1.1.1.1 Demographic Trends

Current demographic trends and future demographic challenges in every nation of the world will profoundly affect the security environment the United States will face in the next several decades. In the developing world, demographic changes involving uneven growth and urbanization, mixed with competition for increasingly scarce resources and sovereignty issues, will be the basis for much conflict over the next 25 years. World populations will increase by an additional 2 to 3 billion people. The vast majority of this growth (approximately 90 percent) will occur in what is now considered "developing" countries. By 2029, many of these countries will be considered "developed." Urbanization will expand; however, as countries are developed, this pattern may shift as the middle class migrates back to the country to avoid the pace of urban life. Many urban areas in 2029 will be fairly advanced. World poverty will slowly decrease. Poverty in 2029 will be around 12% compared to 30% today. However, parts of the world will experience poverty levels well above this projected average. World population growth will continue to stress resources, space, and social and political stability in many parts of the world.

1.1.1.2 Global Economic Growth and Interdependence

One of the new century's greatest potential dilemmas will be the relationship between wealth and resources. The increasing commonality of market-based economics will fuel continuing global economic expansion and foster increasing economic interdependence. Global wealth will increase sharply, but will be unevenly distributed among different regions of the world, between different societies, between different countries, and within societies. Over 1 billion people worldwide will remain mired in poverty. Global distribution of education, technology, and information will make the world's poor well aware of their relative economic status, exacerbating their discontent. Two contradictory trends will impact global economic growth and interdependence:

- Economic, technological, and intellectual forces bringing the global community together.
- Powerful forces of social and political fragmentation pulling the global community apart.

While poverty may be at the root of social turmoil in the developing world, the rise of anti-Americanism is an issue of identity politics. In many cases, support for political authoritarianism may be no more than a quest for personal security and social structure, rules of conduct, and spiritual guidance. In the Middle East and many parts of the developing world, rising economic expectations among educated youth, left without a viable future, will likely result in increased hostility against the US and US interests at home and abroad.

1.1.1.3 Global Environmental Stresses

Pressures on the environment will grow, threatening resource availability in many areas and reducing the quality of life for many people. Environmental damage, including natural and man-made disasters, may surpass the developing world's ability to cope. Environmental degradation will enhance other social and political stress as sources of instability.

1.1.1.4 Pressures on Energy and Other Natural Resources

Without the development of alternative energy sources, world energy supplies will remain largely based on fossil fuels. Energy (oil, gas, and coal) consumption will grow rapidly by 2029. Over half of the world's demand in the next 25 years will come from developing states in Asia. Two-thirds of the world's petroleum needs will be met by turbulent states in the Persian Gulf and Caspian Sea regions, highlighting their importance to US national security. While oil from the Middle East, Indonesia, and the Caspian Sea will remain important, liquefied natural gas will increase its share as an energy resource with Russia, Iran, Central Asia, Bangladesh, Myanmar, and Australia as key suppliers. Almost all countries will remain dependent on imports for at least part of their oil and gas needs.

Although the amount of available energy resources is projected to remain constant in the future, the demand for those resources is expected to increase greatly. With a growing middle class in developing countries, the demands for energy will continue to rise.[1] Oil-rich regions will remain key economic centers of gravity, with newly found reserves in volatile regions (such as the Caspian Basin) taking on increased importance. At the same time, pressures on the environment will continue to grow. Fresh water will become increasingly critical in many regions and countries. Effects such as global warming and El Nino could cause such effects as mass migrations of refugees across borders. Desperate nations could demand resources and aid from their neighbors during such emergencies.

If nations make significant resource investments to overcome the world's energy and natural resource issues, these negative trends could be negated. Significant strides could take place in developing solutions for issues such as global warming, alternative fuel, and energy and water sources.

1.1.1.5 Advanced Technologies

We live in an era of endearing and wonderful technological advancements and in a world far more dangerous than at any time in history. Throughout the ages, there has been a steady and gradual rise in the progress of technology. We have always endeavored to make our lives more efficient because we constantly press the technological bounds. Our future will be a fascinating place. If we extrapolate how technology has changed our lifestyle over the past 50 years, then the next 50 years will be the most extraordinary of all time. Manned missions to Mars, hydrogen-powered cars, automated highways, artificial organs, star travel, and 100-year lifespan are all within reach. The technology spin-off from any of these items will have dramatic effects on our daily living in the year 2050 (and yet, at the time of this writing, let’s not forget that the Air Force plans to retire the last B-52 within a few years of this mark!) Historically, the military has always been at the forefront of instigating our societal changes, as they have always led the technological revolutions of their day. From the earliest armor, to the catapult, to the cannon, musket, airplane, and the splitting of the atom, the military has revolutionized how society viewed itself, and how society attained a higher level of self-awareness. Cautiously, this rise in technical advance has always been gradually assimilated into society. Today we live in the information age—an age that has greatly accelerated the assimilation process and in retrospect, has greatly complicated our lives.

This is an age where the military is no longer the sole leader or the only developer of technology. Now, commercial developers are challenging for the lead. Where for centuries, ideas and hardware were spun off from military applications, now a home computer and the Internet can inform anyone on the latest, startling piece of information. Before the Industrial Revolution, social historians estimated that we doubled our knowledge base every 500 years. The Industrial Revolution shortened that to 50 years and now, in the age of information, we are doubling our knowledge every 5 years. We can now inform people within seconds, not months. We have become more enlightened and more aware; in the process, humans have come to expect instant gratification. We expect instant access and instant results. Our thinking is: issue, problem with issue, problem solved,…next issue. In society, as our expectations rise, so does our desire to control the issues. This has deep ramifications for the military. The military endeavors to control information that maintains US military superiority. As a result, due to this knowledge explosion, the information we cannot control will become an even larger Achilles’ heel. Thus, the information age is a double-edged sword. We live in a world where we can make exponential gains in many altruistic endeavors such as international healthcare and literacy. We also live in a world where the disenfranchised can make a small weapon in a basement that will kill hundreds, if not thousands of people, and all this because their perception is that their cause is unnoticed and their expectations go unrewarded. This is the world we live in, a world of technological marvels and a world, at times, only steps away from opening Pandora’s box. Our military must always be ready to protect this nation and our allies

[1] The world consumption of energy rose almost 50 percent between 1973 and 1993. With the estimated doubling of population in the next 40 years cited earlier, demand for energy could quadruple.

from our traditional nation-state enemies; but we also must be prepared for the emerging, new enemy—individuals who work off of personal ideology or those who lead other like-minded groups against cultural or religious targets and are bent on furthering their cause through genocide.

Further complicating these issues are rapidly changing traditional military operations. Our future operating environment will be greatly transformed from the conflicts our military participated and excelled in the latter half of the twentieth century. Gone are historical linear battle lines from past wars. The nontraditional battlefields of the future will likely be isolated pockets of conflict, each its own sub-battle of the overall engagement. Simultaneous advance, withdraw, and reattack will be coordinated through a multidimensional air and space-based command and control system. Mobility Air Forces will need to adapt to this fluid environment and shape it to their advantage.

Furthermore, America's airpower has increasingly relied upon defeating the radar threats in order to survive the battlefield. The future threat environment will degrade the advantages we have had with our present stealth investments. When it comes to combat, all of our aircraft need to be less noticeable, but not just in the radio frequency (RF) realm. Mobility aircraft need to have balanced signatures with both on- and off-board systems. We need to exploit low observables not only through structures, but also through electronics and tactics—and not only on our aircraft but also through other information support systems as well.

The MAF is truly at a transformational crossroads. In addition to a new, high-tech, rogue enemy, the traditional military-on-military strategy will drastically evolve. We see beyond the horizon the impact that nano-technology and robotics will have on military strategy and culture. Futurists will tell you that these trends are closer than one might expect. As this technology matures, it will have a significant impact on how this nation plans and prosecutes its military actions.

In short, the MAF will need to invest in technologies that will provide new capabilities for our nation to meet these troubling, unique, and diverse challenges. For the present, we must stem the tide and adapt to our troubling environment. As we learn the weaknesses of our foe, we must surge forward and transform the capabilities that are needed to maintain our mobility dominance in a rapid and forever-changed world.

1.1.1.6 The Sovereignty of States

The international system will wrestle constantly over the next quarter century to establish the proper balance between allegiance to the state, on one hand, and the desire to build effective transnational institutions, on the other. This struggle will be reflected in the debate over international institutions to regulate financial markets, international policing, and peacemaking agents, as well as several other shared global challenges. The state, as we know it, will face challenges to its sovereignty under the mandate of evolving international law and by disaffected groups, including terrorists and criminals. Serious erosion of the sovereignty of most nation-states is likely and will pose political, economic, social, and military challenges in the first quarter of this new century.

1.1.1.7 Fragmentation or Failure of States

There will be strong, continuing tension between forces of nationalism and regionalism seeking to build national cohesion and regional stability and those of competing nationalisms seeking to aggrandize or fragment existing political entities or create new ones. The weight of nationalism, citizens' distrust of their governments, and corruption could result in a failure of even some advanced states. States will struggle to take advantage of technological and economic opportunities, establish the social and political infrastructure necessary for lasting economic growth, build political institutions responsive to the needs of their citizens, and find leadership necessary to guide them through an era of uncertainty and risk.

The inability or unwillingness of failed or failing states to govern their own territory poses a grave security concern. Authorities in these states may not have the will or ability to control their borders, protect their civil infrastructure, safeguard military armaments, prevent illicit transnational activities, or deny terrorists the use of their territory as a safe-heaven or base for future operations.

1.1.2 Military/Strategic Trends and Future Implications

Military and strategic trends grow out of the societal trends discussed above. For example, the expansion of the Internet is facilitating access to advanced weapons technology by rogue governments, terrorists, and criminal organizations. A number of developments in the military sector will have a direct bearing on the conduct of future operations.

1.1.2.1 America Remains Vulnerable to Hostile Attack

The events that occurred on and after 11 September 2001 have highlighted the significant threats that groups around the world such as the al Qaeda network pose to the United States and its allies. These groups are difficult to defeat because of the clandestine nature of their organizations, their ideological appeal, and their ability to easily integrate into innocent communities throughout the world. Threats from these types of groups will continue to present a significant threat to American interests in the coming years.

Domestic and foreign terrorists will focus their attacks on America's perceived "center of gravity," American civilians, military personnel and installations, and privately owned property in the US and abroad. They may also be expected to attack the interests of our allies, eroding public support for overseas basing of US forces. Terrorist threats are likely to include weapons of mass effects as well as attacks on information systems and critical economic and social support nodes. States, terrorists, and other disaffected groups will be tireless in their pursuit to acquire weapons of mass destruction, and will not hesitate to use them against the US.

The war on terrorism has highlighted the length rogue actors may go in order to inflict harm on the US and its allies. For example, terrorist organizations in the Middle East could buy arms and/or technology in Europe using money raised by narcotics trafficking in South America. Often seemingly legitimate businesses may be used as covers for financing and/or promoting terrorist organizations. Terrorists may also use coercion against states friendly to the US or attempt to alter fragile political balances in various regions to promote their ideologies. Adversaries may attack key US assets, infrastructure and other civilian targets to terrorize populations, disrupt critical services, undermine economic prosperity, and erode our political will. To help mitigate the impacts of terrorism against America, congress established the Department of Homeland Security. Combining agencies across the federal government, the Department of Homeland Security is designed to focus its efforts on protecting American people and infrastructure from the devastating impacts of events such as 11 September 2001.

1.1.2.2 Proliferation of Weapons of Mass Destruction

The United States now faces what the former Secretary of Defense, William Cohen, called a Superpower Paradox. “Our unrivaled supremacy in the conventional military arena is prompting adversaries to seek unconventional, asymmetric means to strike what they perceive as our Achilles heel. At least 25 countries now possess—or are in the process of acquiring and developing—capabilities to inflict mass casualties and destruction.[2]” At a minimum, these weapons have the potential to delay air mobility’s movement of critical assets to the warfighter.

[2] Proliferation: Threat and Response, January 2001.

Nonproliferation of WMD is on of the greatest security challenges facing the United States. The use of WMD (chemical, nuclear, biological, radiological and high yield explosives) is also the greatest single threat to American military forces deployed in response to regional crises. Many states view the acquisition of these capabilities as vital to countering US conventional warfighting superiority.[3] The availability of delivery vehicles, especially theater ballistic and cruise missiles, is increasing despite efforts aimed at preventing their proliferation. US forces must be prepared to deal with the use of WMD delivered using a broad range of means. Recent studies have concluded the tactical ballistic missile (TBM) is the most probable means of delivering chemical weapons. An adversary could use the possession of WMD in an attempt to intimidate and impede coalition formation and solidarity; deter the granting of access to forward bases, ports, or forward deployment forces; and prevent optimum operational deployments. The ability to deter future WMD adversaries is highly uncertain, especially rogue states willing to take disproportionate risks or entities, such as terrorists groups, with little to lose and much to gain. Another difficulty in deterring WMD attacks will be "stateless terrorism" (terrorist groups working against the US from the confines of "friendly states"). Future operations will continue to require planning to operate in a WMD environment to ensure success.

Weapons of mass destruction pose an enormous challenge. Deployed forces will have to respond to the threatened use of WMD by heightening defensive postures or reorienting operations in ways that may degrade effectiveness. The actual use of WMD against our forces may result in mass civilian and military casualties and seriously stress consequence management capabilities.

Russia and China are capable of directly threatening the continental United States and both continue strategic modernization programs.[4] North Korea is building and selling long-range missiles, and has chemical and biological warfare capabilities.[5] In addition, North Korea has the capability to strike the West Coast of the United States with a long-range missile, the Taepo Dong 2. Iran, with foreign assistance, is buying and developing longer-range missiles, already has chemical weapons, and is seeking nuclear and biological capabilities.[6] Prior to DESERT STORM, Baghdad developed the largest and most advanced biological warfare program in the Middle East. Following Operation DESERT FOX, Baghdad again instituted a rapid reconstruction effort to include former dual-use chemical warfare-associated production facilities destroyed by US bombing.[7] During Operation IRAQI FREEDOM, these type facilities were once again targeted resulting in Iraq's chemical warfare capability being significantly reduced. Libya has chemical capabilities and is trying to buy long-range missiles.[8]

The relative ease of producing some chemical or biological weapons has increased concern that use of these weapons may become more attractive to terrorist groups intent on causing panic or inflicting large numbers of casualties. For example, the Japanese Aum Shinrikyo group attacked the Tokyo subway with the chemical nerve agent sarin in 1995, and reportedly attempted to carry out biological attacks in 1998.[9] Usama Bin Laden's network was at work on developing CBRNE weapons before it was degraded, and had planned to use chemical weapons during the 1993 attack on the World Trade Center. Significantly, it may be difficult to ascertain the identity of the attacker, the type of the attack, or, with respect to biological agents, whether an attack has occurred at all until days later.

[3] Chemical and biological weapons are sometimes referred to as "the poor country's atomic bomb."
[4] Proliferation: Threat and Response, January 2001, p 3.
[5] Proliferation: Threat and Response, January 2001, p i.
[6] Proliferation: Threat and Response, January 2001, p i.
[7] Proliferation: Threat and Response, January 2001, p 40.
[8] Proliferation: Threat and Response, January 2001, p i.
[9] Proliferation: Threat and Response, January 2001, p 62.

There is a growing potential for the production of new and more complex chemical and biological weapons, such as anthrax and smallpox, which are more challenging for defensive measures and medical treatment. While most of these agents exist only in the laboratory, their continued development raises the possibility of their acquisition by rogue states.

1.1.2.3 New Weapons Technologies Will Alter the Shape of Future Battlefields

The US will maintain its technological and military edge for the foreseeable future. No other nation will have the means to surpass our current lead before 2029. Many states will not be able to afford the transformation required to keep their military organizations relevant in the future. Several potential adversaries, however, will continue to pursue advanced weaponry that will complicate our freedom of action in disparate regions. The type of conflict in which this country will engage in the first portion of the twenty-first century will require military capabilities that take advantage of stealth, speed, range, accuracy, lethality, strategic mobility, superior intelligence, and the will and ability to win.

Research and development programs will lead to advances in the fields of stealth technology beyond RF detection, guidance systems, surface-to-air systems (missile and artillery), ballistic missiles, cruise missiles, space and information systems, air-to-air missiles, directed energy weapons, long-range chemical and biological detection systems, and WMD. Our potential adversaries' integrated air defense systems will modernize as associated command and control and weapon systems are developed, upgraded, and exported worldwide. Adversaries will have access to space for near-real-time intelligence and will also attempt to prevent us from exploiting our significant advantage in that arena. More technologically advanced states will continue to pursue developments in directed energy and electromagnetic pulse (EMP) weapons.

Directed energy weapons, including lasers, can be used as both impulse transmitters and flash blinders. While EMP effects are generally associated with a nuclear detonation, some radio-frequency weapons act in a similar way—using ultra-wide-band RF to emulate the electronic paralysis effects of a nuclear blast. RF weapons and lasers are likely to become significant threats by 2029.

Information technology combined with other technologies like precision guidance and tailored munitions increasingly will move to the center of military power. Digital information is becoming rapidly integrated into all aspects of military activities and will be avidly exploited by potential adversaries. An enemy could easily change the shape of the battlefield by finding ways to disrupt or destroy our ability to conduct command and control (C2).

Many states will rely on asymmetric means to counter the overwhelming conventional military capability of the US. This approach emphasizes attacking or exploiting perceived weaknesses while avoiding clear strengths. These asymmetric approaches are likely to include the use of specialized weapons, information warfare, terrorism, and WMD, possibly in combination.

1.1.2.4 Space Will Increasingly Become the Essential High Ground

Current military use of space has been limited. However, as the new century unfolds, military access and use of space as a medium will expand. The significance of access to space for the US military has already been established. As a larger percentage of the US economy takes advantage of space assets, protection of space lines of communications will increase in importance. In addition, enemies may seek to use commercial, remote-sensing and communications satellites, along with space-based timing and navigation data, to expose US infrastructure vulnerabilities to conduct asymmetric attack, as well as to target US forces with a higher degree of accuracy.

1.1.2.5 Threats From US Regional Adversaries Will Increase

The US, its allies, and friends will likely face regional powers that may use sizeable military forces for aggression or coercion to undermine regional stability. These forces can combine relatively large, capable conventional forces with more advanced systems such as ballistic and cruise missiles. Coalitions of hostile state and nonstate actors are capable of linking through global communication and transportation systems that enhance their ability to share information and weapons technology as well as coordinate worldwide activities. They may enhance clandestine activities through access to commercially available space products and services such as high-bandwidth satellite communications, high-resolution imagery of the earth, precise navigation signals, and near-real-time weather data.

The future security environment is also likely to include regional adversaries that have balanced their military modernization between developing capabilities to oppose regional rivals and countering potential US military intervention. Adversaries who are not able to compete with the US military on a force-on-force basis will seek specific capabilities that can be used to prevent, delay, or disrupt US intervention. Some will possess very advanced technology weapon systems, and will focus their efforts on asymmetric strategies against the US.

The most significant military threat the US will face from regional advisories during the next 25 years will come from WMD, including nuclear and biological weapons.

Although all types of WMD pose significant threats, one of the greatest threats is the use of aerosolized biological agents. This threat, among others, is the basis for revising existing biological defense doctrine, developing new doctrine, and implementing biological weapons defense doctrine throughout the DOD. The operational concept melds medical and veterinary procedures for safeguarding food and water and protection from vectors (living hosts) into the overall biological defense operational concept. Biological defense is organized under four principles: sense (detect), shape (construct the battlefield), shield (prevent or reduce), and sustain (restore the force).[10]

While "anti-access" strategies have historically been a part of war fighting, future adversaries, taking a lesson from the Gulf War, will focus on disrupting force deployment, beddown, and sustainment operations as the key to countering our military operations. Politically, adversaries will attempt to manipulate public opinion and pressure the governments of potential US regional coalition partners to limit their cooperation. These *information operations* will appeal to people frustrated by perceived US cultural, economic, and military dominance.

Several states will possess ballistic missiles capable of reaching the United States and its allies during this time frame. An adversary will likely view this capability primarily as a deterrent against US military intervention. States possessing very limited numbers of nuclear weapons are likely to reserve them in order to deter the US from seeking regime change as an objective in war.

Overall, we can expect future adversaries to seek asymmetric avenues of attack and expand their defensive operations in an attempt to reduce the effectiveness of USAF capabilities. These efforts will include changes in their doctrine for the use of force and practical advances in weapon systems. Offensive efforts will be focused on minimum warning attack, cruise and ballistic missiles, WMD, radar homing seekers, directed energy weapons, and special operations forces. Defensive efforts will be focused on concealment and deception, including use of underground facilities; counters to US sensors and navigation systems; and the collocation of military and civilian assets to complicate the application of US air and space power.

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[10] An Operational Concept for Biological Defense (Draft), January 22, 2003, p 1-2.

In addition, adversaries will seek capabilities that provide at least part of their military forces with the ability to engage in highly mobile, dispersed warfare presenting few targets for US air and space power to attack (non-nodal warfare). These capabilities will include Special Forces that are dispersed throughout the countryside, yet remain connected and in control of the surrounding region through the use of advanced information systems. The addition of dispersed, mobile, long-range missile systems could provide an adversary with an offensive capability without the need to concentrate ground forces and thus be exposed to US air and space power. Usama Bin Laden's network of caves in Afghanistan, Iraq's use of underground bunkers and caves, and the use of innocent civilians as "human shields" demonstrate the adversary's desire to take full advantage of natural and man-made structures to hide and shield their personnel and weapons from US and Allied detection and/or attack. Additionally, these structures are often used as bases to plan for and launch attacks against US and Allied forces.

Time will be a crucial factor in future conflicts. Adversaries will attempt to limit U.S. response by launching surprise attacks, inhibiting access to threat areas, etc. They will seek to present the US with the problem of potentially intervening with insufficient force to halt an attack, or not having essential public support to follow through after local conditions have changed to their advantage. Adversaries will seek to achieve a *fait accompli* to enhance their political bargaining position.

Historically, the United States has fought more often to protect important national interests than to wage war for survival. Adversaries will continue to exploit this fact by attempting to raise the political, economic, and military costs of US intervention to the point where they outweigh our desire to secure *less than vital* national interests. In a *limited war* environment, our center of gravity may well be identified as our political will.

An alternative future scenario that deserves special mention involves unconventional warfare. This scenario’s focus is on adversaries that have not attempted to achieve military parity, but instead have focused on developing insurgent, paramilitary, or guerilla forces. Adversaries opposing US peacekeeping, humanitarian, counterinsurgency, counter-terrorism, and counter-drug operations will attempt to wear down US resolve through a protracted conflict using whatever means are readily available.

In this scenario, an adversary will take full advantage of commercially available technologies, such as wireless communications, Global Positioning Systems (GPS), the Internet, commercial surveillance systems, and advanced small arms. Unconventional forces may operate as fish in the sea by using civilian areas to mask their operations. These forces are likely to use technologies that will permit effective operations from dispersed positions. While adversaries of this sort may not have accessible military centers of gravity, they are likely to have political and economic vulnerabilities. As a result, it will be very important to wield all the instruments of US national power in an *effects-based* campaign.

Finally, the adversary will attempt to “blackmail” the citizens of the United States through threats of releasing chemical or biological agents not only into the potential war zone, but also on the US homeland. Such actions, or even threats of such actions, may significantly “raise the bar” in convincing the populace to support military actions.

1.1.2.6 Humanitarian Crises Will Generate Growing Demands for US and Allied Assistance

Major humanitarian emergencies are unlikely to diminish in number and scope over the next several decades, and there is some evidence that they may increase.

1.1.2.7 Access to Forward Bases or Ports Will Remain Critical and Become Increasingly Risky

Forward-based forces, including permanently stationed and rotationally or temporarily deployed forces, promote security and stability, deter conflict, give substance to our security commitments, and ensure continued access. To react in an expeditionary fashion around the world, access to forward bases will continue to be a crucial force multiplier. Many potential adversaries, however, will possess arsenals of weapons with longer range and greater lethality that will enable them to attack critical installations, ports, and surface deployments in and near areas of conflict, rendering forward-deployed forces more vulnerable. This strategy will place strong emphasis on the ability to open bases expeditiously, command and control effectively, and direct mobility operations efficiently.

1.1.2.8 Small-Scale Contingencies Will Loom Larger in Planning

Small-scale contingencies (SSCs) appear likely to increase in frequency and will almost certainly become more challenging. The burden of coping with SSCs usually will be shared with allies and coalition partners. To improve our ability to conduct operations across the military spectrum, the Air Force will need to maintain access to a well-developed set of bases in key locations to allow efficient transit of power through them. With the reduction of US overseas operating locations and an increase in the reliance on mobility, it is imperative we develop a strategy to support intratheater mobility requirements. This strategy will place strong emphasis on C2 to effectively and efficiently conduct air mobility operations.

1.1.2.9 Future Force Structure Must Be Developed with the Ability to Respond to a Changing World Environment

As the new century unfolds, contingencies, calling for expeditionary interventions or stability operations, may require forces different from those designed for major theater war. Military force structure must continually be developed to respond effectively in contingencies ranging from humanitarian assistance and disaster relief, to peace and expeditionary combat operations, to providing defense against CBRNE, to large-scale, high-intensity, conventional warfare against a near peer.

1.1.2.10 Deploying Forces Will Increasingly Require Responsive Resupply and Agile Combat Support

The shift to a more rapid and decisive force projection role will require fundamental changes in the way we field and support expeditionary forces. The Global Mobility (GM) CONOPS is designed to address this challenge. The future force support system must assume little supply and equipment prepositioning, battle areas without well-defined core boundaries or rear supply areas, and nonexistent infrastructure. We must be able to deploy light forces and resupply them with speed and reliability from Day 1 to sustain operations tempo (OPTEMPO), humanitarian relief and displaced persons resettlement operations, counter drug and counterterrorism operations, nation building, peace operations, and many other types of SSCs. Once again, this strategy will place strong emphasis on C2 to effectively and efficiently direct mobility operations. Reliance on C2 will demand flexible, responsive launch to replace failed or destroyed systems, and to augment existing capabilities at the beginning of a contingency.

1.1.2.11 Crisis Action Planning Will Dominate Future Planning Operations

Future operations will be exceptionally fast-paced and diverse. The deliberate planning of the past alone will no longer suffice. Planners, operators, transporters, materiel supporters, and other mission-essential personnel must be empowered to adapt rapidly to the unexpected and to apply available resources to immediate high priorities of our warfighters.

1.1.3 Air Force CONOPS

The Air Force CONOPS is the Air Force Chief of Staff's transformation initiative that articulates how effects-based, capabilities-driven forces will support the warfighters. The purpose of the CONOPS is to make warfighting effects, and the capabilities needed to achieve them, the drivers of everything we do. The CONOPS lay the foundation for our transformation to a capabilities-based Air and Space Expeditionary Force (AEF). The CONOPS transform force presentation to theater commanders by providing tailored forces to solve problems. They also transform the allocation process by linking all planning, requirements, and programming to an effects-generated, capabilities-based construct. Bottom line—the CONOPS are about warfighting and making sure the AF "toolbox" is equipped to do the job right.

The AEF objective of the AF CONOPS is to articulate the span of challenges that the warfighters face in today's geopolitical environment across the entire spectrum of conflict and to articulate the unique core competencies, distinctive capabilities, and broad-based functions that the AEF brings to the warfighter. The objective seeks to explain how the AEF sequences those capabilities in a logical manner to provide capabilities-based Air and Space Expeditionary Forces to the joint force commander (JFC). Below is a brief description of each AF CONOPS. Additional detail is provided for the Global Mobility (GM) CONOPS.

In addition to developing the AF Capabilities CONOPS, the Air Force is building a “playbook” containing Force Modules that will allow combatant commanders to better manage their air assets, particularly in the area of opening and establishing forward air bases. The plan calls for five distinct modules (open the air base, command and control, establish the air base, generate the mission, and operate the air base) to get an air base up and running. The GM CONOPS and force module concept are complementary efforts critical to the transformation of the Air Force to a more flexible, expeditionary, and lethal force.

1.1.3.1 Global Strike CONOPS

Global Strike (GS) assesses Air Force power projection capabilities. These capabilities counter adversary anti-access systems and create conditions to enable follow-on joint force operations. The GS CRRA measures risk in the USAF's ability to counter predicted "worst case" enemy capabilities. Capability shortfall identification and solution proposals offer senior leadership a new tool ensuring the USAF invests in areas necessary to achieve and/or maintain capabilities and divest itself of unneeded capability sets.

GS focuses its assessments in the following areas: pre-conflict, initial entry and engagement, and transition to follow-on joint force operations. Pre-conflict, GS capabilities require persistent all-weather ISR monitoring adversary actions, identifying, locating, and tracking targets and threats for Predictive Battlespace Awareness. From the information gathered through these capabilities, plans will be developed and updated to counter or attack the enemy's anti-access capability. Initial entry and engagement requires low-observable or standoff capabilities supported by focused information operations. These capabilities will "kick down the door" into denied battlespace by rapidly degrading and defeating selected enemy anti-access capabilities while exploiting critical vulnerabilities. Capabilities under GS purview will be able to strike high-value targets and may be required to operate independently in an environment without robust ISR support. The initial GS strikes will create war-winning effects while enabling the Joint Force Commander follow-on operations.

1.1.3.2 Global Response CONOPS

The objective of the Global Response (GR) is to show how the Air Force will provide the nation the capability to rapidly attack fleeting or emergent, high-value and high-risk targets by surgically applying air and space power during a narrow window of opportunity. At the President's direction, these tailored CONOPS will strike single or multiple targets, without warning, anywhere on the globe within hours. GR forces can operate independently or with other joint forces and can be equipped to strike with kinetic or non-kinetic assets. The GR is uniquely distinguished by its speed and responsiveness in achieving desired effects on a limited target set.

1.1.3.3 Homeland Security CONOPS

Homeland Security (HLS) addresses three primary problem areas: 1) defending the homeland through air and space power in an interagency environment within legal and resource constraints; 2) proactive coordination with and responsive actions to requests for assistance from local, state, and Lead Federal Agencies without compromising combat mission capabilities; and 3) preserving our ability to project forces overseas in a terrorist threat environment. This CONOPS includes only those mission areas conducted within the territories of the US and its littoral waters out to 500 NM. Other AF CONOPS focus on operations outside of US territories. Missile defense is addressed; however, specific roles, missions, and budget responsibilities are yet to be determined.

1.1.3.4 Space & Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance CONOPS

The Space & C4ISR (SC4ISR) fundamental objective is to define/identify required C4ISR capabilities so the Air Force can achieve the right mix of assets to synchronize/orchestrate the execution of campaign plans at all levels of conflict and in all operational environments. C4ISR is a key contributor in the find, fix, track, target, engage, and assess (F2T2EA) process. This CONOPS seeks to enable the development of advanced C2 Battle Management, ISR, and C4I systems to conduct effective predictive battle space awareness, facilitate precision attack, and compress the sensor to shooter kill chain. Ultimately, this task force advocates the evolution of strategic, operational, and tactical capabilities that result in globally responsive and persistent forces that become the centerpiece of Joint Command and Control architectures and theater C4ISR mission execution.

1.1.3.5 Nuclear Response CONOPS

The Nuclear Response (NR) and associated CONOPS identifies nuclear warfighting effects and capabilities needed to achieve them. The NR will consist of nuclear strike forces and associated C2 planning and C4ISR functions. The NR, as a minimum, must be compatible with other CONOPS Champion capabilities and ultimately capable of integrating with the other conventional weapons-based CONOPS Champion capabilities. Unique to the NR mission and employment parameters, NR forces must also comply with DOD Nuclear Surety standards that mandate day-to-day security, safety, and reliability from development through employment.

1.1.3.6 Global Mobility CONOPS

Global Mobility (GM) supports the QDR transformation goal of global force projection and sustainment. The GM objective is to provide the regional combatant commander with the necessary planning, C2, and operations capabilities to enable rapid, timely, and effective projection, employment, and sustainment of US power in support of US global interests. The GM describes the capabilities required to rapidly plan and mount a global mobility operation—independently, or as part of a Joint or coalition effort, and defines the capabilities necessary to open a base and establish the right operational environment for conducting sustained air combat operations. The capabilities descriptions form the basis for force development planning and/or doctrine/training definition in the near and long term. GM includes airlift and air refueling capabilities as well as capabilities to operate expeditionary airfields, force protection, and spacelift.

1.1.3.6.1 Global Mobility CONOPS Primary Effects

GM CONOPS capabilities are designed to achieve a single primary effect: Rapid projection and application of joint US military power.

1.1.3.6.2 Global Mobility CONOPS Capabilities

GM CONOPS embodies the Air Force's unique capabilities that support power projection and the deployment of forces across the full spectrum of political and military operations under a variety of environments. GM CONOPS describes the capabilities required to mount global mobility operations, independently or in concert with GS CONOPS, GR CONOPS, NR CONOPS, HLS CONOPS, and SC4ISR CONOPS. Supporting capabilities between the separate CONOPS will be linked, combined, and phased through a comprehensive process and methodology managed by the Integration Champion (IC) at AF/XOR. GM CONOPS defines the capabilities necessary to open a base and establish the right operational environment for conducting sustained air operations—both combat and mobility. The capabilities descriptions will form the basis for developing force doctrine, planning, and training in the near and long term.

The capabilities that define the GM CONOPS cover a wide range of functional areas. There are five primary capabilities. Each capability in turn is divided into levels of sub-capabilities to capture a complete representation of the capability there is some duplication of lower level sub-capabilities within this construct. The five primary capabilities follow.

1. **Global C2.** Capability to manage and control the global deployment, employment, sustainment, and redeployment of forces to the supported regional commander. Includes:
   - Monitor.
   - Assess.
   - Plan.
   - Execute.

2. **Air Refueling Operations.** Includes fixed wing, rotary wing, & UAV.
   - Stage position prep & recover.
   - Range/air refuelable.
   - Access airspace & bases.
   - Survive/protect.
   - Transfer fuel.

3. **Airlift Operations.** Includes:
   - Cargo airlift.
     - Stage position prep & recover.
     - Screen cargo.
     - Onload/offload.
     - Inflight care/service.
     - Range/air refuelable.
     - Access airspace & bases.
     - Survive/protect.
     - Combat delivery operations.
       - SOF support operations.

- Passenger airlift.
  - Stage position prep & recover.
  - Screen cargo.
  - Onload/offload.
  - Inflight care/service.
  - Range/air refuelable.
  - Access airspace & bases.
  - Survive/protect.
  - Combat delivery operations.
    - SOF support operations.
- Aeromedical evacuation. Includes:
  - Stage & move patients.
  - Screen patients (devices & contagions).
  - On/offload patients to mob aircraft.
  - Critical care inflight.

4. Open and Establish Air Base Capabilities.

- Expeditionary C2.
  - Airbase Assessment & Planning. Includes pre-action initial and follow-on assessment and planning for:
    - Airfield.
    - Force protection.
    - Bio environmental/health.
    - Civil engineering.
  - Expeditionary leadership. Includes:
    - Directing forces/SA.
    - Integrating with joint forces.
    - Manage personnel.
    - Establish/maintain comm.
- Expeditionary force protection. Includes:
  - Integrated base defense.
  - Detect and identify threats.
  - Fire protection.
  - EOD protection.
  - CBRNE protection.
  - Force health protection.
  - Insertion via mult means.
  - Integration with Joint Forces.
- Expeditionary Airfield Operations. Includes:
  - Combat engineering insertion.
  - Establish runway ramp & taxiways.
  - Air traffic control.
  - Airfield management.
  - QT aircraft MX.
  - Aircraft refueling.
  - Weather forecasting.
- Expeditionary Reception and Beddown of Forces. Capability to rapidly receive, beddown, and support forces. Includes:
  - Process pax/cargo.
  - Total asset/intransit visibility.
  - Handle/store haz cargo & munitions.

  - Establish living & working facilities.
  - Health service support.
  - Vehicle MX.
  - Equipment supply accountability.

5. Spacelift.

- Spacelift C2. Capability to provide command and control of spacelift assets and operations. Includes:
  - Mission planning.
  - Space traffic management.
- Launch. Capability to lift assets above the atmosphere, routine and on demand. Includes:
  - Prepare launch platform.
  - Prepare payload.
  - Prepare launch infrastructure.
- On-Orbit Logistical Support. Capability to provide logistical support to on-orbit assets. Includes:
  - Reposition/orbit transfer.
  - Recover/retrieve from orbit.
  - Service on-orbit.

1.2 SECTION 2: GEO-STRATEGIC IMPACT ON MOBILITY AIR FORCES

The future security environment has profound implications for MAF operations. This section describes some of the overarching impacts the future security environment will have on the MAF's ability to successfully accomplish its mission in the next 25 years.

1.2.1 MAF Operations Will Increase in Variety and Scale

The MAF will increasingly support US forces that are called upon to employ weapons against adversary forces while simultaneously providing humanitarian assistance to the civilian population. This support will occur at home and abroad. The support of force employment operations and other mission tasks will result in an increase of MAF smaller scale contingency operations. In some instances, mobility forces may be called upon to support small unit operations in which it is desirable to keep the external visibility of operations small. In other cases, the MAF will be called upon to support the large-scale displacement of indigenous peoples, requiring significant airlift operations to provide humanitarian assistance in the form of food, shelter, and medical supplies.

1.2.2 MAF Will be Required to Operate in Small Logistical Footprints

Because of the threat of internal unrest, some allies may grant US forces permission to operate from their territory only if those operations have the lowest possible profile. This means US forces, including mobility forces, may have to operate without extensive support infrastructure including little or no host support. Such operations will require the use of new innovative support concepts. Deployed units must have a reliable C2 system capability with assured reachback and/or reach forward connectivity from anywhere in the world using available military and/or commercial communications.

1.2.3 MAF Critical Information System Will be More Vulnerable to Attack

As with society as a whole, the expansion of cyberspace represents both opportunities and risks for the air mobility system. Greater implementation of information technology is key to the enhanced command and control of mobility forces. In addition, new automated tools are needed to identify, prioritize, and integrate user requirements during contingencies. Intransit visibility (ITV) will be critical to making the air mobility system reliable. On the negative side, as we rely more heavily on information systems, our adversaries will see these systems as lucrative targets. Adversary activities against these systems could take the form of attacks against the systems or the data they hold, or intrusions to gain valuable information. Capabilities must be developed which will defend against attacks, allow continuous C2 systems operations during an attack, and/or influence the enemy's perception of the battlespace.

1.2.4 MAF Will be Required to Operate in a Complex International Environment

Future air mobility forces will operate in a complex international environment, interacting with, serving, and opposing an expanded array of groups and organizations. Regional organizations, such as the European Union and the Organization for African Unity, will sometimes be the source of aid requests for their members, and desire a leadership role in the execution of the aid operations. Other groups, such as non-governmental organizations (NGOs), will sometimes rush into the breach without coordinating their efforts with other players. In the past, lack of experience with these types of operations has resulted in confusing and ambiguous lines of authority and delivery delays. It may be that the MAF, as the key enabler in many of these operations, should sponsor regular exercises with the possible players to improve coordination and to clarify roles and lines of authority.

Also, there will surely be an expanded number of players on the opposing side. The nonstate groups are more amorphous and difficult to fight because they do not have clearly identifiable headquarters or sources of funding. Many of these groups are becoming allied with organized crime and drug syndicates. The result is a complex and threatening set of bad actors that will threaten future air mobility forces.

1.2.5 MAF Will Encounter Different and Deadlier Forms of Weapons Attacks

Among the most difficult strategic developments to predict is how advanced technology will be incorporated into future weapons. Kinetic energy kill capabilities, advanced anti-radiation weapons, high-energy lasers, long-range surface-to-air missiles, and lightweight interceptors are just some of the developing technologies that will influence the weapons of tomorrow. To the extent that the US takes advantage of such technology, new defensive systems for air mobility forces could emerge, such as directed energy self-defense systems.[11] At the same time, however, there could be new threats to our air mobility forces as other countries acquire and exploit innovative technologies for their own military purposes. To defend against new threats, we need to develop new tactics and countermeasures quickly. This requires a robust test and evaluation program to support air mobility forces and the forging of close relationships with research labs and industry. While assessing the impact of future weapon attacks, we must not lose sight of traditional "low tech" weaponry that can be used to further an enemy's goal of rendering US forces ineffective.

1.2.6 MAF Will Encounter Greater Asymmetric Threats

Our adversaries are likely to attempt to bypass the use of conventional forces and seek asymmetric means to attack US forces both overseas and at home. Such means could be terrorist operations aimed at high US casualties, in an effort to sway public opinion against an operation and to force a withdrawal. Chemical attacks on aerial ports of debarkation (APODs) could temporarily stall the deployment of our forces. In addition, the use of biological agents could be spread in a manner similar to chemical agents, through the use of tactical ballistic missiles. However, a biological incident will probably emerge as an isolated illness until it spreads and gains the attention of medical

[11] USAF Scientific Advisory Board, New World Vistas, Air and Space Power for the 21st Century, Mobility Vol. (1996), p. 18.

facilities such as the Center for Disease Control (CDC). Also, the spread of radioactive material through the use of conventional explosives, referred to as a radiation dispersal device (RDD), may cause widespread panic and confusion. Another type of asymmetric strategy would be information warfare attacks to sow confusion and leave our forces vulnerable to attack. Adversaries will increasingly attempt to deny MAF access to certain regions. This anti-access strategy may include forward operatives with advanced man-portable air defense systems (MANPADs) at major CONUS bases and at major transload sites, massive attacks by cruise missiles on forward bases, and a robust air defense system over the area of responsibility (AOR) precluding entry into the area of interest. With the MAF operating in such an uncertain threat environment, highly capable force protection forces will be indispensable. Without them and careful defensive security planning and intelligence, air mobility forces could be severely constrained from supporting DOD customers operating in harm's way.

1.2.7 MAF High Peacetime OPTEMPO Will Continue

Since the end of the Cold War, the trend has been toward greater use of air mobility forces in SSCs, ranging from rapid deployments of forces to Southwest Asia to humanitarian operations in Africa. Because the force has been structured chiefly to respond to major theater wars (MTWs), the resources available during peacetime to conduct SSC operations are limited. The MAF relies upon the volunteerism of the Air Reserve Component (ARC) and the Civil Reserve Air Fleet (CRAF) to conduct SSC operations. These forces become fully available when activated, albeit CRAF may be activated in three stages depending on the airlift requirement. The demands on the forces that actually are available for contingency operations during peacetime have been considerable and have begun to affect personnel retention and aircraft mission capable (MC) rates. Since these demands will likely increase in the future, analysis needs to be conducted to determine affordable ways to make greater resources available to the air mobility system during peacetime.

1.2.7.1 MAF Forces Must Be Prepared to Operate More Efficiently within the Air and Space Expeditionary Force

As a new century unfolds, the Air Force has found itself in a new operating environment. It is often being called upon to deploy forces from main operating bases to austere, relatively unprepared sites in developing countries, and to commence operations immediately. The frequency and duration of these deployments have been highly unpredictable, with resulting stresses on personnel and declines in readiness. In addition, these contingencies require forces that are highly tailored to particular situations, resulting in the use of provisional units and *ad hoc* command arrangements. AEF is the Air Force response to this new environment.

AEF addresses both the *force management* and the *force presentation* challenges presented by the new defense environment. By organizing itself into ten Air and Space Expeditionary Forces that are roughly equivalent in terms of operational capability, a combatant commander of AF forces can put together a tailored package, and present that force to the geographic combatant commander as an Air and Space Expeditionary Task Force (AETF). AETFs are comprised of air and space expeditionary wings, groups, or squadrons. In addition, by making only two of the ten AEFs eligible for deployment at any given time during steady state conditions, the rest of the force is able to conduct necessary training and personnel actions. Each of the AEFs is available for deployment during a 90-day eligibility period, rotating among the AEFs on a 15-month cycle. This force management approach is intended to improve readiness and provide more predictability and stability in the lives of Air Force personnel.

The MAF is a key component of the AEF and is being structured to fully implement this new way of operating. Deployment plans have been formulated to support the rapid movement of AEFs to forward operating bases using the full range of intratheater and intertheater airlift, air refueling, and global reach laydown (GRL) forces. Airlift and air refueling forces (C-21, C-130, KC-10, and KC-135) are available to deploy with the ten AEFs. AMC base operating support (BOS) forces are assigned to the AEFs as well, providing expeditionary combat support (ECS) to the AEF. Intertheater airlift forces (C-5, C-17, and C-141) reside outside the AEF construct and are assigned to the enabler forces, along with their associated GRL assets. They are dedicated to moving and sustaining AETFs along with all other DOD users of air mobility. (Note: C-141s are due to phase out in FY06.) The ECS requirements for GRL are drawn from either the enabler force or the currently on-call AEFs.

In “mobility-centric” operations, such as humanitarian assistance, disaster relief, and noncombatant evacuation operations (HA/DR/NEOs), the MAF may be the primary component of the deploying expeditionary forces. For HA/DR/NEO support, AMC’s lead mobility wings (LMWs) provide a trained and ready on-call force to respond to humanitarian crises, worldwide. At the request of the theater combatant commander, the LMW initial response team (IRT) deploys to the site of the disaster as the AEF’s initial responding forces, providing an on-scene assessment of airfield conditions and assisting the theater in establishing the mobility base for the flow of relief aid or the evacuation of noncombatants.

The AEF structure provides the deploying units a degree of predictability for when they might deploy, alleviating some of the stress associated with supporting overseas presence requirements. However, the mission of air mobility requires that most of our forces and personnel perform their wartime job on a day-to-day basis. In addition, we have seen the demands on the MAF increase to support the national strategy of engagement. Organizational changes are required to provide our personnel the scheduling relief and predictability akin to that envisioned for AEF-assigned forces. Accordingly, AMC planners are working with unit commanders to develop processes that will allow units to recover from surge operations and provide their people with needed relief. The AEF incorporates such a stand-down and reconstitution period following rotational duty. Air mobility unit commanders face challenges in ensuring these benefits are channeled to MAF personnel. Reassessing the organizational structure of our operational squadrons down to the flight level, for instance, may reveal opportunities for improvement in our quest for greater stability and predictability in the scheduling of our personnel. All of this must be accomplished while the air mobility system as a whole continues to meet day-to-day mission requirements. Ultimately, the mission must always come first, but the MAF is working hard to mitigate the pressures on our people, materiel, and units.

1.2.8 MAF Will Require Enhanced Force Protection and Defensive Systems to Survive in the New Environment

It may not be possible to predict exactly what will happen in the future operating environment of the MAF; however, one thing is certain: Force protection will be profoundly impacted by our changing world. MAF will face a wide range of dangers, including conventional, unconventional, terrorism, criminal, insider, environmental, WMD, civil unrest, and informational data threats. New threats, such as laser, microwave, acoustic weapons, or other high-technology weapons that adversaries may possess or have access to, may have a profound impact on future MAF operations.

It is clear that threats to our air mobility forces are proliferating rapidly. If we do not act to counter these threats, the effectiveness and freedom of movement of the future MAF could be severely restricted. The threats posed by theater ballistic and cruise missiles, chemical or biological weapons, terrorists, MANPADS, advanced radar-guided missiles, and directed energy weapons need to be addressed. Force health protection is key to ensuring the safe deployment of mobility air forces into austere or potentially hazardous areas.

The *New World Vistas* study correctly describes the most vulnerable phase of air mobility missions today as taking place in the terminal area during take off and landing. It is at this time that aircraft are most vulnerable to MANPADs, as well as small arms fire.

Interestingly, one of the most effective yet straightforward means of protecting air refuelers, airlifters, and their crews operating in proximity to hostile forces is to lower the density of the target opportunities by shifting offload operations away from major APODs to smaller airfields and dispersed locations. A greater number of dispersed locations could drive the need for a greater number of MAF airframes at a time when the overall force is being drawn down. By reducing ground times to the absolute minimum, air mobility aircraft would present a substantially reduced target signature.[12]

As the first quarter of the new century unfolds, mobility assets will be equally at risk in all levels of flight. Advanced surface-to-air missiles (SAMs) and directed energy weaponry with extreme range may make the high-level en route environment even riskier than the terminal areas in future years.

1.2.9 MAF Will Be More Susceptible to WMD Attacks

Closely related to the force protection issue is the capability to sustain operations in the face of threatened or actual use of WMD weapons. This challenge is the subject of much current investigation and analysis. Some solutions propose the employment of new concepts of operation, involving the transshipment of cargo and passengers between “dirty” theater-assigned aircraft and “clean” intertheater aircraft at secure intermediate locations.[13] Operations in WMD environments are a difficult problem, although recent studies may allow a restoration of operations (RestOps). During a chemical attack, the Air Force previously operated under the assumption that a few or even a single theater ballistic missile could produce virtual, basewide contamination, requiring personnel to conduct all operations in mission-oriented protective posture (MOPP) 4. This would result in a need to shift operations to a transload base and initiating a complicated clean-to-dirty transload operation. Following three years of analysis and testing, it was concluded that only a portion of a base would probably be contaminated, and that it would be possible to have sectors of the base at different MOPP levels. Furthermore, it was determined that the resumption of operations, after a chemical attack, could be measured in hours and days as opposed to weeks or months under the previous concept. Based on this new understanding and comprehensive research, it is possible to return to near normal sortie generation in a much shorter time frame. Although “Operational Decontamination” can be accomplished quickly, in order to minimize contact and transfer hazards to sustain operations, “Thorough Decontamination” permits operations with minimum degradation. However, to achieve “Reconstitution”, or full operational readiness implying unrestricted use of the base/equipment, still requires national and international agreement. The exterior of the aircraft, however, may be substantially decontaminated simply with the flow of air over the surfaces during flight. Some industry experts have proposed that a partial solution may involve installing systems to maintain a flow of decontaminated air out of the aircraft while it is on the ground, to prevent contamination of the interior. Other proposals involve “air curtains” to keep out contaminated exterior air. It may be that systems such as these, combined with long-range detection equipment, and new procedures and concepts of operation, could serve to address the WMD threat. However, much additional research and study are urgently needed.

1.2.10 MAF Operations Must Become Airfield Independent

It has been long recognized in the air mobility community that the chief limiting factor on deployment operations is usually not the number of available aircraft or crews, but is the capability of the

[12] Some industry experts have proposed that standard ground times of less than five minutes should be a feasible goal for even large loads.
[13] Chow, Brian G., et al., Air Force Operations in a Chemical and Biological Environment, RAND, Santa Monica, CA, 1998, p.110.

en route or destination infrastructure to accommodate the ground operations of airlifters and air refuelers. To the extent that future air mobility forces can bypass the need for en route support, or become more independent of theater-basing structures, the effectiveness of the air mobility system will be greatly expanded.

1.2.11 MAF Must Support Operations Requiring Unpredictable and Demanding Responses

Whether hunting down terrorists overseas or defending US interests at home and abroad, responsiveness will be required in order to meet the challenges of the future environment. For example, SOF and combat aircraft must arrive quickly to be effective against elusive, fleeting targets. Similarly, the air defense of critical facilities in the homeland will impose demanding timelines on combat aircraft and mobility forces such as tankers. Even relief efforts to aid affected civilian populations must arrive rapidly to be most helpful. The lack of predictability associated with these operations may stress mobility forces in different ways than other operations of the past.

1.2.12 MAF Success Will Rely on Greater Commonality with the Commercial Sector

Promoting greater compatibility with commercial systems and procedures, while still meeting military requirements, will greatly enhance future opportunities for cost savings and commercial augmentation of the MAF. The opportunities look particularly promising in the area of cargo handling. Currently, the military 463L pallet system and the commercial International Standards Organization (ISO) container configuration are incompatible. Additional cargo handling and delays inevitably occur when cargo must be transshipped between the military and commercial air cargo systems. If the military system could work to develop a more commercially compatible operation, the efficiency of not only the air mobility system, but also the entire strategic mobility system would be substantially improved. Military air cargo would become more compatible with not only commercial air cargo, but with commercial ground and sea transportation systems and Army, Navy and Marine transport systems as well.

1.2.13 MAF Forces Will Require Advanced C2 Capabilities

Air Mobility Command's (AMC's) goal is to provide rapid global projection and sustainment of combat capability to support warfighting commanders at a level that ensures "unprecedented responsiveness" to the Defense Transportation System (DTS). In order to rapidly deploy US forces and initiate operations at remote, bare bases around the world, AMC must dynamically command and control forces by delivering decision-quality information to the hands of commanders and warfighters.

Today, AMC does not have assured instantaneous communications with all MAF aircraft around the world. It is currently pursuing the mobility for the twenty-first century (M21) integration project. M21 is a comprehensive AMC business process and C2 enterprise architecture modernization effort. It is supported by the three pillars of seamless process, seamless systems, and assured connectivity. M21 will revolutionize the command's business processes and C2 data flow connectivity, data processing, data base management, and information display capabilities, positioning the command for more efficient and responsive air mobility operations in the twenty-first century.

M21's vision is to create an environment that facilitates global connectivity among AMC and all MAF mission aircraft, the CRAF aircraft, and CRAF carrier operations control centers (OCCs), regardless of location or mission.

Improved and secure C2 will be critical to the survivability and force protection of air mobility forces, since crews will be able to obtain the latest intelligence information on threats en route and at forward destinations. Another aspect of improved C2 will be better ITV of all personnel, units, and equipment being deployed. This is an important goal of the air mobility system, since with near-perfect ITV, commanders will use limited air mobility resources more efficiently. As the Air Force relies more heavily on the MAF to implement AEF, advanced robust and secure C2 capabilities will be absolutely essential to ensuring the needed levels of mission reliability, flexibility, and survivability in the future operating environment.

1.2.14 MAF Planning Will Be Profoundly Impacted by Changing Customer Requirements

Another important consideration for planning air mobility forces is how our joint customers intend to fight in the future. We have already considered some of the needs of one customer—the future Expeditionary Air and Space Force. The Army also has a vision for its future forces, called Force XXI.[14] With this concept, the Army is envisioning a force of extraordinary agility and maneuverability. Force XXI will seek to employ forces in a very dispersed mode, with highly mobile smaller units operating throughout the depth and breadth of the battlespace. This will serve to both reduce the vulnerability of the force and improve overall combat effectiveness. Weapons will be massed against the enemy, in preference to the physical massing of units.

To support such a future force, the Army believes that an advanced theater airlifter is needed; using sophisticated short-field take off and landing capabilities or tilt-rotor technology. Low-observable aspects may also be incorporated to enhance battlefield survivability. Some versions of the aircraft envisioned by designers would be able to land a 30-ton load in an area 500 to 750 feet long.

Future SOF mobility will also require an advanced infiltration/exfiltration/resupply aircraft (MC-X) capable of delivering and recovering special operations forces and equipment deep in hostile airspace. The MAF future advanced theater airlifter will likely require additional modifications and capabilities to produce an aircraft which can execute the Air Force Special Operations Force (AFSOF) mobility mission. These additional modifications and capabilities could include enhanced speed and range, upgraded threat survivability, adverse weather systems, and the ability to conduct covert and clandestine missions.

Another possible way that smaller dispersed Army forces will be resupplied is with a precision airdrop capability. AMC is currently developing a mission needs statement for such a system. It is conceivable that in the future the MAF will have a capability to precision airdrop single pallet-size loads of up to 2,000 pounds from an altitude up to 20,000 feet. This would be well above the range of small arms and most MANPADs. The Air Force 2025 study envisions that the precision airdrop system would be guided by the GPS, when available, and would have an accuracy of within ten meters.[15] Such a concept would allow the safe resupply of dispersed ground combat forces in some nonpermissive environments.

Capabilities of this kind would revolutionize concepts of resupply and theater airlift. Thousands of additional assault zones could become available in a theater of operations, allowing supplies to be delivered almost directly to engaged forces. Advanced command and control and space-sensing capabilities would allow candidate landing sites to be identified and selected in near real time, with threat sensor data integrated to enhance survivability. When developed, this enhanced C2 technology will be fully protected at both its primary operational and recovery/reconstitution operational sites. This is essential to the function of C2 as a weapons system. The MAF will need to consider possible changing customer requirements, such as these, when identifying solutions to meet future mission needs.

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[14] US Army, Force XXI Operations, TRADOC Pamphlet 525-5, 1994.

[15] Fellows, Local James A., et al., Airlift 2025: The First with the Most, Air Force 2025, 1996, page 8.

The effects and capabilities described above will increasingly rely on space-based systems to enable rapid mobility, precision airlift, and global presence. As adversaries develop capabilities to challenge US space superiority, it will be critical to replace, sustain, and augment the existing space assets in both a preplanned, routine manner and flexibly on demand.

1.2.15 MAF Operations Will Be Profoundly Impacted by Advances in Technology

Mobility Air Forces must adapt to fluid peacetime and wartime environments and shape them to our operational advantage. To ensure mobility dominance in this rapid and forever-changing world, the MAF must invest in advanced technologies that provide the capabilities required to support our nation's national security and national military goals and objectives. Advanced air mobility technology concepts are explained in detail in Volume II of this plan.

1.3 SECTION 3: MOBILITY AIR FORCE CAPABILITIES

To describe the MAF's strategy for coping with the future environment, this section begins with a description of the air mobility's mission areas and mission categories and support processes. After describing each, a brief summary of future environmental issues impacting all MAF operations will be provided. Lastly, future capability statements will show specific capabilities each mission category and support process will need to have for the MAF to be ready to operate in this future environment. The capabilities include all those identified in the GM CONOPS plus other critical support capabilities the MAF must plan for to ensure it can meet the requirements of the Air Force CONOPS and other DOD air mobility mission requirements. Taken together, the capabilities identified, comprise a total picture of what the MAF needs to operate successfully over the next 25 years.

1.3.1 Mission Areas and Categories

As shown in Figure 3, air mobility supports the National Security Strategy and the National Military Strategy across the spectrum of conflict, from peacetime operations for American global interests to engagement in major theater wars. It is the synergy of combining airlift and air refueling capabilities that provides the speed and flexibility in deploying, employing, and sustaining our combat forces. With America's post-Cold War force primarily CONUS-based, rapid power projection is essential to establishing or reinforcing a secure US or multinational presence. Air mobility delivers the bulk of the initial time-critical forces and supplies and will remain a cornerstone of America's security strategy for the foreseeable future. Air mobility is an integral part of power projection, force sustainment, and operations other than war.

Air Mobility Command identifies its unique mission areas by virtue of its organization, training, and equipment. As the lead command for air mobility in the USAF, AMC coordinates with the other mobility air forces to provide the leadership in air mobility force capability and modernization. Air mobility provides two mission areas to support national security and national military goals: airlift and air refueling. These mission areas are further broken down into the unique categories of services provided. The categories include aeromedical evacuation, combat delivery, air refueling, cargo airlift, passenger airlift, special operations support, and OPLAN 8044 support.

Spacelift, performed by Air Force Space Command (AFSPC), is a critical mobility mission. AMC and AFSPC are exploring the possibility of adding a spacelift mission area to a future update of our plan. Until then, additional detail on spacelift and all other space-based capabilities can be found in AFSPC's Strategic Master Plan, available through AFSPC/XP, Peterson AFB, CO. AMC has worked with AFSPC to develop a mobility spacelift roadmap. Spacelift is also integrated into the Global Mobility CONOPS.

Figure 3. Air Mobility Mission Categories

1.3.1.1 Airlift

Air mobility's airlift operations include cargo airlift through conventional or combat delivery means, passenger airlift, to include aeromedical evacuation, and special operations. Powerful C2 capabilities are necessary to make the air mobility mission work. (C2 capabilities are explained in detail in our support process section of this document.)

1.3.1.1.1 Cargo Airlift

Cargo airlift is the airlift of supplies and equipment whose urgency or nature cannot wait for surface transportation. This includes hazardous materials, equipment too large for normal civilian aircraft, and the time-critical equipment and supplies that must be available to the warfighters before the first ships arrive. Air cargo is categorized as follows:

Bulk: General cargo, typically preloaded on 463L pallets (108 inches by 88 inches, 104 inches by 84 inches usable space) or containers and transportable by common cargo aircraft.

Oversize: Cargo in a single item that exceeds the usable dimensions of a 463L pallet of 108 inches long by 88 inches wide by 96 inches high in any dimension.

Outsize: Cargo exceeding the capabilities of C-130/C-141 aircraft and requiring the use of a C-5 or C-17 aircraft. It is cargo that exceeds 810 inches long by 117 inches wide by 105 inches high in any dimension.[16]

Rolling Stock: Equipment that can be driven or rolled directly into the aircraft cargo compartment.

Special: Items requiring specialized preparation and handling procedures, such as space satellites or nuclear weapons.

1.3.1.1.2 Combat Delivery

Combat delivery is the insertion or delivery of personnel, equipment, and supplies by means of airdrop or airland delivery in direct support of combat operations. Airdrop is accomplished by high-altitude low-opening (HALO) and high-altitude, high-opening (HAHO) parachutes, low-velocity personnel airdrops, low- and high-velocity container delivery system (CDS) airdrops, and heavy equipment airdrops. Airland delivery involves landing on semi-improved or austere airfields and can include forced-entry options and combat resupply of engaged troops.

Many of the Army forced-entry concepts rely heavily on air mobility's combat delivery capability. Strategic brigade airdrop (SBA) is a specialized form of combat delivery that includes airdrop and airland insertion of a brigade-size complement of equipment and combat personnel over great distances. This capability supports the JCS requirement for an immediate response to deploy en masse airborne forces to combat zones throughout the world. SBA uses the concept of air direct delivery. Joint Publication 4-01.1 defines air direct delivery as, "The strategic air movement of cargo or personnel from an airlift point of embarkation to a point as close as practicable to the user's specified final destination, thereby minimizing transshipment requirements.[17]" It allows the insertion of combat forces directly into battle or provides immediate resupply in areas where forcible entry is required. Direct delivery is preferred for forward operating forces in need of quick supply and for combat forces seeking the element of surprise and/or superior maneuver.

1.3.1.1.3 Passenger Airlift

Passenger airlift includes airlifting combat and support personnel, unit rotations, and movement of the President and senior government or executive personnel. During contingencies, troop movements must be carefully synchronized to arrive in theater with their prepositioned or sealifted equipment. Special air missions (SAM) use specially configured aircraft with extensive air-to-ground communications to support the President and Vice President of the United States, cabinet members, congressional delegations, and other senior statesmen. These missions are time-critical, often classified, and frequently require operations at civilian airports. In addition to SAM, operational support airlift (OSA) provides wartime movement of cargo and passengers in support of high priority operational requirements, as well as peacetime training for new pilots and priority airlift of key decision makers.

1.3.1.1.4 Aeromedical Evacuation

Air Force aeromedical evacuation (AE) is a specialized airlift mission, providing fixed-wing movement of patients requiring supervision by AE personnel to locations offering appropriate levels of medical care. The AE system can operate as far forward as fixed-wing aircraft are able to conduct air/land operations. The Air Force remains the executive agent (per DOD Directive 4500.9)

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[16] DOD 4500.9-R Defense Transportation Regulation Part II Cargo Movement (Dec. 2000). Page xlviii Oversize & Outsize definitions.
[17] Joint Publication 4-01.1, Joint Tactics, Techniques and Procedures for Airlift Support to Joint Operations (20 July 1996). Chapter III, page III-8.

with AMC serving as the lead command (per AFPD 10-21) for aeromedical evacuation. The new deployable aeromedical assets are light, lean, and capable—transitioning from the 50-bed mobile aeromedical staging facility (MASF) of 39 personnel and 7 C-130 loads to an aeromedical element with incremental packages (AE liaison team, critical care air transport teams, MASF, and MASF augmentation) as needed for a total of 42 personnel and 13 pallet loads. This "early in" and limited footprint concept dovetails with the Army's reduction of forward-deployed medical units and the need to now airlift stabilized versus stable patients.[18] "This 'targeted medical capability' cannot be achieved without full integration of air evacuation into the airlift command and control network.[19]" The new AE peacetime and wartime system will utilize established mobility air routes/air bridges versus scheduling separate missions. Instead of maintaining strategic and tactical trained aeromedical crews, 'multi-role' or 'multi-capable' AE crews will now fly aboard 'multi-purpose' airframes transitioning from 'dedicated' to 'designated' airframes. The new thinking is: "Train as We Fight—Fight as We Train!"

1.3.1.1.5 Special Operations

This mission provides specialized strategic airland/airdrop to special operations forces for joint/combined training, contingencies, war, operations other than war, and other missions, as directed by the President and the Secretary of Defense or their duly deputized alternates or successors. Air mobility is tasked to support the special operations mission in the Defense Planning Guidance. Special operations missions may be covert, clandestine, or overt. Air mobility maintains a limited capability to augment special operations missions through the insertion, resupply, or extraction of special operations forces. This capability augments United States Special Operations Command (USSOCOM) with greater range, speed, and lift capabilities than inherent in their own command-assigned aircraft.

Aircrews designated for the special operations mission receive special training in mission planning and tactics, and they must be capable of operating in a self-sustaining mode for extended periods if necessary. A limited number of airlift crews (special operations low level [SOLL] II qualified) receive training in unique procedures that enhance their ability to conduct special operations (landings, tactical onloads and offloads, forward air refueling, and airdrop) at night in a minimum illumination environment. An additional limited number of air refueling crews (special operations air refueling) also receive training in NVG operations and unique procedures that enhance their ability to conduct special operations (specialized air refueling of other special operations aircraft) at night in a minimum illumination environment.

1.3.1.2 Air Refueling

Air mobility's air refueling operations include deployment, employment, and sustainment operations and support for the nation's OPLAN 8044.

1.3.1.2.1 Air Refueling Tankers

Air refueling tankers allow for rapid deployment of fighters, bombers, transports, and combat support aircraft. This force extension capability enhances force projection by decreasing reliance on staging bases and host-nation support, while accelerating the deployment of combat forces to the theater of operations. Additionally, air refueling increases payload capability for long-range missions by minimizing the necessity to trade off cargo for fuel.

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[18] Brfg (U), Brig Gen Bruce Green, AMC/SG, "Aeromedical Evacuation . . . CONOPs for the Future," ca 31 May 02, E-Sup Doc 4-X; Point Paper (U), AMC/XPD, "Aeromedical Evacuation Doctrine," 15 Oct 02, Sup Doc 4- ; Brfg (U), AMC/DOOE, "Aeromedical Evacuation . . . Today & Enduring Freedom Predeployment Brief," 20 Nov 02, E-Sup Doc 4-.

[19] Article, (U), MSgt Karen Petitt, "Air Mobility Command Medevacs Patients Quickly With Streamlined Process," AMC News Service, 9 Apr 02, Sup Doc 4-.

Combat air forces rely heavily on air refueling during deployment, employment, and redeployment operations. Air refueling is a force enabler, expanding both the reach and power of combat forces. This support may include long-range air refueling of strike forces coming from outside the theater or enabling in-theater aircraft longer range, loiter, or multiple mission capabilities. Operations may require nonstandard formations and be conducted in an emission-controlled (EMCON) or CBRNE environment. It is the employment role that generates the majority of today's air refueling requirements.

The air refueling of joint, multinational, or special operations aircraft is distinguished by the customers' unique requirements. Successful mission completion requires special equipment, specialized crew training, and modified operational procedures. Examples of this task are refueling support for allied aircraft of a multinational coalition or the Navy's requirement for land-based tankers to support carrier task forces. Increasing USAF air refueling support of naval fighters allows DOD savings through a reduced need for carrier-based tankers, while increasing the combat radius of carrier task forces. USSOCOM requires that aircrews be SOAR qualified, able to work within a nonstandard command and control network, use mission planning systems peculiar to special operations forces, operate under EMCON conditions, and use nonstandard night operations.

1.3.1.2.2 OPLAN 8044 Support

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1.3.1.2.3 Strategic Brigade Airdrop Air Refueling Support

Strategic brigade airdrop is a specialized form of combat delivery, which includes airdrop and airland insertion of a brigade-size complement of equipment and combat personnel over great distances. Second only to OPLAN 8044, this is the largest commitment of tankers to a single strategic mission. This capability requires significant numbers of mobility airlift assets to fly worst-case, significant distances. Significant numbers of mobility tankers will be required to support the combat delivery missions during multiple large formation and single-ship refuelings en route to the drop zone (DZ) and forward landing zone (FLZ). Additionally, significant airspace will be required; complex formation air refueling procedures will be executed; and the SBA is an adverse weather capability. Refuelings are also expected to be required from the FLZ en route to the recovery base. The lack of prior knowledge of objective areas minimizes the ability for deliberate mission planning for a complex mission. During increased readiness levels, units must be ready for short-notice launch.

1.3.2 Air Mobility Support Processes

Air mobility support processes, as depicted in Figure 4, are those activities that provide a foundation for the successful accomplishment of all of our missions. Although essential for operations, support processes are not mission categories by themselves. They enable us to accomplish all missions associated with each mission category. They require talented and dedicated professionals trained to task at all levels of the MAF. There are eleven fundamental air mobility support processes essential to the accomplishment of the air mobility mission. Global En Route Support encompasses all AMC operations.

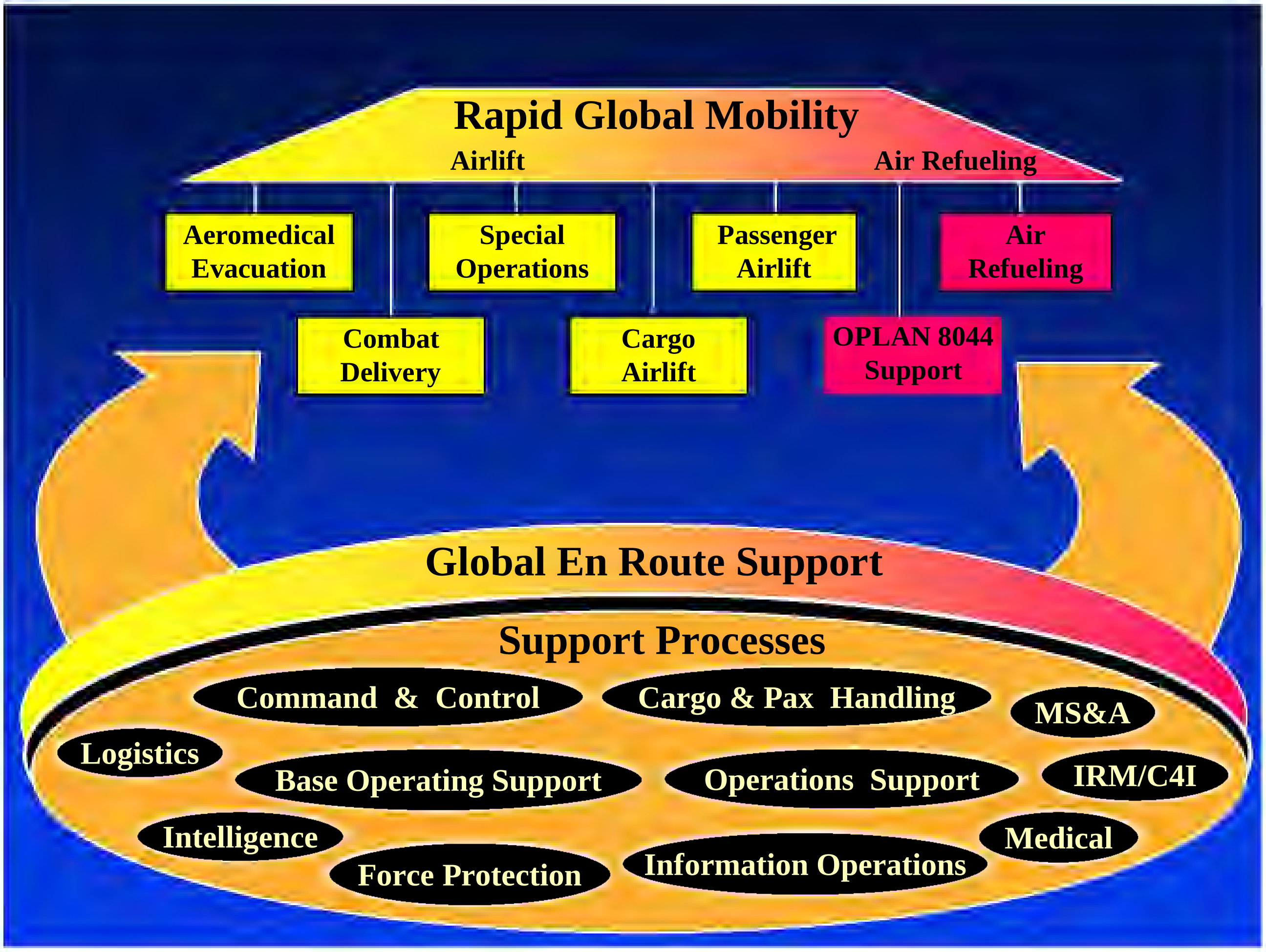

Figure 4. Air Mobility Support Processes

1.3.2.1 Global En Route Support

Global En Route Support (GERS) sustains worldwide mobility operations through 13 established, robust, strategically located en route bases. These bases enable mobility operations and deployable mobility assets/personnel capable of rapid response to open and operate austere, bare-base locations to assist forward air mobility expeditionary airfields. GERS must be capable of supporting operations across the full spectrum of conflict day and night, in adverse weather and in CBRNE conditions. GERS includes the ability to provide services such as aircraft refueling, air mobility command and control, aerial port operations, and MAF aircraft maintenance.

1.3.2.2 Information Resource Management/Command, Control, Communications, Computers and Intelligence Systems

Information resource management (IRM) is the process of managing information resources to accomplish agency missions. The term encompasses both information itself and the related resources, such as personnel, equipment, funds, and information technology. IRM ensures that the right information is available in the right format, to the right place, at the right time, assuring mission success across the spectrum of operations. IRM is central to the ability to carry out operational tasks and is absolutely essential for the proper management of resources worldwide.

Command, control, communications, computers and intelligence (C4I) systems are becoming increasingly vital to the day-to-day global reach mission. The physical operations environment of C4I systems applies to all echelons of command (fixed, deployed, and airborne), and they cover the full spectrum of conflict between and within theaters. C4I systems provide global command and control; intransit visibility; voice; office information systems applications and e-mail; and visual information for mobility operations and our customers. Achieving our target architecture will provide instant access worldwide to all information (air and ground).

1.3.2.3 Information Operations

Information operations (IO) are defined as actions to deny, exploit, corrupt, or destroy the enemy's information and its functions; protecting ourselves against those actions; and exploiting our own military information functions. The ultimate goal of IO is information superiority and preeminent situational awareness to seize and maintain the tactical and operational initiative, influence the enemy's actions, and induce operational paralysis while denying the adversary the ability to do the same.

Under the M21 umbrella, important interfaces that currently exist between functional specialties—for example, maintenance and transportation—must be further strengthened to support the increasingly intense OPTEMPO that will be experienced as the MAF moves to increase the overall velocity in which aircraft move through the Defense Transportation System.

1.3.2.4 Command and Control

Command and control (C2) gives decision makers force management capability by providing two-way connectivity between customers, MAF, and its global forces executing worldwide missions. C2 systems collect, analyze, and disseminate aircrew, mission planning, and execution data, as well as information on maintenance and logistics, passenger and cargo loads, intelligence, weather, air traffic control, and other support requirements. The global nature of air mobility and the need to provide USTRANSCOM adequate visibility over MAF operations define C2 requirements. High-speed, integrated, seamless, secure (when required), interoperable voice and data communications capability and computer systems are essential. They allow users/operators to fuse data and permit improved information to provide enhanced situational awareness for C2, operations, weather, intelligence, logistical, and aeromedical activities. Enhanced C2 is crucial to successfully completing the M21 integration project. Data integrity is crucial to enhancing C2.

1.3.2.5 Intelligence

Intelligence is carefully assessed information on potential hostile capabilities, activities, or intentions. It is collected, interpreted, and disseminated to assist the planning and execution of rapid global mobility missions in peace and war. Intelligence analysts blend data into daily assessments to determine or anticipate global "hot spots" and humanitarian relief situations. They also provide in-garrison and deployed unit intelligence personnel with the situational awareness required to support mission planning, execution, battle management, and force protection.

1.3.2.6 Logistics

Logistics includes aircraft maintenance, supply, transportation, logistics plans, and contracting functions necessary to support all air mobility operations. Aircraft maintenance activities keep aircraft in operational condition by inspecting, repairing, and servicing airplanes before and after flight operations. Routine and preventative maintenance is critical to the long-term viability of aircraft expected in front-line duty. Engine monitoring systems must be installed on aircraft and integrated into logistics and C2 systems. Aircraft generation requires ready access to spare parts and petroleum, oils, and lubricants (POL). Supply orders, receives, issues, stores and tracks critical parts and other inventory to meet customer needs during peacetime and contingencies. Transportation provides efficient and reliable support in a full range of general and special purpose vehicles for ground transportation and aircraft loading. Logistics plans is responsible for providing war reserve materiel management, deployments, planning and execution, base support planning, and support agreements. Contracting implements acquisition strategy to ensure timely approval and execution of contracts; directs and implements programs to comply with small business directives; implements policies to enable contingency contracting in wartime; and implements programs in knowledge management to ensure efficient and effective contracting programs and procedures.

1.3.2.7 Force Protection

Force protection plays a part in every Air Force operation, from conducting surveillance against threats, providing community safety, and protecting communications and information systems. Everyone is responsible for force protection. Every airman must be trained in force protection knowledge, concepts, and weapons skills; self-aid and buddy care; field hygiene; CBRNE defense measures; and antiterrorism and threat awareness. The primary goal is to execute the mission with increased freedom and reduced fear. The actions that accompany force protection mandates are as follows: defending the air base—coordinating host-nation assistance and cooperation, conducting surveillance against threats (to include medical threats), providing community safety (to include observing operational risk management principles), and conducting defensive information operations; increasing awareness; collecting intelligence; performing intelligence assessments; preparing employment security actions; and practicing disaster preparedness and operations security.

1.3.2.8 Operations Support

Operations support encompasses activities that directly impact air mobility operational missions including airfield operations, weather, life support, operations resource management, inspections, safety, and supporting C2. C2 is the lifeblood of air mobility and air mobility support operations.

Airfield Operations include airfield management and air traffic control. Airfield management is responsible for the inspection and daily monitoring of runways, taxiways and airfield lighting, and the supervision of airfield activities, as well as flight service section support (base operations). Air Traffic Control's primary responsibilities are separating and sequencing aircraft on the ground and within assigned airspace. At CONUS locations, MAF air traffic control towers and radar approach controls are fully integrated with Federal Aviation Administration air traffic facilities and the National Airspace System. At austere, hostile, or uncertain locations, AFSOC Special Tactics provides requisite airfield operations and other operations support capabilities in support of air mobility's combat delivery, aeromedical evacuation, and special operations missions.

Air mobility weather services, in concert with the worldwide weather network, provide the MAF an organic capability to collect, analyze, and forecast atmospheric and space environmental conditions impacting operations. MAF operations require accurate/detailed weather information for improved situational awareness, enhanced safety, and increased efficiency and effectiveness of worldwide air mobility operations.

Life Support prepares aircrews for their full range of missions by maintaining and issuing life support equipment and training aircrews in its use.

Operations Resource Management is responsible for tracking the continuation and additional training of aircrew members for the air mobility mission.

The Inspector General (IG) continually assesses air mobility mission capability and readiness. Readiness is evaluated during contingencies, AEF activities, joint and combined exercises, as well as IG-generated exercises.

Safety's charter is to preserve combat resources and mission capability through mishap prevention. Prevention occurs through investigating mishaps and analyzing trends to establish mishap prevention programs and initiatives.

1.3.2.9 Medical

Medical support encompasses providing or arranging high-quality health care for authorized beneficiaries through a network of community-based medical treatment facilities or providing transportation to appropriate care if required medical care cannot be obtained in the local area. Medical support also includes the timely identification and notification that a WMD, especially a biological agent, has been released. The medical community may well be the first to realize the agent exists and will be key to its containment and demise.

1.3.2.10 Cargo and Passenger Handling

Cargo and passenger handling is a key component of air mobility. An integral part of air mobility's peacetime and wartime mission, aerial port forces are trained and equipped to support air mobility operations by processing and loading passengers and cargo for movement throughout the world.

Aerial port squadrons and detachments, air mobility support squadrons, and operating locations process passengers and perform cargo-related operations for organic and contract aircraft as part of the DTS. Selected aerial ports also prepare airdrop cargo loads and perform recovery operations of supplies and equipment at drop zones. Aerial ports also provide rapid deployment of specially trained and equipped personnel in times of war and contingencies.

The air mobility squadrons within the Air Mobility Operations Groups (AMOG) and Aerial Port Mobility Flights (APMFs) provide air mobility the capability to support cargo and passenger processing at bare-base locations worldwide. They train for operations in austere conditions, air base defense, tactical communications, combat survival, and individual weapons proficiency.

1.3.2.11 Base Operating Support

BOS activities contribute directly and indirectly to operational missions by supporting the people and bases that are essential to air mobility operations. BOS activities include base level supply, civil engineering (explosive ordnance disposal, fire fighting, environmental programs management, housing, infrastructure repair and maintenance, disaster support, CBRNE prevention, detection, defense, and bare base beddown planning, construction, and maintenance), contracting, comptroller, chaplain, judge advocate, security forces, services, public affairs, and personnel.

All MAF activities require supplies. Indirect mission requirements depend heavily on base level supply's ability to determine stockage levels. To achieve this, the supply system records demands for particular items, coordinates with customer activities to determine appropriate stockage levels, orders and receives the items, and stores those items until a demand is established by the customer.

Civil engineers plan, program, design, construct, operate, and maintain the airfield facilities and infrastructure necessary to accomplish our peace and wartime missions. This includes maintaining airfield facilities for peacetime and wartime use as well as constructing and maintaining bare base beddowns at contingency locations. Integral to this function is ensuring personnel have access to functional facilities that meet Air Force and Air Mobility Command standards. They also protect our people, equipment, and facilities by coordinating fire protection, explosive ordnance disposal (EOD), and full spectrum threat response (FSTR) (formerly disaster preparedness). Civil engineers protect the environment by preventing pollution; complying with local, state, and federal environmental laws and regulations; and, where necessary, cleaning up past contamination.

Contracting provides support, through constant customer interface, from the acquisition planning stage through the contract closeout for the procurement of commodities, services, and construction.

The comptroller formulates, justifies, and executes operational requirements for appropriated and Transportation Working Capital Funds (TWCF); disburses and collects funds; provides analysis of nonappropriated fund finances; and analyzes financial data as a basis for management and operational decisions.

The chaplain service, through its core competencies of spiritual care and ethical leadership, meets the spiritual needs at fixed, en route, and deployed locations by providing religious observances, pastoral care, and ethical advice to Air Force leaders.

The staff judge advocate provides full-spectrum legal services to support MAF people, operations, readiness and modernization. Legal office core competencies include operational readiness, fair military justice, robust legal programs, legal information mastery, compelling advocacy and litigation, and authoritative counsel.

Security forces ensure combat capability through the functions of installation security, nuclear and conventional weapons systems and resource security, air base defense, law enforcement, information security, military working dog activities, and combat arms training and maintenance.

Services contributes to readiness and improves productivity through programs promoting fitness, esprit de corps, and quality of life for Air Force people. Services provides the major direct support functions of lodging and feeding for mobility forces. In addition, services provides mortuary affairs support to include disposition of personnel contaminated with chemical/biological agents, recreation, revenue-generating operations, and exchange operations.

Public affairs keeps the civilian and military communities informed about air mobility operations and issues with internal information, community relations, and media relations programs.

Personnel organizations provide human resource management as well as personal assistance and personal growth opportunities for their assigned members and families.

1.3.2.12 Modeling, Simulation, and Analysis

Modeling, simulation, and analysis (MS&A) capabilities within the MAF provide the commander, the warfighter, and other DOD leadership with the foundational tools, resources, and information needed for supporting effective decision making and training. MS&A support capabilities cover a wide spectrum of activities shared by AMC headquarters, the Air Mobility Warfare Center, the Air Mobility Battlelab, and MAF operational interests in the field. Among supported activities are acquisition of weapon systems; formal analyses of alternatives; analysis of manpower, resources, and infrastructure; computer modeling and model development; exercise support; wargaming support; joint experimentation; training activities and events; distribution mission operations (DMO); operations in the joint synthetic battlespace (JSB); development of and adherence to DOD architectural standards; and the development and use of live, virtual, and constructive simulations. This array of activity is coordinated among MS&A focal points through the Air Staff (AF/XIW), the Air Force Analytic Community (AFAC), the Modeling and Simulation Architecture Council (MSAC), Air

Force Studies and Analysis Agency (AFSAA), the Air Force Agency for Modeling and Simulation (AFAMS), and joint MS&A agencies including USTRANSCOM J-5, JCS/J-4 Mobility Division, and JCS/J-8 Wargaming, Simulation, and Analysis Division.

1.3.3 MAF Environmental Issues

The issues below are drawn directly from the impacts the current and future environments will have on the MAF. These overarching issues impact all of air mobility's mission categories and support processes. The results of these impacts are addressed in Section 3, the MAF capability statements.

- MAF forces will see an increase in smaller-scale contingencies and possible peacetime OPTEMPO.
- MAF Information Systems will be targeted for attack.
- MAF forces will operate in a complex environment, interacting with, serving and opposing an expanded array of groups and organizations.
- MAF forces will face WMD attacks.
- MAF forces will face different and deadlier enemy weapons.
- MAF forces will face greater asymmetric threats.
- MAF forces will continue to operate within an AEF construct.
- MAF forces will have less access to en route support locations and theater basing structures.
- MAF operations will depend more on the commercial sector.
- MAF forces will face tremendous C2 challenges.
- MAF forces will have to adapt to changing customer requirements.
- MAF operations will be impacted by increasingly constrained civil airspace.

1.3.4 MAF Capability Statements

After assessing the impacts the current and future environments will have on the MAF, the following capability statements were developed. MAF capability statements are designed to ensure planning and programming initiatives consider both current and future mission challenges.

Cargo Airlift		
Provide the capability to move authorized supplies and equipment from port of embarkation (POE) to port of debarkation (POD), across the spectrum of conflict, in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG		
Rationale	**Future Environment**	**Impact/Effect**
– US and allied forces require rapid delivery of equipment and supplies to support the warfighters; cargo airlift is required to provide time-critical equipment and supplies whose urgency or nature cannot wait for surface transportation. – AEF operations require robust, sustained cargo airlift capability for deployment, employment, and redeployment.	– Political and economic trends will lead to a reduced overseas presence and an increased need for extended range and payload capacity on cargo airlift. – Shrinking budgets may force a smaller cargo airlift force structure and/or a dual-role airframe. – Increased need for standardization with NATO and other allies to facilitate effective multinational support. – Future forecasts indicate sudden small “hotspots” that require rapid-reaction moving cargo to/from threatened areas. Cargo fleet must have payload/configuration flexibility to respond rapidly and to divert from hostile capabilities, activities, or intentions. – Lack of areas to preposition material handling equipment will result in a need for on-aircraft systems capable of moving loads out of the aircraft cargo compartment and directly onto ground vehicles. – AEF operations may increase requirement for cargo airlift for deployment and employment. – Adverse weather conditions will restrict air operations. – Threats from radio frequency (RF), infrared (IR), and directed energy weapons up to 200nm of enemy territory may exist.	– Inability to meet required wartime and peacetime closure times. – Increased reliance on prepositioned material handling equipment. – Restrictions related to aircraft capability, causing unacceptable risk to the occupants. – Inability of AEFs to accomplish assigned missions in timely fashion. – Inefficient/ineffective capability to deliver authorized supplies and equipment when and where our customers want.
Required Capabilities		
– Provide the capability to perform mission requirements in CBRNE environments. – Provide the capability to operate commercial cargo aircraft in hostile areas. – Provide the capability to access real-time, time-phased force deployment data (TPFDD). – Provide the capability for real-time ITV/total asset visibility. – Provide the capability to take advantage of containerized cargo. – Provide the capability to deliver cargo equipment to austere locations at any point on the globe. – Provide the capability for direct delivery from POE to POD. – Provide the capability to deliver cargo/equipment in adverse weather conditions day/night. – Provide the capability to automatically identify all aircraft (friend or foe) in vicinity. – Provide the capability for reduced detection from RF and IR defensive systems. – Provide the capability to counter RF, IR, directed energy, and command line-of-sight MANPADs.		

Combat Delivery

Provide the capability, using air refueling where necessary, to deliver combat personnel, their equipment and supplies in direct support of combat operations by airdrop to a precisely designated location or by airland operations at austere landing zones. Airdrop a brigade-size force over strategic distances and sustain combat forces by aerial delivery or airland operations. Combat delivery mission capability must exist at night or during periods of adverse weather and across the spectrum of conflict and in all operating environments.

Source Documents: NSS, NMS, DPG, APPG, AFSP

Rationale	Future Environment	Impact/Effect
– Satisfies theater combatant commander's requirements. – Provides ground force commander rapid mobility. – Provides theater transport system absent adequate road/rail network. – Provides for airborne assault capability. – Provides forward movement for aeromedical evacuation. – Allows delivery with insufficient airfields. – Allows delivery to austere fields/landing zones. – Allows strategic insertions via airdrop forces.	– Location and availability of large overseas bases will present challenges in conducting operations in the future and increase dependency on air refueling. – Future operations may be conducted in a volatile geopolitical world to include the WMD environment. – A higher number of small-scale contingencies and increasing US involvement in other operations (military operations other than war [MOOTW], humanitarian relief operation [HUMRO], noncombatant evacuation operation [NEO], etc.) is expected. – Availability and technological advancement of air defense systems will present challenges in conducting operations. – Adverse weather conditions will restrict air operations. – Unfavorable political climate may exist. – Threats from RF, IR, and directed energy weapons up to 200nm of enemy territory may exist.	– Lack of battlefield mobility. – Increased dependency on road/rail network for transportation resulting in limited mobility in undeveloped areas. – Hindered AE capability at forward operating locations (FOLs). – Inability to conduct mobility operations in a combat zone. – Inefficient/ineffective ability to deliver cargo/fuel, combat personnel and their equipment when and where needed.

Required Capabilities

- Provide the capability to perform mission requirements in CBRNE environments.
- Provide the capability for reduced detection from RF and IR defensive systems.
- Provide the capability to counter RF, IR, directed energy, and command line-of-sight MANPADs.
- Provide the capability to make autonomous, accurate airdrops of personnel, equipment, and supplies in adverse weather conditions.
- Provide the capability to have real-time information on weather, order-of-battle and mission directives.
- Provide the capability to operate from minimal-sized take off/landing zones and semi-prepared surfaces.
- Provide the capability to conduct autonomous approaches, landings, and take offs in adverse weather conditions.
- Provide the capability to operate with minimum detection.
- Provide the capability to continue the mission following battle damage from small arms fire and light anti-aircraft artillery (AAA).
- Provide the capability for autonomous cargo loading/unloading.
- Provide the capability to automatically identify all aircraft (friend or foe) in vicinity.
- Provide capability for aircrews to detect directed energy weapons (applicable to all mission areas).

Passenger Airlift		
Provide the capability to move authorized personnel from point of origin to point of destination, across the spectrum of conflict and in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG		
Rationale	**Future Environment**	**Impact/Effect**
– US forces require rapid delivery of combat and support personnel, unit rotations, and movement of the President and senior government or executive personnel; passenger airlift is required to provide time-critical movement to meet mission requirements.	– Political and economic trends will lead to a reduced overseas presence and an increased need for extended range on passenger airlift. – Future forecasts indicate sudden small “hotspots” which require rapid reaction moving cargo to/ from threatened areas. Commercial/organic passenger fleet must have payload/configuration flexibility in order to rapidly respond and divert from hostile capabilities, activities, or intentions. – Adverse weather conditions may restrict air operations. – Threats from RF, IR, and directed energy weapons up to 200nm of enemy territory may exist.	– Inability to meet required wartime and peacetime closure times. – Unacceptable risk to the aircraft and occupants due to restrictions related to aircraft capability. – Inability to move authorized personnel when and where our customers want.
Required Capabilities		
– Provide the capability to perform mission requirements in CBRNE environments. – Provide the capability to access real-time TPFDD. – Provide the capability for real-time ITV of passengers to and from any point on the globe. – Provide the capability to move passengers from “dirty” to “clean” locations. – Provide the capability to deliver passengers in adverse weather conditions. – Provide the capability to coordinate passenger movement with both US and allied aircraft. – Provide the capability to automatically identify all aircraft (friend or foe) in vicinity. – Provide the capability for reduced detection from RF and IR defensive systems. – Provide the capability to counter RF, IR, directed energy, and command line-of-sight MANPADs.		

Aeromedical Evacuation		
Provide an Air Force aeromedical evacuation system capable of staging and moving patients across the spectrum of conflict and in all operating environments.		
Source Documents: NSS, NMS, DPG, JPD, The Force Health Protection Capstone Document-2010		
Rationale	**Future Environment**	**Impact/Effect**
– US national strategy relies on the rapid deployment and sustainment of AE forces around the world. – AEF operations will require a responsive AE capability. – A single, worldwide, integrated, requirements-based AE system that functions throughout the full spectrum of operational, physical, and threat environments is vital to protecting the life of and caring for the health of US forces. – Force health protection (FHP), under Joint Vision 2010, established goals for delivering en route care to ensure that patients receive uninterrupted care from point of injury, or initial illness, until the patient arrives at a definitive-care facility.	– Deployments depend on a responsive AE system. – AE system uses various airframes to support AEF operations and to move stabilized patients from austere forward locations. – More highly skilled, clinically efficient AE crewmembers and Critical Care Aeromedical Transport Teams (CCATTs) will be required. – Composite AE forces, made up of Total Force personnel, will be available for worldwide deployments. – Inflight care equipment packages will be more technologically advanced, shielded, and portable. – Few or no forward overseas medical facilities exist. – Small, outpatient-oriented medical facilities are common. – A WMD environment is possible. – Increase in small-scale contingencies and increasing US involvement in other operations (MOOTW, HUMRO, NEO, homeland defense, etc.) is expected. – Deployable personnel will be trained in civilian and VA facilities for high-acuity/high-complexity clinical skills (i.e. CSTARS program). – Adverse weather conditions will restrict AE operations.	– A rapidly responsive AE system equipped to support critical care interventions from the origination point to destination, preserving quality of life and sustaining force structure. – Achieve FHP 2010 levels of care. – Need for advanced basic clinical skills driven by vulnerability of sophisticated clinical support equipment to power and other utility failures, as well as high-energy electromagnetic pulses generated by weapons. – Meet theater combatant commander TPFDD requirements. – Operate in a WMD environment affecting the type and number of injuries and impacting the capability of AE crewmembers to provide necessary care to the wounded. – Lack of equipment, training, and procedures, impacting the ability to effect patient movement safely across platforms of care in the full spectrum of threat environments, including WMD-contaminated. – Move patients when and where required.
Required Capabilities		
– Provide the capability for global airborne AE communication supported by requisite communications links and onboard aircraft antennae. – Provide the capability to develop systems capable of defending aircraft crew and patients from hostile actions and/or enemy attack. – Provide the capability to operate AE missions in adverse weather conditions. – Provide the capability to provide advanced skills and critical care inflight on any airframe. – Provide the capability to perform mission requirements in CBRNE environments. – Provide the capability to achieve interoperability of equipment and real-time communications between medical ground units, patient staging units, and joint, military, and civilian aircraft. – Provide the capability to quickly deploy Total Force personnel. – Provide the capability to accomplish time critical retasking.		

Special Operations

Provide airlift capability to execute JCS-directed special operations missions while extending the range of special operations with air refueling. Conduct operations in adverse weather and hostile threat conditions with AFSOC and AMC special operations aircraft.

Source Documents: NSS, NMS, DPG, APPG, AFSP

Rationale	Future Environment	Impact/Effect
– Air mobility is tasked to support the special operations mission. – This capability augments special operations forces with greater range, size, speed, lift, and air refueling capabilities than those inherent in USSOCOM-assigned aircraft.	– Location and availability of large overseas bases will present challenges in conducting future operations. – Deployments will become more heavily dependent on location refueling capability. – Future operations will be conducted in a volatile geopolitical world including the WMD environment. – Higher number of small-scale contingencies and increasing US involvement in other operations (MOOTW, HUMRO, NEO, etc.) are expected. – Availability and technological advancement of air defense systems will present challenges in conducting operations. – Special operations missions can be covert, clandestine, or overt. – Adverse weather conditions will restrict air operations. – Unfavorable political climate may exist. – News media will be highly important. – Threats from RF, IR, and directed energy weapons up to 200 nm of enemy territory may exist.	– Ability to deliver forces with great speed for suppressing or preventing conflict. – Inability to operate in a WMD environment affects deployment and employment. – Ability to deter enemies from engaging in large-scale contingencies. – Inefficient/ineffective capability to deliver cargo/fuel when and where our customers require.

Required Capabilities

– Provide the capability for reduced detection from RF and IR defensive systems.
– Provide the capability to counter RF, IR, directed energy, and command line-of-sight MANPADs.
– Provide the capability to make autonomous, accurate airdrops of personnel, equipment and supplies in adverse weather conditions.
– Provide the capability to have real-time information on weather, order of battle and mission directives.
– Provide the capability to support SOFs in a blacked-out airfield environment.
– Provide the capability to operate from minimally sized takeoff/landing zones and semi-prepared surfaces.
– Provide the capability to operate undetected.
– Provide the capability to continue the mission following battle damage from small arms fire and light AAA.
– Provide the capability for trans-atmospheric operations.
– Provide the capability for autonomous cargo loading/unloading.
– Provide the capability to perform mission requirements in CBRNE environments.
– Provide the capability to automatically identify all aircraft (friend or foe) in vicinity.
– Provide the capability to operate in adverse weather conditions.
– Provide the capability for personnel in the rear of the aircraft, separate from crew, to communicate with their controlling organizations.

<table>
<tr><th colspan="3">Spacelift</th></tr>
<tr><td colspan="3">Provide the capability to provide robust and responsive spacelift to support both routine and time-sensitive military operations and to reposition, recover, and service assets on orbit.</td></tr>
<tr><td colspan="3">Source Documents: NSS, NMS, DPG, APPG</td></tr>
<tr><th>Rationale</th><th>Future Environment</th><th>Impact/Effect</th></tr>
<tr><td>– US military forces are heavily dependent upon space-based mission data such as communications; intelligence, surveillance, and reconnaissance (ISR); weather; and navigation. Therefore, the Air Force needs to ensure a spacelift capability exists to augment, replenish, reposition, and service the assets that provide this data to prevent mission degradation.
– US spacelift forces require the ability to launch on demand; current systems require significant processing and integration prior to launch.
– US space forces require the ability to provide on-orbit support; current launch vehicles do not provide maneuver capability and current satellites do not support on-orbit servicing.</td><td>– In the future the US cannot expect to continue to have unchallenged access to our space capabilities, thus necessitating the need to conduct counterspace operations using responsive spacelift.
– Conducting force application from space using responsive spacelift will help mitigate anti-access limitations.
– The future will see a convergence of military, civil and commercial space.
– There will be an international proliferation of space capabilities.</td><td>– Increased challenge to protect critical launch and satellite infrastructure.
– Increased challenge to protect our space systems, to capitalize on potential efficiencies in space capabilities, and to create new partnerships.
– Increased challenge to maintain unchallenged control of space. For example the European Galileo network of navigation satellites will provide capabilities comparable to our GPS network; however, we will have no control over who has access to the Galileo signal or the accuracies provided.</td></tr>
<tr><th colspan="3">Required Capabilities</th></tr>
<tr><td colspan="3">– Provide the capability for transformational rapid-response launch, payloads, and on-orbit operations.
– Provide the capability for advanced routine launch systems and upper stages.
– Provide the capability for rapid-response launch, payloads, and on-orbit operations.
– Provide the capability to perform mission requirements in CBRNE environments.</td></tr>
</table>

Air Refueling		
Provide the capability to refuel inflight multiple aerospace vehicles simultaneously, across the spectrum of conflict, and in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG		
Rationale	**Future Environment**	**Impact/Effect**
– US forces lack the range to fly to many areas of the world; air refueling is required to avoid en route stops and to meet closure times. – US forces lack the range and loiter time to complete employment missions without inflight refueling. – AEF operations require robust, sustained air refueling capability for deployment, employment, and redeployment.	– Location and availability of large overseas bases will increase reliance on air refueling for deployments. – Future fighters and bombers may have less range and loiter capability than current systems, increasing reliance on air refueling for deployment, employment, and redeployment. – AEF operations may increase requirement for air refueling for deployment and employment. – Shrinking budgets may force a smaller tanker force structure and/or a dual-role airframe. – Adverse weather conditions will restrict air operations. – Threats from RF, IR, and directed energy weapons up to 200 nm of enemy territory may exist.	– Inability to meet theater combatant commander TPFDD requirements. – Inability to meet theater combatant commander requirements for range and loiter time. – Necessity for employed aircraft to land for refueling and/or requirement for larger numbers of aircraft to accomplish theater combatant commander's mission. – Inability of AEFs to accomplish assigned missions in timely fashion. – Inefficient/ineffective capability to deliver fuel/cargo when and where our customers require.
Required Capabilities		
– Provide the capability to conduct air refueling operations in adverse weather conditions. – Provide the capability for reduced detection from RF and IR defensive systems. – Provide the capability to counter RF, IR, directed energy and command line-of-sight MANPADs. – Provide the capability to offload from both boom and drogue simultaneously. – Provide the capability to onload fuel inflight. – Provide the capability to refuel all aircraft types, including helicopters. – Provide the capability to refuel unmanned platforms. – Provide the capability to identify automatically all aircraft (friend or foe) in vicinity. – Provide the capability to carry deployment cargo and passengers in addition to primary fuel load. – Provide the capability to perform mission requirements in CBRNE environments. – Provide the capability to perform ancillary role as communications gateway (Smart Tanker).		

OPLAN 8044 Support		
Provide the capability to refuel inflight strategic assets for bomber force execution, employment, and subsequent bomber survival, recovery, and reconstitution, including US Strategic Command (USSTRATCOM) command and control (C2) aircraft, as directed by national leadership and the Nuclear Posture Review in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG		
Rationale	**Future Environment**	**Impact/Effect**
– US strategic bomber forces lack the range to fly to many areas of the world; air refueling is required to complete their missions. – USSTRATCOM C2 aircraft lack the range and loiter capability to complete their missions without air refueling.	– Future bombers may have less range and loiter capability than current systems, increasing reliance on air refueling for bomber force execution. – Shrinking budgets may force a smaller tanker force structure. – Nonstate actors may possess and threaten to use nuclear weapons. – Adverse weather conditions may restrict air refueling operations. – Threats from RF, IR, and directed energy weapons up to 200 nm of enemy territory may exist.	– Inability of strategic bombers to complete their assigned missions under OPLAN 8044. – Inefficient/ineffective ability to deliver fuel when and where our customers require.
Required Capabilities		
– Provide the capability to conduct air refueling operations in adverse weather conditions. – Provide the capability for reduced detection from RF and IR defensive systems. – Provide the capability to counter RF, IR, and command line-of-sight MANPADs. – Provide the capability to refuel unmanned platforms. – Provide the capability to identify automatically all aircraft (friend or foe) in vicinity. – Provide the capability to sustain flight operations in EMP environment. – Provide the capability to operate autonomously from austere airfields. – Provide the capability for continuous secure communications with higher headquarters before, during and after OPLAN 8044 execution. – Provide the capability to perform mission requirements in CBRNE environments.		

Global En Route Support		
Provide worldwide capability to support mobility operations through established or expeditionary en route airfields, capable of supporting sustained mobility operations using in-place infrastructure or deployable assets and personnel, across the full spectrum of conflict and in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG, AFSP		
Rationale	**Future Environment**	**Impact/Effect**
– DOD and coalition forces require rapid delivery of forces, equipment, and refueling aircraft to support worldwide operations. – Air Mobility forces require established en route bases supporting aircraft movement into or through any theater of operations. – Air Mobility forces must be capable of opening and operating austere bases worldwide to support initial deployment and operations in any weather and threat environment. – Air Mobility forces must be capable of supporting all Air Force CONOPS. Specific air mobility capabilities identified in the Air Mobility Task Force CONOPS for operations from NEO/HUMRO to full combat.	– Overseas basing infrastructure will continue to decrease in numbers and suitable locations. – Availability of MILCON to support overseas construction will decline. – Threats for asymmetric use of CBRNE will increase. – Increasing SSC operations will require a more flexible en route capability including base opening and infrastructure setup and repair in austere locations. – Political realities will impact air mobility operations in overflight and landing rights, increasing deployment distances and straining the en route system. – En route threats from man-portable missiles will increase.	– Inability to operate into austere airfields, delaying force closure. – Inability to operate in a CBRNE contaminated environment. – Denial of overflight or landing rights, resulting in an inability to close forces in a timely manner. – Inability to open and operate austere airfields in remote locations. – Inadequate global C2 with interoperability with CAF, coalition partners, and CRAF, hindering en route operations. – Inability to decontaminate CBRNE-contaminated aircraft and support equipment at en route locations.
Required Capabilities		
– Provide the capability to perform mission requirements in CBRNE environments. – Conduct en route support mission in adverse weather conditions. – Conduct interoperable en route support missions with DOD, US allies, and US commercial partners. – Provide en route support worldwide total asset visibility of passengers, cargo, patients, personnel, aircraft, equipment, etc. – Provide en route support global C2 capability with all MAF and CRAF assets. – Provide multi-level security for en route support missions. – Provide the capability for timely receipt of en route support C2, intelligence, and weather data. – Provide the capability for en route support to receive and transmit C2 instructions, order-of-battle information, and mission directives to supported headquarters and participating forces. – Provide the capability for the MAF to meet throughput requirements for the programmed airlift fleet. – Provide the capability to meet mission closure without having to swing from one theater to another. – Provide the capability to synchronize en route aircraft ground support activities of air mobility missions under all operating scenarios.		

Information Resource Management/Command, Control, Communications, Computer, Intelligence

Provide superior and effective command, control, communications, computers, and intelligence (C4I) capabilities that are pervasive throughout all functions at every echelon of command (fixed, airborne, and deployed); cut across the entire spectrum of conflict; and provide a flexible, responsive, secure, survivable, integrated global information infrastructure. These superior C4I capabilities and the supporting infrastructure are maintained in peak performance by a fully manned, well-trained, and skilled base of information resource managers. Information resource management (IRM) ensures the right information is provided in the right format, to the right place, at the right time to support decision makers at all levels. Information must be timely, accurate, relevant, and secure—assuring mission success across the conflict spectrum and in all operating environments.

Source Documents: NSS, NMS, DPG, AFSP, AFC&ISP Vol 1

Rationale	Future Environment	Impact/Effect
– C4I systems are becoming increasingly vital to the day-to-day global reach mission. – Timely collection, evaluation, assessment, and dissemination of information are critical to directing mobility forces effectively. – A secure C4ISR architecture must be designed and developed from the outset for rapid deployment and with joint, multinational, and commercial interoperability in mind. – A modern, flexible C4I systems architecture must be in place and kept technologically current in order to maintain our superior global air mobility capabilities. – A robust C4I systems infrastructure must be in place to meet current and future command needs and be able to withstand IO attack. – Data systems must be integrated and meet open systems standards to provide faster, accurate information for decision makers.	– Future operations will be exceptionally fast paced and diverse. Mobility forces must be able to adapt rapidly to the unexpected and apply available resources to the immediate high priorities of our warfighters. – Fast pace of technological advances will increase and present challenges and opportunities to our C4I architecture. – The emergence of countries or groups with the ability and intent to attack our C4I systems and infrastructure will increasingly challenge us, especially through the mid to long term.	– Inability of decision makers to access data when and where needed. – Inability to adapt to changing mission needs. – Inaccurate data or conflicting data for decision makers. – Inability to share data between systems, impacting C2 and ITV. – Increased cost of hardware and software impacting readiness. – Inability of computer systems to use new technology and reengineered business processes resulting in less capability for the warfighter. – Inability to command and control AMC assets, globally, in near real time. – Inability to provide ITV of passengers, patients, and cargo in the global air mobility system. – Vulnerability to IO attack.

Required Capabilities

- Provide critical C4 systems and infrastructure availability at 99.999% (max. 5 minutes down time per year), eliminate single points of failure through the fixed base backbone, and ensure sub-millisecond transfer to alternative long-haul points of presence to non-classified internet protocol router network (NIPRNET) and secret internet protocol router network (SIPRNET).
- Provide the capability to continue communications operations in the presence of unconventional threats.
- Provide capability to assess fixed airfield command and control (C2) infrastructure and deployable C2 communication resources suitability for mobility operations.
- Provide active computer network safeguards to prevent cyber attacks on information infrastructure.
- Provide the capability to conduct unclassified and classified video teleconferencing (VTC) at deployed locations.
- Provide the capability to perform mission requirements in CBRNE environments.
- Provide the capability to quickly and easily incorporate technology refresh.
- Provide a secure global capability for timely receipt of C2, intelligence weather information, and total asset visibility (TAV) of passengers, cargo, patients, personnel, aircraft, equipment, etc.
- Provide a global network to link airborne assets to any C2 node (airborne, ground, and maritime) with voice and data capabilities.
- Provide initial secure voice/data capability to common-user deployed forces on Day 0.
- Provide an electronic records management capability that allows concise, accurate, timely, and relevant information at all levels, anywhere, anytime.
- Provide units the capability to perform all information management (IM) functions including records management, administrative communications, work group management and core IM duties.
- Provide the capability to conduct unclassified, and classified VTC to all CONUS locations.
- Provide an integrated tasking, workflow capability that integrates with electronic records management to manage information in a near paperless environment.
- Provide the capability to be 100% interoperable with MAF assets (both fixed and deployed) air mobility and CRAF aircraft, AOCs, air traffic control agencies, our commercial partners, allies, and other DOD entities.

Information Operations

Provide information superiority and preeminent situational awareness to seize and maintain the tactical and operational initiative and to influence the enemy's actions, while denying the adversary the ability to do the same, across the spectrum of conflict and in all operating environments.

Source Documents: NSS, NMS, DPG, APPG, AFSP

Rationale	Future Environment	Impact/Effect

– To satisfy the theater combatant commander's requirements.
– Information and information systems are vulnerable to exploitation and interruption and needs to be protected.
– Aircraft navigation, communication, and defensive systems are vulnerable to attack.
– To protect our resources to conduct operations.
– To operate globally w/o interference.
– To maintain and retain the advantage.
– To improve security.
– To efficiently use of resources.
– Effective IO is crucial to secure, robust, flexible voice and data communication necessary for global MAF C2.
– Information warfare (IW) is a critical battlespace in today's infosphere during crises/contingencies and will continue to be a battlefield of the future.
– Although the MAF is primarily focused on defensive counterinformation, offensive capabilities for Military Deception and PSYOP are required. The MAF must have insight to offensive counterinformation to ensure operations are not placed at risk.
	– Future operations may be conducted in a volatile geopolitical world including the WMD environment.
	– A higher number of small-scale contingencies and increasing US involvement in other operations (MOOTW, HUMRO, NEO, etc.) are expected.
	– Availability and technological advancement of air defense systems will be more dependent on timely, accurate information.
	– Unfavorable political climate will exist.
	– C2 becomes increasingly important, as fixed operating environment decreases and mobile environment increases, information operations could be at risk.
	– Sophisticated hostile information attacks will be more prevalent.
	  – Electronic
	  – Signals
	  – Perception
	– Adversary will rely heavily on their information and information systems.
		– Loss of mission and equipment by failing to understand/recognize enemy intentions.
		– Loss of operational control and supporting information if C2 is not maintained.
		– Availability of MAF critical information to the adversary making the enemy's targeting capability more effective.
		– Ineffective MAF information systems.
		– Inability to conduct operations.
		– Inability to participate in joint information attacks.
		  – Information attack less effective; adversary still able to trust their information and information systems making them more effective.

Required Capabilities

- Provide the capability to use information operations to counter threats from criminal activity, terrorism, and covert operations against MAF forces.
- Provide the capability to counter adversary full-scale, strategic information attacks against MAF forces.
- Provide the capability to ensure offensive and defensive IO superiority.
- Provide warfighters immediate access to fully integrate information operations across the full spectrum of conflict.
- Provide the capability to integrate IO into MAF wartime and peacetime exercises.
- Provide the capability to protect all AMC information systems from information attacks and to test and verify that protection.
- Provide MAF immediate access to fully integrated IO across the spectrum of conflict via integral forces or reachback.
- Provide the capability to conduct IO risk assessment of MAF operations and systems.
- Provide the capability to perform perception management in support of deployed MAF forces.
- Provide the capability for near-real-time IO campaign assessments to update course-of-action development.
- Provide the capability to autonomously identify and protect against MAF IW threats and vulnerabilities.
- Provide a modeling and simulation capability for MAF IO.
- Provide seamless integration of MAF, CAF, space and IO assets into an indistinguishable single entity.
- Provide the capability to ensure MAF forces are fully trained in information operations and the vulnerabilities associated with it.

Command and Control

The ability to successfully command and control forces across any environment or spectrum of conflict will remain a high priority for AMC. MAF forces will therefore require the capability to perform command and control, monitor and assess global conditions and events, and plan and execute missions across the full range of conflicts around the globe. Effective, secure, robust, and flexible voice and data communication are the foundation to deliver the capability.

Source Documents: NSS, NMS, DPG, APPG

Rationale	Future Environment	Impact/Effect
– C2 must be given the highest priority possible to ensure expanded future MAF mission information requirements can be successfully supported. – Global mobility requires the ability to dynamically plan and execute mission changes real time. – Intransit visibility of all mobility assets and their status due to large number of concurrent operations is essential. – Dynamic interactive en route situational awareness, real-time threat updates are required.	– Increasingly dispersed number of operating locations, a deployment-driven air force, and greater need for ITV/TAV will elevate the need for flexible, robust, secure C2. – Future operations may be conducted in a volatile geopolitical world to include the WMD environment. – Higher number of SSCs and increasing US involvement in other operations (MOOTW, HUMRO, NEO, etc.) expected. – Availability and technological advancement of air defense systems will be more dependent on timely, accurate info.	– Severe mission degradation. – Inability to command and control global mobility operations. – Inability to control global mobility operations. – Inability of supported combatant commander to have visibility of forces in transit to theater. – Compromise or loss of operational control and related support information.

Required Capabilities

- Provide enterprise architecture standards and requirements processes that drive the selection, development, and deployment of enterprise applications with advanced information technologies and integrated communication solutions and components to operate seamlessly in the conduct of global mobility operations.
- Provide the capability to plan, allocate, and execute missions using standard, integrated, and automated IT tools and improved processes from initial tasking to final billing.
- Provide the capability for responsive planning and replanning to changing priorities and environments to redirect missions around the globe before they are impacted.
- Provide the capability to reduce aircraft and aircrew ground times through aggressive and ingenious initiatives to coordinate local mission support, maximize use of MAF resources, and reduce delivery times.
- Provide the capability for assured, timely, secure, tailorable, and worldwide C2 connectivity for MAF forces with interoperable voice, video, and data capability with CRAF, CAF, Joint, and coalition forces and command centers (e.g., Tanker Airlift Control Center (TACC), AOCs), and civil aviation authorities.
- Provide for seamless, high-volume, over-the-horizon, full-spectrum, required bandwidth, machine-to-machine interfaces, using expeditionary C2 nodes for real-time data collection and exchange and reachback capability to command centers and aircraft operating on a network-centric system (one Air Force…one network).
- Provide automated systems for push-pull information transfer to provide common operating picture (COP) and predictive battlespace awareness (PBA) to control agencies and aircrews and to provide battlespace optimization.
- Provide the capability for information security assurance to protect our critical information and systems including information operations.
- Provide the capability for a global, interoperable, secure infosphere environment.
- Provide ground and air interface with air traffic management to optimize use of civil air structure.
- Provide the capability to track aircraft, cargo, and passengers to provide visibility on movement status to decision makers and customers.
- Provide light, lean, and tailorable air-transportable deployment packages to provide, shelters, utilities, communications, and infrastructure for base operations at forward locations.
- Provide for the identification, survey, and selection of landing sites in forward operating locations for almost direct delivery of personnel, equipment, and supplies to engaged forces.
- Provide the capability to perform mission requirements in CBRNE environments.
- Provide aircraft systems modernized to become advance C2 nodes with communication networks on the aircraft to allow direct connectivity to “One Air Force…one network.”
- Provide capability to train C2 forces to support global air mobility operations.
- Provide capability to equip C2 forces to support global air mobility operations.
- Provide capability to conduct adverse weather global air mobility operations without reference to fixed ground-based navigational aids.
- Provide capability to rapidly report observed enemy weapons deployment or employment to appropriate agencies while conducting operations.
- Provide capability for MAF aircraft to detect, identify, evade, and report hostile threats, radars, and fire control systems.
- Provide the capability to counter space systems and services that could be used for hostile purposes against MAF command and control and other critical capabilities.
- Provide en route aircrews capability to receive near-real-time/real-time tactical information broadcasting system & tactical relay and processing system data for threat situational awareness.
- Provide recurring capability to systematically insert new technology into mobility operations through the AF tactical exploitation of national capabilities (TENCAP) process.
- Provide capability to identify/geolocate/track container delivery system (CDS) high altitude airdropped loads.
- Provide capability to identify/geolocate/track human daily rations (HDR) TRIWALL aerial delivery system (TRIADS) high-altitude, airdropped loads.
- Provide capability for en route aircrews to receive “signal-in-space” high-precision, station-keeping signal for information operations.

Intelligence		
Provide the capability to collect, analyze, and disseminate timely, relevant, and actionable intelligence on potential hostile capabilities, activities, or intentions to assist the planning, execution, and force protection of worldwide mobility missions, across the spectrum of conflict and in all operating environments.		
Source Documents: **NSS, NMS, DPG, APPG, AFSP**		
Rationale	**Future Environment**	**Impact/Effect**
– Provides commanders with info of threat capabilities and intentions so air mobility missions can be executed safely. – Allows aircrews to avoid threats. – Gives commanders strategic and tactical warning. – Allows commanders the ability to optimize power projection more efficiently.	– Future operations may be conducted in a volatile geopolitical world, including the WMD environment. – A higher number of small-scale contingencies and increasing US involvement in other operations (MOOTW, HUMRO, NEO, etc.) is expected. – Availability and technological advancement of air defense systems will present challenges in conducting operations. – Improve future communication connectivity while in-garrison or deployed. – Technological advancements improve intelligence application during mission planning.	– Loss of AMC assets by failing to collect, analyze, and disseminate intelligence on the threat properly. – Inefficient operations. – Failure to accomplish mission.
Required Capabilities		
– Provide the capability to perform mission requirements in CBRNE environments. – Provide the capability to keep pace with demands to analyze, assess, synthesize, and disseminate intelligence information. – Provide the capability to fuse information derived from space systems to generate automatically threat forecasts, courses of action, and best responses for consideration by decision makers. – Provide the capability to directly load, store, query, and retrieve standard mapping data products produced by National Imagery and Mapping Agency (NIMA). – Provide the capability for rapid dissemination of intelligence and intelligence products including multispectral, hyperspectral, and panchromatic imagery. – Provide the capability to ensure full intelligence DAY ZERO support for the AEF and/ or deployed Air and Space Operations Center (AOC) operations. – Provide operations and plans personnel instant access to threat analysis, predictive analysis, and modeling and simulation analysis directly to their work environment both on board and off board air mobility assets. – Provide a globally vigilant intelligence system that is able to operate in a complex environment with increasing number of potential opponents and more sophisticated technology. – Provide the capability for full intelligence support from the rear through forward projected technology. – Provide deployable intelligence capability to support aircrews and units at austere/ bare base locations and ensure appropriate Day 0 communications necessary to support MAF requirements. – Provide the capability to report accurate wartime readiness. – Provide the capability to ensure a fully trained and qualified Intelligence work force.		

Logistics		
Provide the capability to prepare units for deployments, maintain supplies, provide maintenance in joint operations area, and manage personnel and equipment movement in support of Air and Space and other DOD Forces, across the spectrum of conflict and in all operating environments.		
Source Documents: NSS, NMS, DPG, APPG		
Rationale	**Future Environment**	**Impact/Effect**
– AEF operations require a robust logistics support capability for deployment, employment, redeployment, and sustainability. – US forces will have to travel with their equipment and personnel to austere locations.	– AEF operations will increase requirements to move people and equipment. – Decreased locations overseas will lead to more reliance on logistics channels. – Integrated procedures for wartime/peacetime transportation deployment and sustainment will simplify management process.	– Inability to accomplish AEF objectives. – Inability to meet combatant commander TPFDD requirements.
Required Capabilities		
– Provide the capability to integrate logistics functions within the air and space force structure. – Provide the capability for a smaller, more versatile, technically proficient logistics force. – Provide the capability for a seamless logistics system responsive to customer needs. – Provide the capability for MAF logistical forces to operate across theater/command boundaries. – Provide the capability to respond to shortened equipment life cycle demands. – Provide the capability for time-definite delivery of weapon system spares directly to fielded units to support sustained combat operations. – Provide the capability to leverage high-velocity, just-in-time processes to manage missions and logistical uncertainties in lieu of larger safety stock levels. – Provide the capability to operate/launch MAF aircraft in severe winter conditions during periods of heavy snow and freezing precipitation. – Provide the capability to reduce the mobility footprint and aircraft supportability. – Provide capability for errorless tactical tracking of aircraft tail numbers for fuel billing and accounting between tanker and receiver aircraft. – Provide the capability for realistic maintenance training, hands-on qualification, and certification that minimizes operational aircraft use. – Provide the capability to perform mission requirements in CBRNE environments.		

<table>
<tr><th colspan="3">Force Protection</th></tr>
<tr><td colspan="3">Provide the capability of activities that prevent or mitigate successful hostile actions against Air Force people and resources when they are not directly engaged with the enemy. Force Protection is accomplished by a commander program designed to protect service members, civilian employees, family members, facilities, and equipment in all locations and situations. Force Protection must exist across the spectrum of conflict and in all operating environments.</td></tr>
<tr><td colspan="3">Source Documents: NSS, NMS, DPG, APPG, AFDD 2-4.1</td></tr>
<tr><th>Rationale</th><th>Future Environment</th><th>Impact/Effect</th></tr>
<tr><td>– Mobility forces are increasingly vulnerable to a variety of threats: conventional and unconventional terrorism, criminal, insider, environmental, WMD, civil unrest, information/data, and future threats.</td><td>– Adversaries have the potential ability to orchestrate asymmetric threats against mobility forces.
– Future threats such as laser, microwave, acoustic weapons, or other high-technology weapons that adversaries may possess, have access to, or are developing.
– The variety of challenges that we will face may also require less than lethal technology to meet demands at the lower end of the range of military operations.</td><td>– Vulnerability to attack from a variety of sources.
– Inability of MAF to maintain freedom of action to complete their mission(s).</td></tr>
<tr><th colspan="3">Required Capabilities</th></tr>
<tr><td colspan="3">– Provide trained and equipped expeditionary combat force protection forces to meet CONUS/outside of the continental United States (OCONUS) taskings across the spectrum of conflict in all operating environments.
– Provide fly-security teams on AMC aircraft scheduled to transit OCONUS areas where the terrorist and/or criminal threat has been assessed as high or the security situation is unknown.
– Provide the capability to perform mission requirements in CBRNE environments.
– Provide the capability to gather, access, and disseminate critical force protection information to decision makers.</td></tr>
</table>

Operations Support

Provide the support capabilities that directly impact air mobility operational missions, including airfield operations, weather, life support, operations resource management, inspections, and safety, across the spectrum of conflict and in all operating environments.

Source Documents: NSS, NMS, DPG, APPG, AFSP

Rationale	Future Environment	Impact/Effect
– Train and equip force properly to perform missions. – Global air mobility operations require a "systems" approach to be effective. – Preclude loss of equipment and personnel. – Ensures units are capable of performing assigned missions.	– Robust economies make it difficult to recruit/retain. – Location and availability of large overseas bases will present challenges in conducting operations in the future. – Future operations may be conducted in a volatile geopolitical world, including the WMD environment. – A higher number of small-scale contingencies and increasing US involvement in other operations (MOOTW, HUMRO, NEO, etc.) are expected. – Unfavorable political climate may exist. – Adverse weather conditions will restrict air operations.	– People not trained for the missions. – Inability to support wartime taskings or other missions short of combat operations, including MOOTW, HUMRO, and NEO. – Inability to accomplish assigned mission essential task lists (METLs). – Inefficient/ineffective capability to deliver cargo/fuel when and where our customers require.

Required Capabilities

– Ability to generate operations support missions in a nuclear, biological, or chemical environment.
– Provide the capability for the timely receipt and transmission of C2, intelligence, weather data, and mission directives.
– Provide the capability to integrate multi-level security for all operations support data systems.
– Provide the capability to field and operate deployable airfield equipment to support adverse weather contingency operations.
– Provide the capability to receive and transmit command and control instructions, order-of-battle information, and mission directives to generate mobility missions.
– Provide the capability to provide airfield data, weather information, and aviation resource management (ARM) data accessible by participating forces.
– Provide the capability to standardize systems and processes to ensure interoperability across the MAF, the DOD, our allies, and commercial partners.
– Provide the capability for weather services for Northeast CONUS to all Army and AF missions.
– Provide the capability for weather data integration into MAF decision making.
– Provide capability to fully support home station and contingency requirements.
– Provide the capability of performing in zero-zero conditions regardless of airfield infrastructure.
– Provide the capability for worldwide mission planning for all MAF platforms.
– Provide capability to prepare aircrews for their full range of missions by maintaining, issuing, and tracking life support equipment and training aircrews in its use.
– Provide the capability to preserve combat resources and mission capability through mishap prevention.
– Provide worldwide seamless processing of post-mission paperwork. Be able to transmit a stream of data to replace paper forms used by aircrews for recording flying time and aircrew training events.
– Provide the capability to electronically collect inspection data through computer interfaces for consolidation into a central database. Computer-based capability enables IG inspectors to immediately capture inspection history and effectively and efficiently edit/modify data into reports. Allows trend analysis of critical inspection data and information to be shared with field units through the Internet. Data provides commanders, functional managers, and key personnel inspection results and associated information.
– Provide the capability to perform unit compliance inspections. These inspections are conducted to assess areas mandated by law as well as mission areas identified by senior Air Force and MAJCOM leadership as critical or important to the health and performance of organizations.

<table>
<tr><th colspan="3">Medical</th></tr>
<tr><td colspan="3">Provide a managed community health care system that delivers a seamless uniform health benefit that focuses on disease prevention, health promotion, force health protection, and personnel physical fitness with medically appropriate access to the right level of care, at the right time, and at a reasonable cost, commensurate with the operation of a dual peacetime/readiness-capable infrastructure.</td></tr>
<tr><td colspan="3">Source Documents: DPG, APPG, AMC MSP</td></tr>
<tr><th>Rationale</th><th>Future Environment</th><th>Impact/Effect</th></tr>
<tr><td>– National strategy relies on the rapid deployment and sustainment of US forces around the world, with minimal disease nonbattle injury and prompt treatment of combat injuries.
– A fit force, in both physical and mental terms, is vital to mission accomplishment.
– The well-being of family members in peacetime and knowledge they will have access to high-quality health care during deployments are key factors to mission accomplishment as well as retention.
– Implementation of force population health strategies requires automated support of relevant data-gathering and processing for presentation to senior leadership as management decision making tools.
– Taking care of those patriots who have served before us is a promise we must keep.</td><td>– Outpatient facilities will evolve around a single tertiary facility (hub and spoke) where medical treatment facilities and their available levels of care will be rationally organized so that duplication of resource requirements will be minimized and customer convenience maximized in transitioning from one level of care to the next.
– Integrated networks carrying voice, video, graphics, and text into the home as well as treatment facilities will be vital (i.e., telemedicine, virtual reality environments, electronic medical records, self-care manuals, nurse triage, etc.).
– Use of clinically-validated demand management strategies will result in on-demand access to appropriate modalities of consultation and care.
– Bill coding and electronic payments will occur simultaneously with episode of care.</td><td>– Inability to meet customer satisfaction needs/requirements will result in Air Force medical service for “deployed active duty care only” with all peacetime functions being contracted out.
– Loss of motivation for high-quality board-certified providers and medical technicians to remain in the active duty military population, resulting in degraded quality of the AF provider force.
  – Possible endangerment of provision of appropriate care to employed and deployed forces or their family members at home.
  – Potential return to a peacetime medical draft.
– Unfavorable comparison of medical care as a fringe benefit of employment, leading to inadequate recruitment and retention of qualified active duty military members.</td></tr>
<tr><th colspan="3">Required Capabilities</th></tr>
<tr><td colspan="3">– Provide medical support capability responsive to AEF and joint force service operational requirements.
– Provide the capability for medical personnel to maximize force health protection.
– Provide the capability to perform mission requirements in CBRNE environments.
– Provide an integrated medical logistics system, which is capable of supporting joint service requirements and providing full-spectrum supportability.
– Provide the capability to quickly react to changing technological requirements and opportunities.
– Provide deliberate planning responsive to AEF and joint force service requirements.
– Provide the capability/interface for timely, accurate, and relevant information systems to ensure patient intransit visibility and medical logistics support.
– Provide medical intelligence and public health/bioenvironmental engineering, health risk assessment, and guidance support.
– Provide trained medical support capability.</td></tr>
</table>

Cargo and Passenger Handling

Provide the capability to process, upload, and download authorized cargo and passengers, across the spectrum of conflict and in all operating environments.

Source Documents: NSS, NMS, DPG, APPG, AFSP

Rationale	Future Environment	Impact/Effect
– Timely processing and loading of passengers and cargo are critical to sustain operations throughout the world.	– Future operations will be exceptionally fast paced and diverse. The deliberate planning of the past alone will no longer suffice. Materiel supporters must be empowered to adapt rapidly to the unexpected and to apply available resources to immediate high priorities of our warfighters. – Lack of areas to preposition material handling equipment will require air transportation personnel to be able to operate worldwide with minimal or no support equipment/facilities. – Cargo handling systems and procedures must be enhanced to reduce airlifter ground times at expeditionary forward operating locations. – Adverse weather conditions will restrict air operations.	– Increased closure times. – Inability to deliver cargo and passengers when and where customers want.

Required Capabilities

– Provide the capability for deliberate and crisis planning to ensure right sized forces and equipment are sourced to support the full spectrum of air mobility operations.
– Provide the capability to support a seamless cargo transportation configuration across the DTS.
– Provide the capability to meet cargo and passenger handling requirements without having to swing materials handling equipment (MHE).
– Provide the capability to integrate cargo onload and offload with allied and coalition aircraft.
– Provide the capability to meet MAF wartime airlift throughput requirements.
– Provide the capability to onload and offload aircraft day/night during adverse weather, under all conditions (including blackout and austere airfields).
– Provide the capability to screen all cargo and baggage for hostile explosive devices without breaking down pallets or opening sealed containers.
– Provide the capability to perform mission requirements in CBRNE environments.
– Create a common system for cargo and passenger documentation and management in peace and war.

Base Operating Support

Provide critical base operating support services (civil engineering [CE], services, chaplain, contracting, personnel, staff judge advocate, etc.) at CONUS and deployed locations, across the full spectrum of conflict and in all operating environments.

Source Documents: DPG, APPG

Rationale	Future Environment	Impact/Effect
– BOS provides critical support to our wartime and peacetime missions; potential threats in the future environment requires a close examination of the level and/or method of delivery of services in an “all threat environment.”	– US homeland and deployed will be at greater risk of attacks from WMD, chemical warfare, terrorists, etc.	– MAF inability to provide home station and deployed location commanders critical support services required to house, feed, clothe, and provide necessary legal, spiritual, and other needs of personnel. – Lack of BOS will result in degraded ability to perform required missions and/or tasks at home and abroad. – Air mobility Total Force is put at risk of injury, disease, and/or death.

Required Capabilities

– Provide capability to effectively meet war, peacetime, and/or contingency requirements with all available assets to include active duty, ANG, and AFRC.
– Provide capability to place the right people, in the right job, at the right time, which enables commanders to meet their mission requirements.
– Provide capability to recruit and maintain a highly skilled civilian workforce.
– Provide capability to support Air Force goals for maintaining a high-quality force and enhancing professional and personnel development, recruitment, retention, and readiness.
– Provide capability to assign senior officers to appropriate positions within and outside AMC, based on AF requirements and officers' career development needs.
– Provide capability to perform mission requirements in CBRNE environments.
– Provide fly-security teams on AMC aircraft scheduled to transit OCONUS areas where the terrorist and/or criminal threat has been assessed as high or the security situation is unknown.
– Provide the capability to deploy properly trained and equipped chaplain service packages/teams to respond to worldwide taskings across the full spectrum of conflict in all operating environments to support Air Force members by providing for their diverse religious requirements and spiritual needs, and to support Air Force leaders at every level with counsel about the religious requirements, spiritual needs, and moral issues that impact mission, quality of life, and religious freedoms.
– Provide the capability to maintain properly trained and equipped chaplain service teams to respond to home station needs of Air Force members and their families by providing for their diverse religious requirements and spiritual needs, and to support Air Force leaders at every level with counsel about the religious requirements, spiritual needs, and moral issues that impact mission, quality of life, and religious freedoms.
– Provide capability to accomplish chaplain services deliberate and crisis-action planning.
– Provide the capability to advise AMC/CC, his staff, and subordinate commanders on military justice, civil law, contract matters, environmental matters and compliance, operational policy, and any other relevant legal issues.
– Provide capability to provide the warfighter with the full spectrum of legal services of any type, anyplace, anytime, to advance military operations.
– Provide capability to fairly and efficiently administer the military justice system, fostering morale, good order, and discipline.
– Provide capability to provide AMC with valued programs, which serve its people, its organization, and its mission.
– Provide capability to develop and deliver essential legal information, fostering legal awareness and compliance.
– Provide capability to counter challenges to lawful AMC operations and activities, preserving command prerogatives.
– Provide capability to give decision makers timely, accurate legal analyses and assessments of options, promoting informed decisions.
– Provide the capability to ensure MAF facilities and infrastructure to support new weapons systems and mission changes.
– Provide the capability to sustain, restore, modernize, and replace degraded facilities and infrastructure to meet mission requirements.
– Provide the capability to ensure adequate family and dormitory housing for all authorized MAF personnel.
– Provide the capability for environmental programs to reduce the amount of legally required projects that have accumulated.
– Provide the capability to investigate and clean up contamination associated with past activities, while executing ongoing environmental programs and projects, to ensure current activities comply with all appropriate laws, regulations, and agreements and to prevent future threat to public health, safety, and the environment.
– Provide the capability for environmental programs to maintain compliance with federal, state, or local laws and regulations and reduce the threat to public health, safety and the environment.
– Provide an ordnance-free environment to permit continuous operations at an explosively contaminated air base anytime, anywhere, and across the full spectrum of conflict.
– Provide 24/7 capability to neutralize or destroy unexploded ordnance (UXO) to sustain, restore, and replace facilities and infrastructure to meet mission requirements.
– Provide trained and equipped, rapidly deployable, and scalable teams capable of performing infrastructure damage assessment and emergency repair of damaged structures, pavement surfaces, and utilities to establish at least a minimum level of service needed to conduct operations.
– Provide site preparation and protection, trained and equipped, rapidly deployable, and scalable teams capable of providing critical initial beddown and sustainment at bare bases for air mobility operations.
– Provide trained and equipped rapid response contingency response units (CRUs) as first-on-scene forces to open austere, bare bases for mobility operations. The CRU’s mission includes

Base Operating Support
airfield/base assessment, determination of follow-on force requirements, reception of forces, and base preparation for operational activity. CRUs must be specifically trained in the full range of air mobility missions, including humanitarian relief and noncombatant evacuation operations. – Provide air-transportable deployment packages to establish on-scene shelters, utilities, and infrastructure for base operating forces. Packages must be easily tailored to operational requirements, light and lean, and rapidly transportable. – Provide trained and equipped teams capable of supporting infrastructure and repairing structures, pavement surfaces, and utilities. – Provide functional planning requirements for deliberate, consequence, and crisis management implementation. – Provide the warfighter a full spectrum of manpower services including access to all AMC controlled unit type codes (UTCs); manpower annexes for operational plans; deployment, requirement, and manning documents; AMC's input to the manpower requirements (MANREQ) process; and total force assessment used to determine and document in-place and deployable wartime requirements. – Provide the capability to advise AMC/CC, his staff, and subordinate commanders on all manpower matters related to performance management, manpower programs and organization, strategic sourcing, requirements, and any other relevant manpower issue. – Provide the capability to manage the HQ AMC staff and provide manpower guidance and policy to AMC wing manpower offices on all manpower issues. – Deploy combat-ready services forces to meet beddown base operating support requirements for deployed forces during wartime/peacetime/contingency operations. – Provide home-station programs to maintain community morale-supporting activities to remaining base populaces during wartime/peacetime/contingency operations. – Perform essential functions to develop, define, refine, and execute aspects of the planning process to meet functional requirements for deliberate and crisis action planning needed during wartime/peacetime/contingency operations.

<table>
<tr><th colspan="3">Modeling, Simulation, and Analysis</th></tr>
<tr><td colspan="3">Provide capability for modeling, simulation, and analysis (MS&A) support to analyze worldwide mobility operations moving through established or expeditionary en route airfields, capable of supporting sustained mobility operations using in-place infrastructure or global laydown deployable assets and personnel. Capability must provide MS&A support to decision makers and warfighters for airlift and tanker operations across the full spectrum of mobility operations in all operating environments and in training environments to include live, virtual, and constructive simulations. Provide capability for MS&A to support commanders at all levels, war games, exercises, planning, operations, distributed mission operations (DMO)/training, experimentation, and acquisitions with robust and timely analyses to support the decision makers and assure the most effective decisions for the utilization of MAF forces.</td></tr>
<tr><td colspan="3">Source Documents: NSS, NMS, DPG, APPG, AFSP</td></tr>
<tr><th>Rationale</th><th>Future Environment</th><th>Impact/Effect</th></tr>
<tr><td>– Provides answers to senior leadership’s questions in exploring policy and decision options.
– Used extensively in exercises and war games for mobility and tanker simulations and visualizations for both red and blue players. Gives commanders strategic and tactical views of the effects of their decisions.
– Provide more detailed and robust capability for analysis of material and personnel movement, airframes, fuel, crews, infrastructure support, command and control, information flow, integration of airlift and tanker operations, etc to support war games, exercises, planning and operations on a daily basis.
– Analysis tools used within the developing joint synthetic battlespace (JSB).</td><td>– Future operations may be conducted in a volatile geopolitical world, including the WMD environment requiring ability to accurately use modeling and simulation to conduct successful operations.
– Technological advancements improve MAF ability to accurately model and simulate air mobility operations.
– Availability and technological advancement of air defense systems will present challenges in producing accurate MS&A of air mobility operations.</td><td>– Inability to assure selection of best decision from possible options will result in less than the best support for the warfighter.
– Inability to answer the more detailed mobility questions concerning all aspects of mobility operations results in reduced operational performance.
– Inability to evaluate DMO and mission rehearsal effects before operations results in less than optimum support for the warfighter.
– Inability to interact with other models and simulations reduces the fidelity and value of mobility answers provided to senior leadership resulting in less than optimum support for the warfighter.
– Inability to model mobility operations in all training environments to include live, virtual, and constructive simulations within the JSB results in less than optimum training for the warfighter.</td></tr>
<tr><th colspan="3">Required Capabilities</th></tr>
<tr><td colspan="3">– Provide a robust and detailed modeling capability for AMC airlift, tanker, and support assets.
– Provide smart tanker and multimode platform (Tanker, Airlift, and ISR) modeling.
– Provide the capability to integrate MAF MS&A and Air Warfare Center to model personnel and infrastructure.
– Provide the capability to integrate MAF MS&A with DOD architectural standards.
– Provide the capability to use MAF MS&A to develop a tanker deployment and employment capability within JFAST.
– Provide interoperability of MAF MS&A with JSB.</td></tr>
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2 VOLUME II: AIR MOBILITY CAPABILITIES PLAN

Volume II of the Air Mobility Master Plan is the Mobility Air Forces' (MAF) roadmap to the future. It describes our plan to meet current air mobility requirements and to operate into the year 2029 as described in Volume I, Air Mobility Future Environment. The need for a capabilities plan has never been greater. The effects of rapidly changing political and military world environments have generated newer and larger requirements for air mobility. To meet this challenge, we must constantly reexamine the MAF's ability to perform rapid global mobility, today and through the foreseeable future. This must be accomplished realizing the impact that constrained resources have on the air mobility mission. Mission success relies on proper planning and clearly defined objectives. Volume II consists of four sections and provides long-range strategic guidance to planners, programmers, research professionals, and decision makers for managing air mobility resources.

The first section provides background information to serve as a framework for capability-based strategic mobility planning. Section 2 reviews the airlift mission area, first examining current and future airlift requirements and then assessing our airlift capabilities. This section then provides roadmaps for cargo airlift, combat delivery operations, passenger airlift, aeromedical evacuation (AE), and special operations. Section 3 describes our ability to perform the air refueling mission, vital to global deployment and employment operations and in support of the nation's OPLAN 8044. Section 4 describes our ability to provide the air mobility support processes addressed in Figure 4. The assessment of each mission category and support process roadmap describes those critical priorities we must focus on to strengthen our ability to accomplish rapid global mobility. Objectives, milestones, and supporting programs are established for each mission category and support process, thus establishing our plan to overcome shortcomings and achieve the desired capabilities for each area.

2.1 AIR MOBILITY MISSION

The air mobility mission, performed by the MAF, is to provide global reach for the United States through airlift and air refueling of the nation's military forces and other authorized agencies. As an instrument of national power, a robust air mobility capability increases the number of options available to the President, Vice President, Secretary of Defense, or Chairman of the Joint Chiefs of Staff during crises. It provides the wherewithal to project US forces rapidly overseas in support of actions ranging from humanitarian operations to warfighting. Today's strategic environment, characterized by a decline in US overseas force structure, reinforces the importance of air mobility. US forces, responding to overseas contingencies, must be projected over long distances from CONUS—and this trend is expected to continue in the 1-4-2-1 force structure defense strategy.[20]

2.1.1 Mission Description

Rapid global mobility is achieved through the optimized use of active duty and Air Reserve Component (ARC) military airlift and air refueling forces, and is supplemented by the Civil Reserve Air Fleet (CRAF) during major operations. The essence of global mobility is quickly moving large quantities of personnel, equipment, combat forces, and supplies from the CONUS to overseas theaters, between theaters, and from ports of embarkation in the theaters to points as close as practicable to the final destination. Any movement is exercised as a single seamless process, providing a commander visibility over air mobility operations and providing customers a "single face" for their air mobility requirements. Subdividing the process into individual "links" suboptimizes the

[20] 1-4-2-1 force structure defense strategy is defined as defending the US homeland and territory against external attacks; deterring aggression and coercion in critical regions of Northeast Asia, East Asian Littoral, Middle East/Southwest Asia, and Europe; and swiftly defeating the efforts of an adversary in two overlapping wars while preserving the President's option to call for a decisive victory in one of those conflicts—including the possibility of regime change or occupation.

use of air mobility assets and reduces the effectiveness of the global air mobility system. Some cargo and troops will be delivered using direct delivery, eliminating the need for an intermediate transshipment point in the theater. This concept of operations is not limited to the support of combat operations or major contingencies, but is applicable in all operating environments.

2.1.1.1 Airlift

Airlift provides the ability to rapidly transport personnel, equipment, combat forces, and supplies anywhere on the globe. Airlift offers commanders a degree of speed, range, and flexibility not available with any other mode of transportation, making it an important instrument of foreign policy and an essential wartime capability. The demands placed on the nation’s airlift forces are continuous, highly unpredictable, and global in scope.

Airlift forces conduct both intertheater and intratheater common-user operations. Intertheater airlift missions move passengers and cargo between the CONUS and a theater, or between theaters. Intratheater missions are generally of shorter range, and provide transportation within a theater combatant commander’s area of responsibility (AOR). The distinction between intertheater and intratheater airlift has in the past been largely a function of the capabilities of the aircraft employed. However, with the continuing acquisition of the C-17, this distinction is blurring; and concepts of operation such as direct delivery and theater augmentation are expanding the range of options available for planners. Theater augmentation is typically characterized with aircraft and crews performing intertheater airlift—entering a theater and then flying one or more intratheater sorties before returning to intertheater operations. This augmenting capability is in addition to theater-assigned airlift assets already performing intratheater missions.

While airland is the preferred method of delivery from airlift aircraft, airdrop of troops and equipment is a critical capability that remains an integral part of joint warfighting doctrine. This method of combat employment and resupply of forces is used when the airland option is not available. Combat airdrop can be conducted during either intratheater or intertheater missions; however, it is a highly specialized mission requiring extensive crew training and preparation. Strategic brigade airdrop, a unique Air Force-Army capability, permits the US to quickly deploy airborne forces directly into combat anywhere in the world.

2.1.1.2 Air Refueling

Combined with airlift, the capability provided by inflight refueling makes rapid global mobility possible. Air refueling forces can support both intertheater and intratheater operations. Intertheater air refueling supports the long-range movement of airlift, combat, and combat support air forces. Typically, this movement will be between the CONUS and a theater, or between theaters. This flexible “air bridge” concept substantially enhances our nation’s force projection capability. It functions as a “force multiplier” by accelerating the deployment cycle and reducing dependency on forward staging bases and host-nation support.

In intratheater operations, air refueling acts as a “force enhancer” by extending the range, payload, and loiter time of combat and combat support forces. The increased range afforded by air refueling allows fighters and bombers to attack strategic and tactical targets well within the interior of the enemy’s defenses. The additional range afforded by air refueling increases the complexity of an enemy’s defensive problem and allows us to maximize the element of surprise.

2.1.1.3 Mobility Air Force Support Processes

Support is the backbone of global mobility. Large-scale mobility operations require an integrated system of support forces in place to ensure aircraft are serviced and maintained, crews are rested, and passengers and cargo are properly handled. Our support processes are melded in a global network of manpower, materiel, and facilities that provide command and control, logistics, and aerial port services to air mobility forces. It is the conduit for our nation's ability to rapidly project power anywhere in the world. We support global operations by using fixed bases with well-developed mobility infrastructure for normal peacetime operations, or we put into place a temporary structure for contingency operations.

2.1.2 Organization, Roles, And Responsibilities

The following paragraphs identify the roles and responsibilities of key agencies that must work together to ensure successful air mobility operations.

2.1.2.1 United States Transportation Command

United States Transportation Command (USTRANSCOM) is one of nine unified commands in the United States military structure. Established in 1987 to manage transportation in wartime, USTRANSCOM took on increased responsibilities when, in February of 1992, it was designated as the single manager for air, land, and sea transportation for the DOD, both in times of peace and war. As a functional unified command, USTRANSCOM has global responsibility to support combatant commanders' requests for intertheater lift. The supported combatant commander establishes these movement requirements in a time-phased force and deployment data (TPFDD), which is a listing of the supported combatant commander needs. This TPFDD is sent to supporting commanders via the Global Command and Control System (GCCS). Each combatant commander reviews this database, validates requests, and establishes or revises detailed transportation requirements.

USTRANSCOM's service components—Military Traffic Management Command (MTMC), Military Sealift Command (MSC), and Air Mobility Command (AMC)—comprise the forces of the Defense Transportation System (DTS), employing USTRANSCOM forces to satisfy DOD's worldwide transportation needs. USTRANSCOM integrates all transportation resources while its three components execute the missions. MTMC, the land component, orchestrates movement of equipment, vehicles, weapons systems, supplies, ammunition, and troops to their area of operation. It uses surface transportation assets to accomplish its mission. To enhance its future operations, MTMC is pursuing the single port management concept, similar to the Tanker Airlift Control Element (TALCE) employed by AMC. The sea component of USTRANSCOM, MSC, provides ocean transportation for DOD cargo supporting US forces around the world. Using more than 145 ships organized in four major area commands, MSC fulfills over 90 percent of DOD's total transportation requirements, during both peace and war.

2.1.2.2 Air Mobility Command Future Warfighting Construct

AMC is going through a transformational change, centralizing warfighting responsibility to a single command element. 18th Air Force was established on October 1, 2003 to provide global operational command and control for air mobility forces. The Tanker Airlift Control Center, two expeditionary mobility task forces, 12 wings, three groups, four air mobility operations groups, and the air mobility global en route system will report to 18th AF. The TACC is the 18th AF global air operations center for air mobility, providing centralized command and control and decentralized execution. AMC has also established the 15th Expeditionary Mobility Task Force (EMTF) at Travis Air Force Base, California and the 21st EMTF at McGuire AFB, New Jersey organizations responsible for global expeditionary mobility support. Headquarters AMC has adopted the A Staff structure to train, organize, equip and provide command policy. The new construct and its associated components are identified in Figures 5-8.

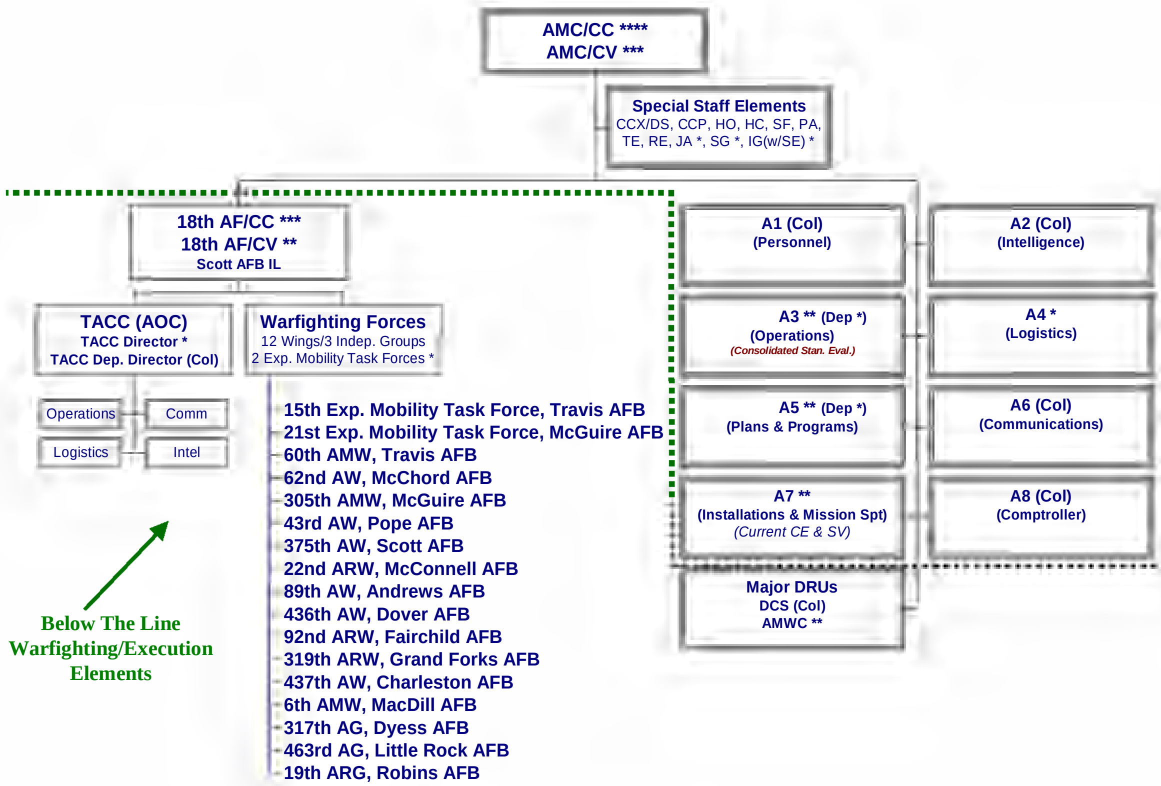

Figure 5. AMC Warfighting Construct

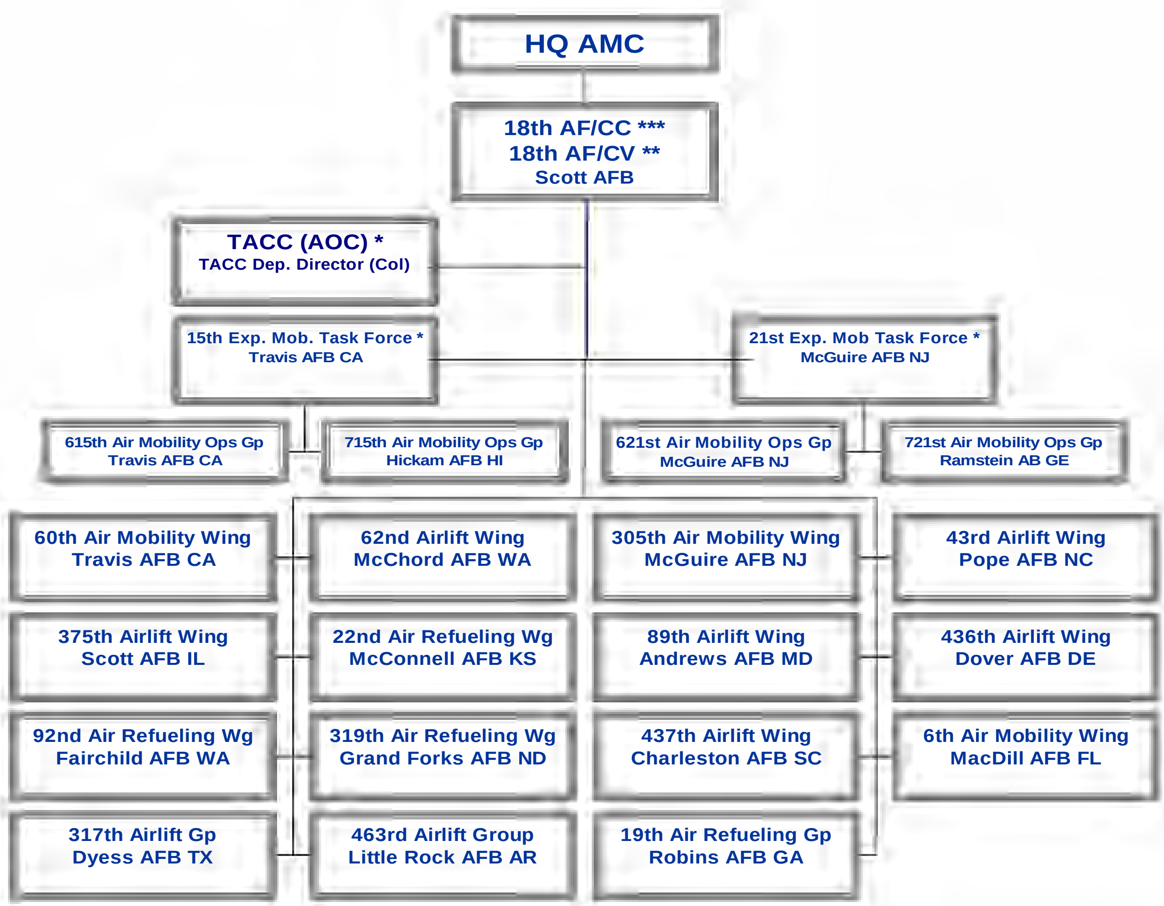

Figure 6. AMC Warfighting Construct: Warfighting/Execution Elements

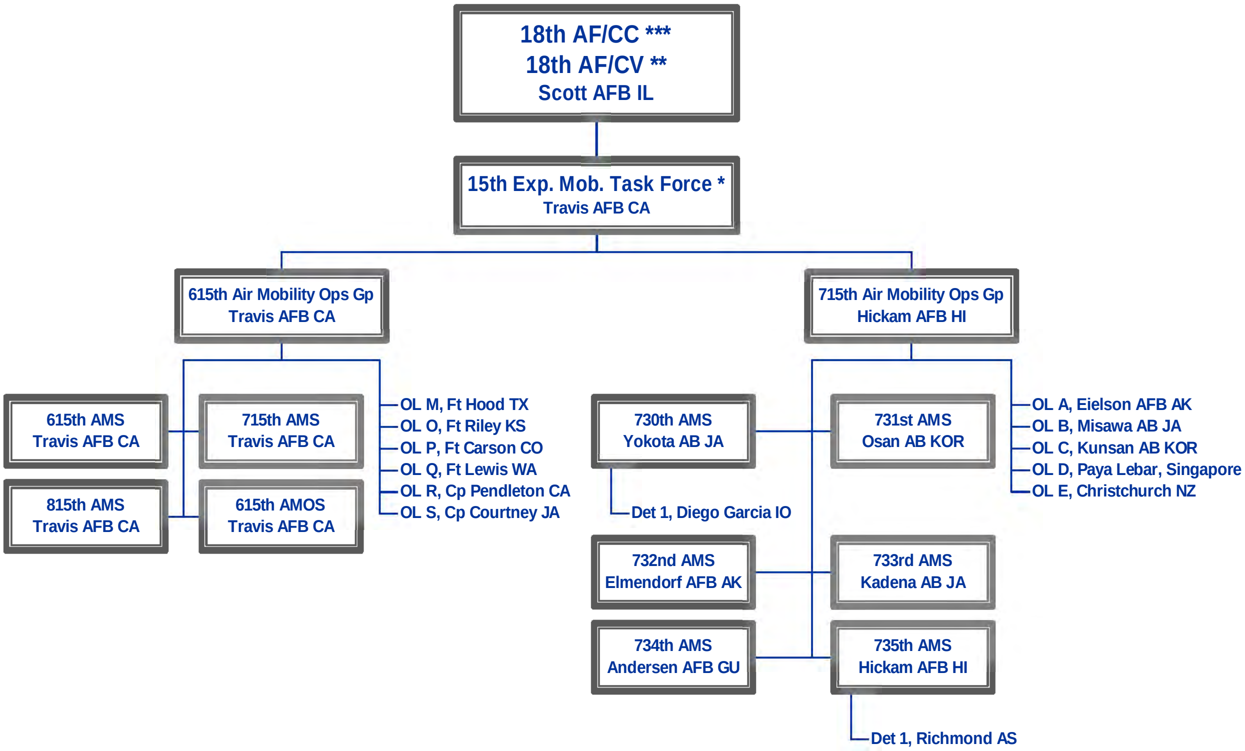

Figure 7. AMC Warfighting Construct: 15th Expeditionary Mobility Task Force

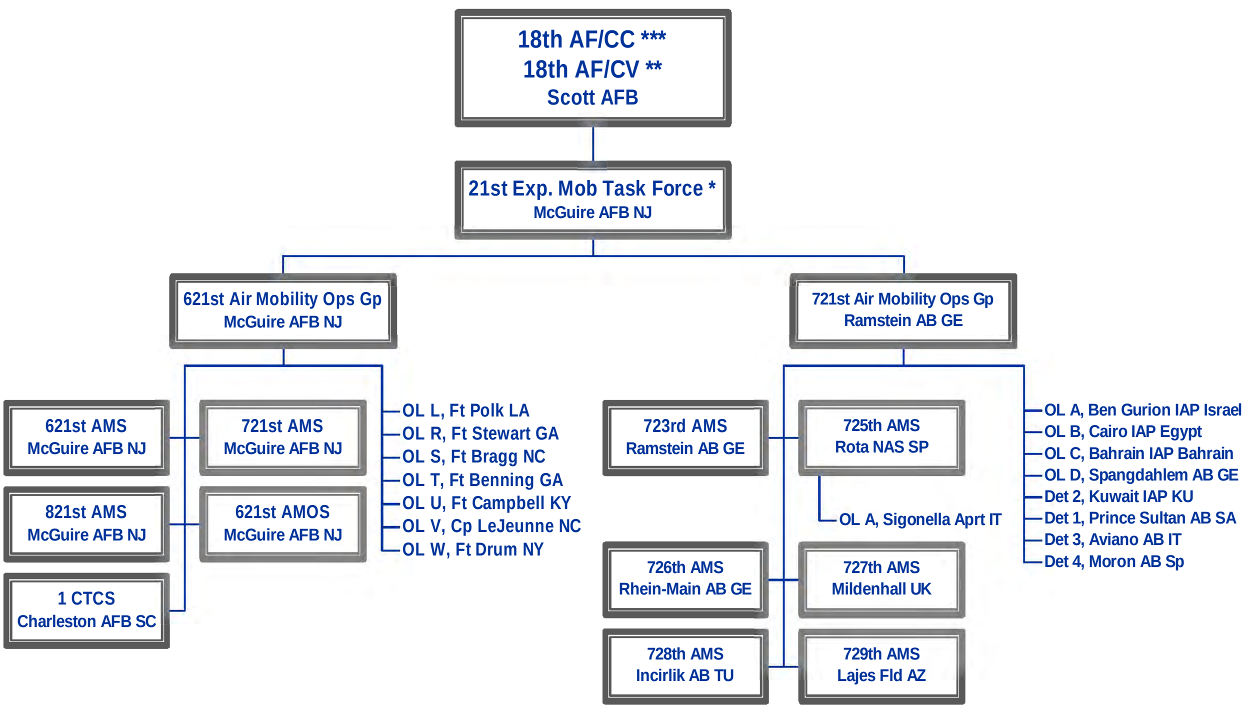

Figure 8. AMC Warfighting Construct: 21st Expeditionary Mobility Task Force

2.2 CAPABILITIES ASSESSMENT

Strategic air mobility is critical to our nation's ability to rapidly project forces globally in peace and in war. While the MAF has developed an air mobility capability unmatched in military history, improvements are needed. We do have shortfalls and must aggressively pursue a number of actions to meet mission requirements today and in the years to come.

Our strength lies in our highly trained and motivated professionals from both active duty and ARC units, who operate very capable aircraft. However, quality of life issues need constant emphasis if we are to recruit and retain the outstanding force we have today.

The C-17 has proven to be an exceptional aircraft and, together with the capable C-5 fleet, provides the nation's long-range cargo airlift capability—yet a significant shortfall in meeting intertheater lift requirements still exists. We must procure additional C-17s and improve the mission capability rates of the C-5 fleet. The C-130 is a superb aircraft that has long been the mainstay of combat delivery operations, but avionics modernization is needed for continued combat effectiveness. The KC-135 continues to perform the refueling mission well, but it is aging and increasingly costly to operate. Additional aircrews are required to meet refueling mission needs. The KC-135E fleet is 44 years old; we intend to retire the aircraft and replace them with KC-135Rs. The KC-10 is a good aircraft but needs to be made GATM compliant. Global reach and power missions are dependent upon air refueling and highlight the need to add a modern tanker to the fleet.

As the aircraft fleet is modernized, we must not forget about the command and control required for effective execution of the mobility mission. An interoperable communication architecture with trained personnel capable of commanding and controlling assets, monitoring and assessing global conditions, as well as planning and executing mobility missions in all environments is a must for successful operations. All MAF aircraft are exposed to an environment with increasing hostile threats; we must install modern defensive systems if we expect to operate unhindered. We are fortunate to have a very well-developed CRAF, which plays a vital role during time of conflict, but CRAF aircraft do not have defensive systems and may not operate following chemical or biological attacks.

2.3 AIRLIFT AND WEAPONS SYSTEM ROADMAPS

The MAF conducts daily airlift operations around the globe in support of national objectives. This section first addresses the airlift requirements that the MAF must meet with its assigned and future force structure. Next, we recognize that airlift operations are diverse and include a review of the cargo airlift, passenger airlift, combat delivery, aeromedical evacuation, and special operations mission categories. Mission category roadmaps are designed to serve as approved flight plans to follow over the next 25 years, and guide us to fielding the required airlift capabilities. In the last section, we have included weapon system roadmaps, which provide course guidance for our aircraft modernization programs and modification programs.

Cargo Airlift Requirements. The Mobility Requirements Study FY2005 (MRS-05) established the

(b)(5)

(b)(5) [redacted]

(b)(5)

For the first time, the MRS-05 acknowledges our ongoing postures of engagement around the globe and prepares us for an adversary who has the capability and will to employ weapons of mass destruction (WMD). Even in the midst of a single major theater war, the MRS-05 recognizes the need for MAF responsibility to concurrently conduct special operations; continue the defense of our allied partners by deploying missile defense systems; and to maintain a small, but critical, presence in other theaters that demonstrates US resolve to preserve our commitments to allies and deter potential aggression by our adversaries.

While this requirement definition seems to “cover the earth” as a full solution, we must recognize two fundamental realities: our current capacity falls far short of supporting the warfighter alone, and (b)(5) [redacted] (b)(5) [redacted] When constraints regarding warning time; President, Vice President, Secretary of Defense, and Chairman of Joint Chiefs of Staff decision making; ARC mobilization and CRAF activation; levels of allied support; and wa (b)(5) [redacted]

(b)(5) [redacted]

There is no MRS-next scheduled at this time, but mobility airlift requirements to achieve additional mission capabilities not reviewed during MRS-05 are clearly greater than 54.5 MTM/D.

(b)(5) [redacted]

(b)(5) [redacted] We are currently funded to replace 270 C-141s with [redacted] C-5s that is unable to meet the wartime mission capable (MC) rate of 75%. Substantial investment is needed to negotiate a follow-on multiyear acquisition for C-17s and to modernize the C-5s to close the airlift gap by FY2010. (b)(5) [redacted] (b)(5) [redacted]

Certain steps are necessary to provide 54.5 MTM/D. It appears that the solution must be some combination of additional C-17s and C-5 improvements, including the Reliability Enhancement and Re-engining Program (RERP). AMC recommends beginning the C-5 RERP with the C-5B models and then undertaking a reliability, maintainability, and availability (RM&A) evaluation before deciding to RERP the C-5As. The options are illustrated in Figure 9. The size of the C-17 fleet needs to increase from 180 (currently programmed number) to a minimum of 222. If the fleet increases in size to 222 or beyond, Altus AFB would have an increased need for aircraft for training (TF). This may incur MILCON/support infrastructure requirements for the additional aircraft, as well as an adjustment to flying hour resource requirements.

(b)(5) [redacted]

[21] 1-4-2-1 force structure defense strategy is defined as defending the US homeland and territory against external attacks; deterring aggression and coercion in critical regions of Northeast Asia, East Asian Littoral, Middle East/Southwest Asia, and Europe; and swiftly defeating the efforts of an adversary in two overlapping wars while preserving the President's option to call for a decisive victory in one of those conflicts—including the possibility of regime change or occupation.

F Cargo Airlift Requirements. MRS-05 confirmed earlier requirement studies that determined (b)(5) [redacted] B-747-100 wide-body-equivalent (WBE) cargo aircraft (b)(5) [redacted]) is the maximum usable amount of CRAF to support either of two nearly simultaneous MTWs. Air mobility cannot exceed this (b)(5) [redacted] of capacity provided by the CRAF in any single theater due to the capacity of the airlift system and the requirements of military-unique cargo. Increasing CRAF participation beyond that level may cause the global mobility network to become saturated in terms of infrastructure and may adversely impact the organic capability to deliver outsize and oversize cargo. CRAF assets are capable of carrying some oversize cargo; however, other issues arise (such as longer loading times and floor strength concerns) when oversize is slated to be loaded on a civilian carrier. Additionally, CRAF cannot/will not fly in a chemically contaminated theater of operations, perform the special operations mission, or deliver Patriot launchers and missiles. Many theater combatant commander support missions move military unique payloads (outsize, classified, weapons, etc.), involve austere or politically sensitive destinations, or require specially trained crews that CRAF cannot accommodate. Finally, CRAF usage might actually drop off in a conflict where the enemy has used chemical weapons, making the availability of more CRAF unnecessary.

CRAF Passenger Airlift Requirements. (b)(5) [redacted] (b)(5) [redacted] In the analysis, troop delivery was constrained to a two-day window prior to the arrival of their equipment. The CRAF provides 93 percent of the total DOD passenger airlift capability for two nearly simultaneous MTWs. (b)(5) [redacted] (b)(5) [redacted]

CRAF Aeromedical Evacuation (AE) Airlift Requirements. The wartime AE requirement consists of two distinct areas: intratheater AE and intertheater AE. The intertheater requirement is met with a mix of organic lift and CRAF aircraft, while movement within the theater requires a mix of organic mobility airlift, primarily the C-130. For planning purposes, CRAF is designed to fulfill the vast majority of the intertheater movement requirement, with organic opportune lift being used to supplement the CRAF. The various combinations of aircraft complement each other by moving patients from forward bases to theater hubs and then interfacing with onward intertheater movement.

As of 1 March 2003, two carriers have committed a total of 45 B-767 aircraft to the Stage III AE CRAF segment. This current commitment exceeds the anticipated JCS lift requirement. AE shipset (AESS) kits, used to convert commercial passenger aircraft for the AE mission, provide the capability for 87 litters, medical crew, and 20 plus ambulatory patients. While AE CRAF requirements are currently met, the loss of one or both carriers could prove troublesome. The CRAF office has had significant difficulty in convincing other carriers to sign up to the program due to the extra risks involved (compared with standard passenger operations), especially the concerns with the proximity of the liquid oxygen subsystem to the electronic equipment compartment in the forward cargo hold.

Intratheater Airlift Requirements. C-130s are the backbone of the Air Force theater airlift fleet. In August 1997, HQ AMC formed a multi-command C-130 Tiger Team to identify problems with the C-130 weapon system and develop an integrated long-term plan to resolve the many issues. The team examined C-130 requirements, training issues, and fleet modernization strategies, and recommended a fleet beddown plan in its C-130 Tiger Team Final Report, published on 10 April 1998. The MAF commanders agreed to an investment strategy for this overall plan, which included the acquisition of simulators/training devices, replacing the oldest C-130s with new C-130Js, and completing the Avionics Modernization Program (AMP) for the C-130Es and C-130Hs. An updated Tiger Team Report was published on 30 April 1999 and was officially released to the public in June 1999.

In June of 1998, HQ AMC formed a similar team to focus exclusively on matters concerning the C-130J. A "911 Team" was organized to help bring this new aircraft smoothly on-line into the AMC fleet. Among the team's numerous challenges were to develop a concept of operations, training plans, beddown plans, operational test and evaluation plans, a procurement/delivery strategy, and Amended Program Objective Memorandum inputs. The team accomplished its goals and was formally disbanded in May 1999, although HQ AMC/A58 continues to monitor the C-130J program closely.

(b)(5)

[redacted]

Aeromedical Evacuation (AE) Requirements. Aeromedical evacuation is defined as a “specialized airlift mission,” which moves patients by fixed-wing aircraft to and between medical treatment facilities under the supervision of aeromedical evacuation crews. The Air Force remains the executive agent (per DOD Directive 4500.9), with AMC serving as the lead command (per AFPD 10-21), for aeromedical evacuation. The new deployable aeromedical assets are light, lean, and capable—transitioning from the 50-bed mobile aeromedical staging facility (MASF) of 39 personnel and 7 C-130 loads to an aeromedical element with incremental packages (AE liaison team, critical care air transport teams, MASF, and MASF augmentation) as needed for a total of 42 personnel and 13 pallet loads. This “early in” and limited footprint concept dovetails with the Army’s reduction of forward deploy medical units and the need to now airlift stabilized versus stable patients.[22] “This ‘targeted medical capability’ cannot be achieved without full integration of air evacuation into the airlift command and control network.[23]” The new AE peacetime and wartime system will use established mobility air routes/air bridges rather than scheduling separate missions. Instead of maintaining strategic and tactical trained aeromedical crews, “multi-role” or “multi-capable” AE crews will now fly aboard “multi-purpose” airframes transitioning from “dedicated” to “designated” airframes. The new thinking is: “Train as We Fight—Fight as We Train!”

Special Operations Requirements. The C-17 assumed the special operations mission from the C-141 in 2002. It is scheduled to assume the special operations mission of the C-5 by the end of FY04 making it AMC’s only remaining SOLL II Platform. The initial appropriation of 120 C-17 aircraft did not accommodate the special operations requirement; therefore 15 additional C-17s have been funded.

Strategic Brigade Airdrop. The airborne division-ready brigade, medium-force package is the airdrop requirement driving force structure planning. War planners need the flexibility, with the follow-on airland forces, to be able to use austere airfields not suitable for C-5 or C-141 operations. As formation-capable C-141s reach the end of their service life, we will transfer the requirement to the C-17 fleet. Analyses have determined that C-17s, modified with dual-row airdrop capability, will

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[22] Brfg (U), Brig Gen Bruce Green, AMC/SG, “Aeromedical Evacuation . . . CONOPs for the Future,” ca 31 May 02, E-Sup Doc 4-X; Point Paper (U), AMC/XPD, “Aeromedical Evacuation Doctrine,” 15 Oct 02, Sup Doc 4-; Brfg (U), AMC/DOOE, “Aeromedical Evacuation . . . Today & Enduring Freedom Predeployment Brief,” 20 Nov 02, E-Sup Doc 4-.
[23] Article, (U), MSgt Karen Petitt, “Air Mobility Command Medevacs Patients Quickly With Streamlined Process,” AMC News Service, 9 Apr 02, Sup Doc 4-.

meet Army strategic brigade airdrop requirements. The C-17 was certified in the strategic brigade airdrop role during FY97 with a successful initial dual row airdrop capability tested in FY98. Full mission capability will be reached after procurement of 120 C-17s.

Peacetime Airlift Operations. Planning factors are based on wartime requirements; however, peacetime airlift operations provide several components needed to ensure air mobility is ready to meet wartime requirements. Mission-ready crews, CRAF, and an infrastructure/en route structure are three components of wartime readiness achieved and maintained through peacetime airlift operations. Funding for these operations come largely from Transportation Working Capital Fund (TWCF) revenues. These are revenues paid by customers in return for airlift services. Day-to-day TWCF customer-based revenues cover most of the cost of strategic airlift aircrew currency training, commercial augmentation activity, and the cost of infrastructure. Efficient peacetime airlift operations make critical contributions to mobility readiness.

2.3.1 Cargo Airlift Roadmap

OPR: Airlift Mission Area Team

MAF Capability Statement

Provide the capability to move authorized supplies and equipment from port of embarkation (POE) to port of debarkation (POD), across the spectrum of conflict, in all operating environments.

Roadmap Assessment

While the MAF possesses the world's premier mobility capability, additional effort is needed to meet future capability requirements. First, we need to increase our airlift capacity to meet Joint Chiefs of Staff (JCS) requirements. In the near term and mid term, we intend to satisfy this shortcoming procuring more C-17 aircraft and also increasing the mission capability rates of our C-5 fleet through the C-5 Reliability Enhancement and Re-engining Program (RERP) modification program. We also recognize that changes in the operating environment suggest that we need to properly ascertain what changes, if any, are necessary to ensure our aircraft can accomplish the mobility mission in 2029. Improved connectivity and data transfer will provide the capability to seamlessly and automatically smart push and pull aircraft and aircrew voice, video, and data to permit near-real-time information flow and improved decision making. This includes timely information transfer of aircraft systems performance data, mission data (i.e., air refueling offloads and cargo/passenger), aircrew flight times, and currency data. Enhanced capability will provide automated systems for push-pull information transfer of dynamic retasking information, common operating picture, and predictive battlespace awareness (BPA). Flying local area networks (LANs) will permit access to communication systems from anywhere in the aircraft to support mission functions such as aeromedical evacuation, special operations, and brigade movement. Autonomous aircraft approach and landing systems will allow unrestricted operations, during adverse weather (low ceilings/visibility) at any airfield, regardless of the availability of ground-based navigation aids, airfield markings, and approach/runway lighting. Beyond aircraft programs, we will need to place continued emphasis on peacetime readiness training for our aircrews and support personnel. It is clear that our materials handling equipment (MHE) is aging and must be replaced; our MHE modernization programs, currently in progress, will solve that shortcoming. Advanced C2 systems will improve the effectiveness of cargo airlift operations and provide aircrews with real-time information in the cockpit, thus increasing our mission success rates. Lastly, we recognize the fact that we will need to operate in an ever more hostile threat environment; and therefore, we will need to pursue advanced aircraft defensive systems aggressively as well as acquire the equipment that will permit us to conduct mobility operations following weapon of mass destruction (WMD) attacks.

Capability Objective

Provide sufficient cargo airlift capability to satisfy JCS requirements in adverse weather and under hostile threat conditions.

Milestones

Short-Term (FY05-12)

(b)(5)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

2.3.2 Combat Delivery Roadmap

OPR: Airlift Mission Area Team

MAF Capability Statement

Provide the capability, using air refueling where necessary, to deliver combat personnel, their equipment and supplies in direct support of combat operations by airdrop to a precisely designated location or by airland operations at austere landing zones. Airdrop a brigade-size force over strategic distances and sustain combat forces by aerial delivery or airland operations. Combat delivery mission capability must exist at night or during periods of adverse weather and across the spectrum of conflict and in all operating environments.

Roadmap Assessment

The MAF operates the C-130, and we plan to continue it in service through 2029. We also recognize the combat delivery contributions that the C-17 can make with its capability to airdrop and operate from short fields. The C-17 is the backbone of our brigade airdrop capability during the near- and mid-term time periods. The effectiveness of the C-17 will increase with the implementation of the dual-row airdrop system and with the Large Aircraft Infrared Countermeasures (LAIRCM) modification. Improvements to the C-130 fleet are critical. The C-130 Avionics Modernization Program (AMP) will standardize the current mixed fleet of airlift C-130s. Together, C-130J and C-130E/H modernization initiatives reduce the number of aircraft variants from 20 to 2 core aircraft. This will significantly reduce the support footprint and increase the capability of the C-130 fleet. Additionally, this modification program will enable the fleet to meet known Global Air Traffic Management (GATM) requirements for the future. Improvements in line-of-sight and beyond-line-of-sight communication systems will provide the needed global connectivity for dynamic command and control (C2) and the interoperability to effectively interface with all theater C2 and aircraft for enhanced predictive battlespace awareness (PBA). Today, onboard C-130 radar systems provide a good capability to conduct approaches into airfields without ground-based navigation aids. Similarly, the C-17 is equipped with a computer system that could be used to accomplish approaches autonomously. However, neither system permits operations in near zero-zero weather conditions; more-capable autonomous aircraft approach and landing systems will allow us to operate unrestricted at any airfield, regardless of the availability of ground-based navigation aids, airfield markings, and approach/runway lighting. More effort is needed to further today's rudimentary capability. Beyond aircraft programs, we will need to place continued emphasis on peacetime readiness training for our aircrews and support personnel. We need to upgrade our C-130 simulators to Federal Aviation Administration (FAA) Level C+ capability. These improved, more-capable simulators will enhance the aircrew-training program significantly. Lastly, we recognize the fact that combat delivery missions are flown in direct support of combat operations and are commonly exposed to hostile weapons systems. We will need to equip these aircraft with the defensive systems necessary for them to complete their missions. Some aircraft do have defensive systems installed today, and aircraft armor is being added. Similarly, we can expect combat delivery operations to be necessary following weapon of mass destruction (WMD) attacks. More work is needed to ensure more of the combat delivery aircraft are equipped to operate in contaminated areas and also have updated defensive systems required to operate in the expected theater threat environment. The modernization of our C-130 forces strengthens our ability to ensure the success of our warfighting combatant commanders and lays the foundation for tomorrow's readiness. We know that the operations environment will continue to evolve and that over time, today's combat delivery fleet will need to be improved. Now is the time to begin the process--determine what combat delivery capabilities are needed, and establish the time line and milestones for fielding the improved capability.

Capability Objective

Deliver personnel, their equipment, and supplies in direct support of combat operations to unmarked drop zones or to landing zones in adverse weather conditions and existing threat environments. Conduct the airdrop of a brigade-sized force of personnel, their equipment, and supplies over strategic distances.

Milestones

Short-Term (FY05-12)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

2.3.3 Passenger Airlift Roadmap

OPR: Airlift Mission Area Team

<u>MAF Capability Statement</u>

Provide the capability to move authorized personnel from point of origin to point of destination, across the spectrum of conflict and in all operating environments.

<u>Roadmap Assessment</u>

A review of our passenger airlift capabilities drives a positive assessment. We are fortunate to have a viable and robust Civil Reserve Air Fleet (CRAF) to bolster our mobility capability during a time of conflict. We also recognize the outstanding contributions that the CRAF made during DESERT SHIELD and IRAQI FREEDOM, as well as the movement of passengers by the commercial carriers during contingencies and in daily peacetime airlift operations. Given the large dependency on civil carriers to move passengers, we must be cognizant that civil aircraft do not have defensive equipment, nor are they equipped to conduct operations following chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) attacks. The requirement to airlift passengers into locations with an increased threat of CBRNE attack clearly exists. This requirement, coupled with the drawdown of the C-141, suggests that we consider aircraft modifications to improve the passenger lift capability of our organic C-17 and KC-10 fleets. Implementation of an improved Tanker Airlift Control Center (TACC) command and control (C2) system will show benefits in our capability to provide passenger airlift through more efficient operations. When we focus our attention on our organic passenger airlift capabilities, we see similar needs as those identified for cargo airlift. First, we need to increase our airlift capacity to meet Joint Chiefs of Staff (JCS) requirements. With the retirement of the C-141 fleet, we intend to satisfy our airlift shortfalls with the procurement of additional C-17 aircraft, in addition to increasing the mission capability rates for our C-5 fleet through the C-5 Reliability Enhancement and Re-engining Program (RERP) modification program. Secondly, we also recognize the need to ascertain the future operating environment carefully to determine changes that may be necessary to ensure that the C-17 will be able to accomplish the mobility mission in 2029. Next, autonomous aircraft approach and landing systems will allow us to operate unrestricted at any airfield, during adverse weather (low ceiling/visibility) regardless of the availability of ground-based navigation aids, airfield markings, and approach/runway lighting. We will need to place continued emphasis on peacetime readiness training for our aircrews and support personnel. Lastly, we recognize the fact that we will need to operate in an ever increasingly hostile threat environment. Therefore, we will need to aggressively pursue adding defensive systems to our aircraft, as well as procuring the equipment that will allow operations following weapon of mass destruction (WMD) attacks.

<u>Capability Objective</u>

Provide passenger airlift capability to satisfy JCS requirements in adverse weather and hostile threat conditions across the spectrum of conflict.

Milestones

Short-Term (FY05-12)

(b)(5)

[redacted]

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

2.3.4 Aeromedical Evacuation Roadmap

OPR: Airlift Mission Area Team

MAF Capability Statement

Provide an Air Force aeromedical evacuation system capable of staging and moving patients across the spectrum of conflict and in all operating environments.

Roadmap Assessment

The C-141 fleet has historically performed the majority of peacetime intertheater aeromedical evacuation (AE) missions and the C-9 has been the workhorse for patient movements within the CONUS and in the European and Pacific theaters. The C-141 will leave the AF inventory by the fourth quarter of FY06 and the C-9A is scheduled to complete its last AE mission in FY03. These fleet retirements drove an analysis that determined the best method to move patients was not dedicated AE airframes. Rather, the AE mission will be flown in the future with organic mobility aircraft, equipped with Patient Support Pallets (PSPs) and required medical equipment. We need to consider, and incorporate as appropriate, AE requirements during the acquisition and development phase of all new AE-appropriate AMC airlift platforms. These requirements include: an integral therapeutic oxygen capability that can be distributed throughout the patient care area; access to 110 VAC/50-400 Hz electrical outlets; an ultra high fequency (UHF) satellite communications (SATCOM) terminal system (USTS), high frequency (HF), and very high frequency (VHF) voice and data link communications port in the patient care area; an environmental control mechanism to maintain the patient care area temperature at 60-80 degrees Fahrenheit; and either an integral or carry-on/carry-off litter support system. Additional mandatory assets include latrine, handwashing capability, and galley provisions. Tailoring AE medical unit type codes (UTCs) into incremental stages and the requirements to support developing contingencies and ongoing Air and Space Expeditionary Force (AEF) deployments will require manpower adjustments between MAF partners.

The return of patients to the continental United States (CONUS) during wartime is a responsibility that would largely fall to Civil Reserve Air Fleet (CRAF) B-767s, especially if required during the deployment stage when the organic force is required to deliver war materiel to the theater at maximum rates. Each B-767 in the CRAF requires an aeromedical evacuation shipset (AESS) kit to convert a commercial passenger aircraft to the AE configuration. As the B-767 fleet ages, both an alternative CRAF-AE platform and AESS kit requirement will need to be evaluated.

Inherent capability to provide peacetime and contingency AE support will be required in all appropriate AMC aircraft. Aeromedical evacuation crew members (AECMs) and critical care aeromedical transport teams (CCATTs) will be capable of providing inflight medical care on any of these platforms. Combining these capabilities will allow maximum flexibility to meet AE airlift requirements and match the vision of AE as a mission.

Improved connectivity and data transfer will provide the capability to seamlessly and automatically smart push and pull aircraft and aircrew voice, video, and data to permit near-real-time information flow and improved decision making. This includes timely information transfer of aircraft systems performance data, mission data (i.e., air refueling offloads and cargo/passenger), aircrew flight times, and currency data.

Capability Objective

Move patients from forward airfields to hospitals in the rear and definitive care facilities outside the theater during peacetime, across the spectrum of conflict, and in all operating and threat environments.

Milestones

Short-Term (FY05-12)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

[redacted]

(b)(5)

(b)(5)

(b)(5)

2.3.5 Special Operations Roadmap

OPR: AMC/A32

MAF Capability Statement

Provide airlift capability to execute JCS-directed special operations missions while extending the range of special operations with air refueling. Conduct operations in adverse weather and hostile threat conditions with AFSOC and AMC special operations aircraft.

Roadmap Assessment

AMC and AFSOC provide mobility for special operations activities with the long-range airlift capability of our C-17, C-5, and MC-130H aircraft, and the short range MH-53. Refueling support of fixed wing special operation aircraft is provided by KC-135s or KC-10s with rotary winged refueling accomplished by MC-130 aircraft. Given that the C-5 and C-17 aircraft have the inherent capability to transport outsized/oversized cargo transport over strategic distances, we have equipped them specifically for the missions tasked. Aircrew members receive the intensive, highly specialized and frequent training necessary to be a part of the special operations team. The KC-135 plays a significant role in refueling fixed wing special operations aircraft, thus extending their range and time on station. The C-17 has already proven its ability to perform the special operations mission. These aircraft were built with night vision goggle (NVG)-compatible cockpit lighting systems; special operations aircrew procedures are tested and approved, as well as the testing of specialized equipment. We have identified enabling capabilities in other roadmaps that will significantly assist us in performing the special operations mission. These enabling capabilities include improved aircraft defensive systems, adaptable electronic warfare (EW) jamming systems, detection awareness, detection avoidance systems, threat avoidance, real-time information in the cockpit, and an autonomous approach and landing capability. We recognize the challenges of operating in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment including the ability to transload/onload cargo and passengers between "dirty" and "clean" locations. This requirement is addressed in our cargo and passenger handling roadmap. Since none of the capabilities listed above are special operations forces (SOF)-unique, they are addressed as deficiencies for all combat delivery MAF forces and located in the combat delivery roadmap of this strategic plan. However, the capabilities described above should be given priority on special operations MAF assets since the SOF mission is generally exposed to the highest threat levels.

Capability Objective

Provide airlift capability to execute Joint Chiefs of Staff (JCS)-directed special operations missions while extending the range of special operations with air refueling. Conduct operations in adverse weather and hostile threat conditions with AFSOC and AMC special operations aircraft.

Milestones

Short-Term (FY05-12)

(b)(5)

[redacted]

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

[redacted]

(b)(5)

[redacted]

(b)(5)

2.3.6 Spacelift Roadmap

OPR: AFSPC/XPXK

MAF Capability Statement

Provide the capability to provide robust, responsive, and secure spacelift to support both routine and time-sensitive military operations and to reposition, recover, and service assets on orbit.

Roadmap Assessment

AFSPC's current fleet of launch systems is comprised of a mix of medium- and heavy lift expendable boosters. To provide command and control (C2) of these boosters, AFSPC maintains the Launch and Test Range System (LTRS) consisting of the Eastern Range located at Cape Canaveral AFS, FL and the Western Range located at Vandenberg AFB, CA. Early in the near-term, AFSPC will complete the transition from its heritage fleet of medium- and heavy-lift launch vehicles (Atlas IIAS/III, Delta II, and Titan IV) to the Evolved Expendable Launch Vehicle (EELV) families (Delta IV and Atlas V). AFSPC will sustain the EELV into the far-term when advanced launch systems and upper stages will be fielded to provide routine launch that is robust, responsive, and secure. Additionally, AFSPC will develop and employ Operationally Responsive Spacelift (ORS) to support on-demand launch operations with the potential of providing one or more orders of magnitude reduction in costs to enhance space access and responsiveness. For routine launch operations, EELV adequately covers our medium and heavy payload needs. AFSPC will continue to observe the development of commercial launch capabilities and assess their usefulness to the warfighter. Early in the near-term, AFSPC will complete the transition to the Range Standardization and Automation (RSA) program to increase range capability and streamline sustainment. In the mid-term, the current ranges will be evolved into the Global Launch & Test Range (GLTR) to provide the increased capacity, extended geographic coverage, shorter flight plan approval timelines, and concurrent operations that new responsive launch systems will require. All aspects of security, to include physical security requirements, for each of these evolving systems will need to be addressed as the systems are developed.

Capability Objective

Provide critical spacelift capabilities that enable the Space Force Enhancement, Counterspace, and Space Force Application mission areas to effectively perform their missions.

Milestones

Short-Term (FY05-12)

(b)(5)

[redacted]

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

2.3.7 C-5 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-5 provides passenger and outsized/oversized cargo airlift for both airland and Special Operations Low Level II (SOLL II). It is capable of airlifting 291,000 pounds of cargo up to 1,530 nautical miles (NM) or 180,000 pounds of cargo up to 3,200 NM. It is also capable of carrying 73 passengers, inclusive of cargo weight. With its unique visor door and kneeling capability, the aircraft can both load and offload (roll on/roll off) simultaneously. The weapon system is facing avionics obsolescence and Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) compliance challenges. It also has historically low mission capable (MC) rates (59-64%--AMC standard 75%) and reliability rates (~81%--AMC standard 85%). Two modernization programs address these C-5 problems: the Avionics Modernization Program (AMP) and Reliability Enhancement and Re-engining Program (RERP). AMP provides a fully supportable, CNS/ATM compliant avionics suite/"glass cockpit and digital upgrades to allow continued sustainment." RERP replaces engines with commercially proven, more powerful engines and addresses "bad actor" components; projected performance improvements include increases in fleet logistics departure reliability to 92% and MC rate over 75%. Upon completion of these two major modifications, the airplane will be designated the C-5M.

To ensure the C-5 can fulfill required mission capabilities, operation in the chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment must be addressed. Refer to the CBRNE Roadmap located in this document for deficiencies and solutions that apply to all weapon systems.

-- First Flight: 30 June 1968.
-- First Operational Aircraft Delivered: C-5A, 1969; C-5B, 1986.
-- Average Age of Fleet: C-5A, 32 years; C-5B, 15.5 years.
-- Payload/Range: 291,000 pounds (max) at 1530 NM; 180,000 pounds at 3,200 NM; max ferry range 6238 NM.
-- Crew Ratio: Active, 1.8; Associate Reserve, 1.8; Air National Guard and AF Reserve, 2.

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

[redacted]

C-5 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed Funding			Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
C-5 Reliability Enhancement and Re-Engining Program (RERP)	X	X	X	X		
Fuel Flow Transmitter	X	X				
Hydraulic Surge Control Valves	X	X				
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)						
Troop Floor Corrosion Prevention						
Malfunction Detection, Analysis and Recording System III (MADARS III)	X	X				
Link-16, Joint Tactical Radio System (JTRS)						
Emergency Power System Upgrade	X	X				
Transponder Upgrade	X	X				
Digital Flight Data Recorder (FDR) & Cockpit Voice Recorder (CVR)	X	X				
AAR-47 Missile Warning System			X	X		
Advanced Situational Awareness and Countermeasures (ASACM)						
Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)	X	X	X	X		

(b)(5)

Modification Explanations

C-5 Reliability Enhancement and Re-Engining Program (RERP)

RERP is a comprehensive modernization of the C-5 that improves aircraft reliability, maintainability, and availability. This effort includes replacing TF-39 engines with a more reliable commercial, off-the-shelf (COTS) turbofan engine with increased take-off thrust, reduced fuel consumption, Stage III noise compliance and FAR 34 emissions compliance. These new engines (along with new pylons, wing attach fittings and upgrades, and thrust reversers) increase payload capability, improve transportation system throughput, and decrease engine removals by five fold. Studies validate that RERP will increase Reliability, Maintainability, and Availability (RM&A) to levels comparable to other AMC aircraft, with substantial increases in aircraft availability and on-time departures. Currently, the TF-39 accounts for over 20% of the C-5 not mission capable (NMC) time. Replacing the aging TF-39 engine fleet with a modified commercial, off-the-shelf (COTS) engine should substantially increase C-5 reliability. Commercial, off-the-shelf engines should increase aircraft departure reliability to 92%. Additional re-engining benefits include a 22% increase in thrust, which will increase wartime mission throughput. The program upgrades numerous subsystems, including auxiliary power units (APUs), electrical, hydraulic, fuel, fire suppression, pressurization/air conditioning systems, landing gear, and the airframe. RERP replaces the Malfunction Detection, Analysis and Recording System III (MADARS III) with an Embedded Diagnostic System (EDS) which will improve maintenance repair time. EDS will provide improved Fault Isolation so that 99% of all faults will be solved using EDS and technical orders. All faults will be presented in English text.

Fuel Flow Transmitter

This modification replaces fuel flow transmitters, the C-5s #1 mission-delay item in FY98. In 1995, the transmitter failed 338 times. Repairing these failures and replacing condemned units is costly in terms of dollars, manpower and reduced mission capability. Replacing these units with more reliable, state-of-the-art units will result in reduced aircraft delays and increased aircraft availability. A total of 665 transmitters includes 4 per aircraft plus 161 for War Readiness Equipment (WRE). Field installation will be complete by the third quarter of FY04 using 3400 funding.

Hydraulic Surge Control Valves

Hydraulic surge control valves are currently being developed to reduce hydraulic failures associated with system use. Upon activation, the current system instantaneously applies over 3000 psi to the system. The new "slow opening" valves will allow for the even pressure build-up within the system. Prototype testing was completed in the third quarter of FY03. Kits will be installed by operational units using 3400 funding.

Large Aircraft Advanced Infrared Countermeasures (LAIRCM)

The LAIRCM mod is proposed for a total of 26 C-5Bs as part of a LAIRCM-equipped fleet of 444 MAF aircraft. AMC carried forward an FY06 POM initiative which would start development for LAIRCM mods on C-5Bs b ng in FY05 and modifying the first 26 aircraft in a single-turret configuration by the end of (b)(5)

Troop Floor Corrosion Prevention

Stress panels in the troop compartment latrine are corroding. To replace the panels, the entire latrine must be removed. This causes a 3-week programmed depot maintenance (PDM) delay. The C-5B-designed latrine will be installed on the C-5A. The C-5B latrine has a one-piece fiberglass floor pan, fiberglass walls, and a larger holding tank. Four C-5A aircraft have prototype kits installed. Fifty-five kits have been purchased. Kit installation will be programmed through the R&PC process. The requirement is approximately (b)(5)

Malfunction Detection, Analysis and Recording System III (MADARS III)

This modification is for the Multi-Function Display Controller Recorder (MDCR) for C-5 aircraft. The MDCR is a flight essential component of the C-5 Malfunction Detection Analysis and Recording System (MADARS II). This modification replaces four obsolete and unsupportable Line Replaceable Units (LRUs) that are currently part of the MADARS II system. MADARS II components replaced are (1) the Display Unit (DU), (2) the Controller (CNTRL), (3) the Maintenance Data Recorder (MDR), and (4) the Printer. In addition, this modification eliminates the current SATCOM laptop computer and printer (located in the C-5 cockpit), and transfers the SATCOM functionality to the MDCR (workstation). This modification consists of the following five LRUs: (1) Uninterruptible Power Supply, (2) Work Station Assembly, (3) Communications Controller (CC), (4) Graphics Print Out Unit, and (5) Voltage converter. The MADARS II MDR and DU functionality are replaced by a ruggedized COTS laptop workstation that records flight data onto a PC card instead of the current MDR magnetic tape. A COTS graphics printer replaces the current POU printer functionality. The Communications Controller (CC) computer replaces the CNTRL functionality and also redundantly records flight data in a real time environment. The CC routes all data to the graphics printer under normal operation and in the event of a workstation malfunction. Flight test of the Prototype was completed 3rd Qtr/FY03. The program has $9.9M in FY02/03 production funding for 112 aircraft. Contract Field team kit installation will begin 4th

Qtr/FY03 and complete in FY04.

Link-16, Joint Tactical Radio System (JTRS)

JTRS is a joint program that is using spiral development to produce a software compliant architecture radio supporting multiple waveforms. OSD has issued a mandate that no more aircraft radios can be purchased that are not JTRS or JTRS compliant. They've also tasked the AF to develop a migration schedule to JTRS for all platforms. The AMC plan is to initially migrate to JTRS for Tactical Datalink (Link-16) and Ultra High Frequency (UHF) Satellite Communications (SATCOM). Installation is projected starting in FY08 (JTRS airborne cluster is not available until FY08). JOINT TACTICAL RADIO SYSTEM (JTRS) ORD Version 3.2, JROCM 087-03, 9 April 2003. Advanced Situational Awareness/Countermeasures CDD, Draft, in AFROC Coord.

Emergency Power System Upgrade

C-5 Emergency DC Power System Upgrade provides increased electrical capacity for emergency use. Current system is original system designed 36+ years ago. Load analysis indicates DC power buses exceed emergency generator capacity and are projected to exceed capacity by ~ 25 amps when C-5 AMP is installed. Initiative replaces the current system (3 KVA generator and two 5 amp-hr batteries) with a new 6.5 KVA MOTS generator and one 54 amp-hr battery. The upgrade also adds two new 100-amp Regulated Transformer Rectifier Units (RTRU), a battery charging system, and modifies the Flight Engineers DC Control Panel.

Transponder Upgrade

The addition of SI code capability is an ICAO amendment 73 mandate that must be complied with before March 2009. It is needed to correct current deficiencies in European airspace. The current C-5 APX-100 (IFF transponder) provides an identifier code; however, due to increased airspace utilization and interrogators utilization there currently are not enough identifier codes available. SI codes are basically the same functionality but provide a longer digital word so additional identifier codes can be assigned. Not being assigned an identifier code by ground interrogators creates a situation where ground controllers are unaware of all aircraft in their assigned airspace; thereby, significantly increasing the possibility of mid-air mishaps. The additional extended squitter capability is to automatically provide additional aircraft parameter information to ground controllers. This is also an ICAO amendment 73 mandate that must be complied with before March 2009. This enhancement is designed to improve airspace safety by reducing ground controller workload, which continues to increase exponentially as airspace utilization increases. The current C-5 transponder (APX-100) has the capability to provide some of the needed parameters. To provide the remaining parameter, there is a need to modify the APX-100 software as well as the Flight Management System (FMS) software. Enhanced Surveillance is a new capability that automatically provides flight parameter information to ground controllers. To accomplish this enhancement, the software in the APX-100 (IFF transponder) needs to be updated to send numerous flight parameters to ground controllers every 3 seconds. Additionally, there is a need to modify FMS software and aircraft wiring. There is a military concern that providing this additional information automatically could compromise mission security, and endanger flight crews. The current design standard does not allow for the ability to turn off this signal to meet military needs.

Digital Flight Data Recorder (FDR) & Cockpit Voice Recorder (CVR)

FDR and CVR are flight critical systems and required for safety compliance. They capture data used by a crash investigation to determine cause of the incident and to provide recommendations to improve equipment and procedures. FDR and CVR are becoming difficult to support due to parts obsolescence and do not meet current survivability requirements. Mod will replace both line replacable units (LRUs). Executing the modification will reduce combined maintenance man hours (MMH) by 86% (1,184 hrs to 169)(DFDR reduced 90%; CVR reduced 80%). HQ USAF/SE and XO have mandated FDR and CVR on all troop/passenger aircraft.

AAR-47 Missile Warning System

This modification is applicable to the 50 C-5B and 1 C-5A that currently have the AAR-47 system already installed. The AAR-47 components are: Control Processor (1), Controller Indicator (1), Aft Sensors (2), Fwd Sensors (2), Signal Repeaters (2). To continue to provide protection for AMC C-5 aircraft against infrared (IR) guided surface-to-air missiles and correct system obsolescence issues, the missile warning system must be modified. Older sensors on MWS are degrading and are unable to detect an approaching missile, leaving the aircraft and crew vulnerable. Further, advances in technology have rendered various system components obsolete. Optical sensors chemically decompose, blinding MWS sensors to a threat missiles signature. Failing sensors must be replaced to maintain a missile warning system capable of detecting IR surface-to-air missiles. Obsolete parts must be replaced to ensure the MWS remains logistically supportable. Without a functioning MWS, AMC crews and aircraft are vulnerable to the IR SAM threat. The Navy-managed, optical sensor replacement program replaces all four MWS optical sensors, upgrades the MWS computer processor software and hardware, and provides a new control indicator. AF1067, AMC 01-041.

Advanced Situational Awareness and Countermeasures (ASACM)

ASACM addresses AMC radio frequency countermeasures mission need statement, Nov 00. System will initially provide advanced SA capability for threat avoidance by upgrading RWRs with precision location and identification (PLAID) capability—anticipated fielding in FY06. Adds coordinated countermeasures to limited number of MAF aircraft for response to defeat or degrade threat systems if avoidance is impossible. Presently is an unfunded POM initiative with an anticipated CDD approval beginning in Jan 05.

Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)

AMP modifications combine two major ORDs for the C-5. Both the CNS/ATM and the All Weather Flight Control System (AWFCS) requirements are included in this program. Some of the CNS/ATM items include: HF, data link capability; upgraded Global Positioning System (GPS) receivers; International Maritime Satellite (INMARSAT) communications (voice and datalink); and a Required Navigation Performance (RNP) certified Flight Management System (FMS). The AWFCS effort replaces low reliability avionics components in the autopilot/flight augmentation systems with new digital systems. It also replaces unsupportable flight and engine instruments with a new digital electronic display suite. Projected reliability of the avionics systems is represented by a five-fold increase in mean time between failure (MTBF). SECDEF directed safety modifications are installed to include both Traffic Alert and Collision Avoidance System II (TCAS II) and Terrain Awareness and Warning System (TAWS). Risk to both program and funding is being mitigated by use of a single (competitive) source for integration development, kits, installation, and options for follow-on support. The TCAS portion of the AMP was accelerated and completed in FY02. Installation of new communications and surveillance equipment to improve air traffic management under CNS/ATM will allow the C-5 to take advantage of optimum air routes. Non-CNS/ATM-compliant aircraft will be unable to fly without special approval in European airspace or the oceanic track systems as new CNS/ATM procedures are implemented beginning in March 2005.

2.3.8 C-9 Roadmap

OPR: AMC/A58

Weapon System Assessment

The mission of the C-9C is to provide first-class operational support airlift of very important persons (VIPs), travel teams, and critical mission support items supporting war, peacetime, homeland defense and contingency requirements. Additionally, the C-9C enhances the flexibility of the combatant commander travel support aircraft pool by providing a medium volume/range alternative. The C-9 is a twin-engine, T-tailed, medium-range, swept-wing jet aircraft based on the commercial DC-9-30. Air Force Reserve Command (AFRC) currently possesses 3 C-9A's stationed at Scott AFB.

The current fleet of C-9Cs received funding from Congress to modify them with hush kits. This will allow the aircraft to become Stage III compliant and reduce engine noise emissions. The way ahead for this airframe is to transfer the C-9Cs from Andrews AFB to Scott as the C-40Bs are delivered to Andrews. The C-9Cs would replace the C-9A's on a one-for-one basis between March and November 2005.

-- First Operational Aircraft Delivered: August 1968.
-- Average Age Fleet: 30 years.
-- Range: 1,739 nautical miles (NM).
-- Crew Ratio: Active Duty, 2.0 for C-9C; Air Force Reserve Command (AFRC), 2.1.

(b)(5)

C-9 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5) [redacted]	
Airworthiness Directives/Service Bulletins	X	X				

(b)(5) [redacted]

Modification Explanations

Airworthiness Directives/Service Bulletins

The C-9 is a FAA-certified aircraft. Consequently, it is required to comply with all FAA airworthiness directives. Service bulletins affect safety, product improvement, maintenance, and reliability and are necessary to comply with and maintain FAA certification and compliance.

2.3.9 C-12 Roadmap

OPR: AMC/A58

Weapon System Assessment

The aircraft provides on-call, rapid-response, modern air transport for high-priority supply and movement of key personnel. Specifically, it is used for very important person (VIP) transport or to deliver repair parts/equipment, and technical, crash investigation, and accident investigation teams wherever needed. Its support role also includes such functions as range clearance, medical evacuation, and administrative movement of personnel, transportation connections, and courier flights.

As a worldwide deployed aircraft, the C-12 lacks the necessary equipment to be compliant with current and future global airspace requirements. Primarily used for embassy support, the aircraft operates in a wide range of environments. From landing on unimproved runways at austere locations to working out of international airports, the C-12 needs the right equipment to navigate through all extremes. The C-12 does not meet Global Air Traffic Management (GATM) and Air Force navigation safety (nav safety) Master Plan requirements; the fleet has serious reliability, maintainability, and supportability (RM&S) issues.

The Electronic Flight Instrumentation System (EFIS) upgrade meets USAF and long-term communication, navigation, surveillance/air traffic management (CNS/ATM) requirements such as Required Navigation Performance (RNP), Precise Positioning Service (PPS), Global Positioning System (GPS), Traffic Alert and Collision Avoidance System (TCAS) II, and Terrain Awareness and Warning System (TAWS). It also employs a high-fidelity, large-format display system, data link-based flight management system, and radio tuning system. It retains existing baseline avionics recently modified by the USAF that satisfy specified USAF and CNS/ATM requirements, thereby maximizing USAF investment in these avionics. Other capability enhancements would be a modification to install electronic countermeasures (ECM) and engine exhaust suppression devices on C-12Cs/Ds to reduce infrared (IR) signature and provide electronic countermeasures protection against IR missiles. Lastly, the Raisbeck Enhanced Performance Package is a commercial modification that could significantly improve the aircraft in one or more of these areas: payload, range, block speed, operational flexibility, economy, and style. It consists of quiet turbofan propellers, ram air recovery system, high-floatation gear doors, nacelle wing lockers, enhanced performance leading edges, and dual-aft body strakes.

AMC is lead command for the C-12, but owns no aircraft. AFMC pays for operational control of the aircraft while AMC maintains lead command responsibilities for configuration management.

-- First Operational Aircraft Delivered: 1974.
-- Average Age of Fleet: 24.6 years.
-- Range/Payload: 1,974 nautical miles (NM)/8 passengers/2,647 pounds of cargo (56 cubic feet).
-- Crew Ratio: 2.0.

(b)(5)

** REPLACEMENT/MODERNIZATION FORECAST

There has been no analysis done to identify when a replacement effort should begin. Taking into account average flight hours and the Service Life Extension Plan (SLEP) by Raytheon at the 30,000-hour point, the C-12 is a long way from meeting a major overhaul requirement. However, this point should be identified, along with major modifications and future requirements, in order to frame an accurate picture of the C-12 fleet. The EFIS "glass cockpit" avionics upgrade will meet and exceed known future requirements, but technology moves rapidly and thus a continued look into future requirements is needed. A more formal study should be done that takes into account current/future modernization efforts and parts obsolescence.

**There is currently no requirement document/initiative to begin a replacement effort.

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

C-12 Program/Modifications

Program/Modification	Past FY04	Execution FY05	Programmed Funding FY06	FY07	Estimated Completion (b)(5)
Electronic Flight Instrument Program (EFIS)	X	X	X		[redacted]
Countermeasures					
Raisbeck Enhanced Performance Package					
Simulator Upgrades	X	X	X	X	
Low Cost Modifications	X	X	X	X	
Service Bulletins	X	X	X	X	

(b)(5) [redacted]

Modification Explanations

Electronic Flight Instrument Program (EFIS)

This approach meets USAF and long-term communication, navigation, surveillance/air traffic management (CNS/ATM) requirements such as Required Navigation Performance (RNP), Precise Positioning Service (PPS), Global Positioning System (GPS), Traffic Alert and Collision Avoidance System (TCAS) II and Terrain Awareness and Warning System (TAWS). It also employs a high-fidelity large-format display system, a data link-based flight management system, and a radio tuning system. It also retains existing baseline avionics recently modified by the USAF that satisfy the USAF and CNS/ATM requirements specified, thereby maximizing the USAF investment in these avionics.

Countermeasures

This modification installs electronic countermeasures (ECM) and engine exhaust suppression devices on C-12C/D to reduce infrared (IR) signature and to provide electronic countermeasures protection against IR missiles.

Raisbeck Enhanced Performance Package

This commercial modification significantly improves the aircraft in one or more of these areas: Payload, Range, Block Speed, Operational Flexibility, Economy, and Style. It consists of quiet turbofan propellers, ram air recovery system, high floatation gear doors, nacelle wing lockers, enhanced performance leading edges and dual aft body strakes.

Simulator Upgrades

No additional information available.

Low Cost Modifications

Aircraft procurement (3010) funds for small mods where costs do not exceed $2.0M each year.

Service Bulletins

The C-12 fleet requires funding to comply with contractor product improvements incorporating Raytheon and other outside organizations' service bulletins, identified as items recommended for USAF compliance. (b)(5) [redacted]

2.3.10 C-17 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-17 is the Nation's core military airlifter. Initial squadron operations began June 1993 with the first aircraft delivery to Charleston AFB, and AMC/CC declared initial operational capability on 17 January 1995. The C-17 provides direct-delivery options; the air movement of cargo and/or personnel from an airlift point of embarkation (POE) to a location as close as practical to the customer's final destination. It is the only aircraft capable of delivering outsize cargo to small, austere airfields. It is also capable of aerial delivery, night vision goggle (NVG) operations, nuclear weapons transportation, and aeromedical evacuation. The C-17 provides the flexibility to support both intertheater and intratheater missions and allows AMC to significantly improve throughput during contingency operations. The aircraft is designed to carry up to 102 troops (188 troops with new palletized seating system), 36 litter patients, or 18 standard 463L pallets. To ensure the C-17 can fulfill required mission capabilities, operation in the chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment must be addressed. Refer to the CBRNE Roadmap located in this document for deficiencies and solutions that apply to weapon systems.

-- First Flight: 15 September 1991.
-- First Operational Aircraft Delivered: 14 June 1993.
-- Range: 160K pounds at 2,400 nautical miles (NM); 110K pounds (threshold) at 3,200 NM.
-- Max Ferry Range: 4,600 NM.
-- Crew Ratio: 5.0.

(b)(5)

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[redacted]

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(b)(5)

(b)(5)

[redacted]

(b)(5)

[redacted]

C-17 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5) [redacted]	[redacted]
AN/AAR-47 Sensor Upgrade Program	X	X	X	X		
On Board Inert Gas Generating System (OBIGGS)-II	X	X	X	X		
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)	X	X	X	X		
Fuel System Redesign	X	X	X	X		
Joint Precision Airdrop System (JPADS)						
Combat Lighting	X	X	X	X		
Airborne Network Integration (ANI)						
Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM)	X	X	X	X		
Radar Warning and Countermeasures Capability						

(b)(5) [redacted]

Modification Explanations

AN/AAR-47 Sensor Upgrade Program

Commodity modification to AN/AAR-47 processors procured prior to FY99 buy. Improve throughput and memory reserves. Improve probability of detection, increase warning times, reduce false alarms, add new threats to be detected, and add Mil-Std-1553 interface. Update software to Ada. Provides for recurring flight test efforts required by Group B GFE software block cycle updates. Provides for WR-ALC installation costs of ALE-47 and AAR-47 hardware and software updates (memory & processor). Provides for study of alternate MWS(s) to replace the AAR-47 in FY-2000 to address FOT&E MWS deficiencies. Provides for Boeing's participation in the Air Force Labs Large Aircraft IRCM (LAIRCM) ATD (LIFE).
Impact: No memory reserve for software upgrades. Limited ability to improve threat detection and false alarm performance. Incompatible with future sensor upgrade.
Fix: Install new processor circuit card, mother board in Lot I, II, & III boxes; install Ada S/W.
Status: Fielding underway (P-113 cut in). Navy is lead service.

On Board Inert Gas Generating System (OBIGGS)-II

OBIGGS improvements needed to decrease crew workload, improve suitability, operational capability, survivability, and reliability. Impact: The current system requires flight crew preflight mission planning to ensure the aircraft profile does not place excessive demands on the OBIGGS system resulting in explosive vapors in the fuel tank ullage area. System improvements are also needed to reduce ground servicing times and servicing requirements. Lastly, all system modifications must improve current system reliability. Fix: Improve system operational capability, suitability, and reliability. Status: SPO is pursuing two courses of action: the first is to retrofit current system reliability upgrades (P-100 cut in) and the second is to complete development of the final OBIGGS-II solution (P-138 cut in).

Large Aircraft Advanced Infrared Countermeasures (LAIRCM)

LAIRCM provides a highly effective defensive system capability for transport and tanker aircraft against IR SAMs, including the proliferating IR Man-portable Air Defense Systems (MANPADS) threat. The LAIRCM system consists of an improved missile warning system and directed laser countermeasures system. .
Impact: Without upgraded systems, aircraft will not have the capability to address future threats. This upgrade will also help defeat threats during SOLL II operations.
Fix: Develop a Large Aircraft Infrared Countermeasures (LAIRCM) system. Should include advanced missile warning, [redacted] er, and improved flares.
Status: 12 aircraft fielded; (b)(5) [redacted]

Fuel System Redesign

Fuel system redesign is needed to eliminate unreliable fuel quantity indications and increase reliability of fuel system components. Furthermore fuel system deficiencies have led to contaminated fuel tanks, fuel venting which leads to environmental concerns, mission and maintenance impacts; and aircraft performance penalties. Impact: Apple jelly (viscous mix of icing inhibitor and water) and water accumulation have resulted in fuel tank contamination and gauging inaccuracies. The contamination causes the compensators to give erroneous readings resulting in fuel overfills and also corrodes the fuel system structure and components. Excessive water also introduces the possibility of icing at the pumps inlet, which could result in engine flameouts. As a result of the contamination, there has been increased maintenance activity such as BPO sumping, compensator washes and fuel spill clean ups. The flight crews are required to manually manage fuel loads above 135K and include a gross take-off weight penalty due to the gauging inaccuracies.
Fix: Redesign fuel system and fuel quantity gauging system.
Status: Production cut-in at P-100 (Mar 03). Retrofit complete by Dec 06.

Joint Precision Airdrop System (JPADS)

JPADS will provide the means to meet the COCOM requirement of sustaining combat power using high altitude, precision airdrop, as a direct and theater delivery method, into a dynamic, dispersed, and unsecure battlespace. This must be done with speed and flexibility to provide an optional capability previously unavailable to the COCOM, and to enable decisive operational superiority.

C-17 requires capability to conduct unilateral, joint, and other DOD combat, resupply, and humanitarian high altitude airdrop operations with accuracy standards that meet Army requirements (100 meter accuracy) and enhance survivability of AMC assets (stand-off and altitude – greater than 2000 ft and up to FL350). There is insufficient equipment onboard to permit accurate airdrops from high altitudes. Reference: JPADS Advanced Concept Technology Demonstration Implementation Directive, 17 Nov 03.

Combat Lighting

Current NVG capabilities are limited and increase aircraft vulnerability. Most cockpit lighting is NVIS compatible and meets aircrew and customer requirements. However, none of the exterior lights or cargo compartment lights are NVIS compatible or covert. Exterior IR lighting, including anti-collision beacons, landing/taxi lights, and formation lights, will be controllable from a single switch in the cockpit. At the flip of a switch, the crew could extinguish all exterior overt light sources and illuminate the above-mentioned light sources. In addition to these exterior lights, the cargo compartment must also have NVIS compatible lights, also controlled from a single switch. Cargo compartment lighting must be able to be controlled by forward, middle, and aft sections. Exterior lighting must have the capability to select either an NVIS-compatible, FAA-compliant mode or a covert lighting mode. Impact: Lighting for SOLL II, airdrop, and air-land wartime/training mission requirements not met. Fix: Procure lights that meet C-17 NVG lighting requirements. Require all future aircraft procurements to be NVG compatible in all respects. Status: Cargo compartment covert and NVIS-compatible lighting cut-in at P-127, fleet retrofit complete Dec 04. External combat lighting production cut-in at P-153.

Airborne Network Integration (ANI)

AMC has a global secure and non-secure communications requirement to meet AMC missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the Global Information Grid (GIG) to support C2 voice and data requirements, transfer aircraft status and position information to secure TDL, and provide aircraft IP addressability within the GIG for sharing of operational data. AMC's plan is to use JTRS Program radios to provide required capabilities not provided by Global Air Traffic Management modifications or Avionics Modernization Programs (e.g. Airborne Networking, wide-band applications, etc). ANI will satisfy requirements in Real Time Information to the Cockpit (RTIC) AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3), Joint Tactical Radio System (JTRS) ORD Version 3.2, JROCM 087-03, 9 April 2003, and Advanced Situational Awareness and Countermeasures (ASACM) CDD (Draft currently in AFROC coordination). ANI development is contingent upon availability of JTRS low rate initial production projected in late FY08.

Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM)

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management (ATM). The ability to reduce aircraft separation and implement other new ATM procedures, while maintaining or improving safety standards, is based on the use of new technology.

Radar Warning and Countermeasures Capability

A radar warning and countermeasure system is needed on the C-17 to alert the crew of acquisition by air and ground-based enemy target tracking by threat systems and to defeat the incoming threat.
Impact: Installation of this system will increase situational awareness, especially in theaters where no intelligence gathering platforms are available. Aircrew and aircraft survivability will be enhanced with a countermeasure system. This system is critical for SOLL II operations and will ensure the C-17 has the same capability as the C-141 SOFI aircraft presently performing the special ops mission. The C-141 SOFI aircraft are modified with the ALR-69 Radar Warning Receiver (RWR).
Fix: Develop Advanced Situational Awareness/Countermeasures (ASACM) capabilities including Precision Location and Identification (PLAID) and future countermeasures on a portion of the C-17 fleet.
Status: (b)(5) [redacted]

Heads-Up Missile Warning System (MWS). Missile warning system indications need to be presented in the field of view of both pilots.
Impact: This modification will increase safety of flight by preventing a "heads down" situation by both pilots while trying to determine the location of an incoming missile. Also, this will allow a quicker reaction to the indicated threat. The reaction time of the crew is critical to defeating an incoming missile. This system will also help during SOLL II operations.
Fix: Move current MWS indications from the throttle pedestal into the field of view.
Status: (b)(5) [redacted]

2.3.11 C-21 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-21's primary mission is the training and aging of the crew force through the transportation of critical personnel and cargo with time, place, or mission-sensitive requirements. This mission satisfies high-priority, small-volume airlift requirements that cannot be efficiently moved by other means.

In order to meet these requirements, the C-21 is beginning to fall behind in meeting current/future Global Airspace Traffic Management (GATM) requirements. Aircraft are currently restricted from operating in designated reduced vertical separation minimum (RVSM) airspace across the globe, delaying distinguished visitor (DV) travel due to the increased need for fuel stops. Along with this, transponder (Mode S and Mode 5) changes, as well as the Traffic Alert and Collision Avoidance System (TCAS) II Version 7 upgrade is forcing mandatory restraints that cannot be accomplished at this time. The capabilities associated with these upgrades will allow the aircraft to fly unrestricted in the congested airspaces of Europe, the North Atlantic, and the Pacific.

-- First Operational Aircraft Delivered: 1984.
-- Average Age of Fleet: 19 years.
-- Range/Payload: 2306 nautical miles (NM)/8 passengers/3,153 pounds of cargo (42 cubic feet).
-- Crew Ratio: 1.13.

** REPLACEMENT/MODERNIZATION FORECAST

Currently, AMC's best resource for a replacement decision: Jan 04 RAND study MR-1763-AF "Investigating Optimal Replacement of Aging Air Force Systems;" available online at http://www.rand.org/publications/MR/MR1763. RAND's objective was not to come to a definitive conclusion, rather present an analytic methodology to be used as part of a more detailed analysis—a tool for replacement decisions. Taking into account average flight hours and the cost involved for a Service Life Extension Program (SLEP) by Learjet at the 20,000-hour point, an estimate for when the C-21 should begin procurement of another commercial derivative aircraft is 2012. The SLEP will cost around $500,000, half the residual value of the C-21; thus it would be cost-prohibitive to upgrade the aircraft. Although the C-21 is only 20 years old, it has already reached the point where aircraft systems are becoming unsupportable by the commercial sector.

** There is currently no requirement document/initiative to begin a replacement effort.

**C-21 Force Structure – AMC is lead command for 76 aircraft

(b)(5)

[redacted]

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(b)(5)

(b)(5)

C-21 Program/Modifications

Program/Modification	Past FY04	Execution FY05	Programmed Funding FY06	FY07	Estimated Completion
Service Bulletins	X	X	X	X	(b)(5) [redacted]
Reduced Vertical Separation Minimums (RVSM)					
Fuel Imbalance					
Flight Data Recorder (FDR)					
TCAS II Version 7/Mode S Level 2 Elementary Surveillance	X	X			
Enhanced Mode S/Mode 5					
PACAF Oceanic Navigation	X				
USAFE SPECTRUM	X				
Secure Communications	X	X			
Simulator Upgrades	X	X	X	X	
Low Cost Modifications	X	X	X	X	

(b)(5) [redacted]

Modification Explanations

Service Bulletins

The C-21 fleet requires funding to comply with contractor product improvements incorporating Learjet and other o [redacted] e bulletins, identified as items recommended for USAF compliance. (b)(5) [redacted]

Reduced Vertical Separation Minimums (RVSM)

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and Global Air Traffic Management (GATM) mandates, which are necessary for worldwide, unrestricted airspace access.

Fuel Imbalance

Modify existing C-21 fuel system to warn the flight crew of hazardous fuel imbalance condition before the imbalance affects the aerodynamic stability of the aircraft and leads to loss of flight control authority.

Flight Data Recorder (FDR)

Currently, the FDR installed on the C-21 is facing obsolescence and safety issues related to recent mishaps. It needs to be replaced in order to comply with Navigation Safety (Nav Safety) equipment mandated by the Secretary of Defense (SECDEF) and the Chief of Staff of the Air Force (CSAF).

TCAS II Version 7/Mode S Level 2 Elementary Surveillance

TCAS II Version 7 logic is an Aircraft Collision Avoidance System (ACAS) II compliant system as required by the European Civil Aviation Authorities (CAA) and other ICAO regions. ACAS II is the internationally recognized and accepted version of TCAS. Implementation is mandated by 2005 with military waivers until 2008.

Enhanced Mode S/Mode 5

Mode S Elementary Surveillance is defined as the carriage of a Level 2 Mode S transponder that can support air-ground reporting of aircraft identification (radio call sign) and data link capability via the Mode S ground-initiated Comm-B protocol. The European Civil Aviation Authorities (CAA) and other ICAO regions require this. Implementation is mandated by 2005 with military waivers until 2008

PACAF Oceanic Navigation

Required in the Pacific in order to ensure aircraft meet FAA GPS remote/oceanic navigation requirements. This modification entails equipping the aircraft with dual independent navigation systems.

USAFE SPECTRUM

This modification is for four (maybe more) USAFE C-21s to be modified with the SPECTRUM patient transport module. USAFE C-21s are going to be required to pull Bravo AE alert after the retirement of the C-9s in the USAFE theater beginning FY05.

Secure Communications

Modify the C-21 fleet with a stand-alone system with a supporting satellite infrastructure that can provide genuine independent and global secure connection worldwide if necessary. This upgrade will provide Combatant Commanders the capability to stay in contact with senior leaders and forces under their command.

Simulator Upgrades

No additional information available.

Low Cost Modifications

Aircraft procurement (3010) funds set aside for small modifications where costs do not exceed $2M each year. Examples include reconfiguration of the passenger seats to stow the Emergency Passenger Oxygen System (EPOS) and the modification of certain aircraft to accommodate the SPECTRUM patient transport module.

2.3.12 C-130 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-130 is the primary combat delivery aircraft for the US military. Its mission is to provide rapid transport of personnel or cargo for delivery by parachute to a designated drop zone, or by landing at austere locations within the theater of operations. A highly versatile weapon system, C-130 variants routinely provide combat delivery capability, penetrate hurricanes, provide combat communications links, facilitate rescues on land or at sea, service our remote stations at the North and South Poles, refuel aircraft, broadcast radio and television messages, deliver ordnance, and fight forest fires. In addition, C-130s augment strategic airlift forces and support humanitarian, peacekeeping, and disaster relief operations when needed.

Combat Delivery C-130s do not meet Global Air Traffic Management (GATM) and Air Force Navigation Safety (nav safety) Master Plan requirements; the fleet has serious reliability, maintainability, and supportability (RM&S) issues; and aging C-130s are reaching the end of their service life.

The Air Force plans to replace 150 of the oldest C-130Es with the C-130J. The C-130 Avionics Modernization Program (AMP) modifies 311 combat delivery aircraft addressing the avionics related RM&S and nav safety/GATM problems, as well as, training and interoperability issues. Specific non-avionics equipment shortfalls (engine, environmental, auxiliary power unit [APU]) must still be addressed. While there is currently no written requirement for a replacement for the C-130 weapon system, current plans call for introduction of the Advanced Mobility Concept-X (AMC-X) in 2022.

To ensure the C-130 can fulfill required mission capabilities, operation in the chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment must be addressed. Refer to the CBRNE Roadmap located in this document for deficiencies and solutions that apply to all weapon systems.

-- First Flight: 7 April 1955.
-- First Operational Aircraft Delivered: 9 December 1956.
-- Average Age Of Fleet: Over 29 years for active duty aircraft.
-- Payload/Range: 25,000 pounds at 2,500 miles; max ferry range is 5,200 miles.
-- Crew Ratio: Continental United States (CONUS) Active, 2.0; Overseas Active, 1.75; Air National Guard (ANG), 2.0; Air Force Reserve Command (AFRC), 1.75.

(b)(5)

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[redacted]

(b)(5)

(b)(5)

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C-130 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed Funding		Estimated Completion
	FY04	FY05	FY06	FY07 (b)(5)	
Electrical System Upgrade	X				
Autopilot/GCAS	X	X			
Enhanced TCAS	X	X	X		
C-130 Avionics Modernization Program (AMP)	X	X	X	X	
ALR-69	X	X	X	X	
C-130 Generator Disconnect					
Synchrophaser Wiring (BAR)	X	X			
Service Bulletins	X	X	X	X	
Low Cost Modifications	X	X	X	X	
Link-16, Joint Tactical Radio System (JTRS) [C-130 E/H/J]					
Global Air Traffic Management (GATM) [C-130 J]	X	X	X	X	

(b)(5)

Modification Explanations

Electrical System Upgrade

This flight safety modification incorporates C-130 Broad Area Review (BAR) recommendations to upgrade the C-130 electrical power system, which was designed in the 1950s. Modern avionics systems, however, are dependent on solid-state circuits and computer support that makes them more susceptible to disruptive electrical transients/spikes within the system. A low-voltage condition is suspected in the propeller synchrophaser malfunction, causing a loss of engine power in over 30 cases from 1987 to 1999. The C-130 will need "clean" electrical power for all new modifications to operate properly and reliably. A total of 394 aircraft will be modified.

Autopilot/GCAS

The current C-130 autopilot is unreliable, unmaintainable, and rapidly becoming unsupportable. Congress has mandated a GCAS system to provide warning of insufficient terrain clearance during low-level and terminal operations. This navigation safety (Nav Safety) modification replaces the obsolete E-4 and selected AP-105 autopilot systems and installs GCAS capability. A total of 618 aircraft will be modified.

Enhanced TCAS

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and Global Air Traffic Management (GATM) mandates, which are necessary for worldwide, unrestricted airspace access. The Secretary of Defense (SECDEF) directed installation of an airborne collision avoidance system, in response to the findings of the April 1996, CT-43 crash. This is an ongoing modification. To date, 378 C-130s have been either modified, or are on contract to be modified with the ETCAS system. The enhanced function is physically present, but is not functional, hence the C-130 will only use the TCAS II or normal mode. The remaining aircraft requiring ETCAS will be modified under the C-130 Avionics Modernization Program (AMP).

C-130 Avionics Modernization Program (AMP)

The weapon system has evolved into 20 models with multiple variants within each model. Multiple models and configurations result in large support and training inefficiencies and complicate unit interoperability. This modification will incorporate Navigation Safety (Nav Safety), Global Air Traffic Management (GATM), various other reliability, maintainability, and supportability and C-130 Broad Area Review (BAR) requirements including: Enhanced Traffic Alert and Collision Avoidance System (ETCAS), Terrain Awareness and Warning System (TAWS), replace APN-59 and APQ-175 radars, replace N-1/C-12 compass, provide dual autopilot, install dual flight management systems, and provide commercial high frequency (HF)/ultra high frequency (UHF)/very high frequency (VHF) datalink. Approximately 476 aircraft will be modified.

ALR-69

C-130 aircraft routinely operate in areas of heightened tension without electronic combat support or escort aircraft, in support of US policy. All C-130 aircraft require the capability to detect and avoid radar threats to increase survivability. The ALR-69 provides airborne warning of radar directed anti-aircraft artillery (AAA), interceptors, and surface-to-air radio-frequency (RF) threats. The system is being upgraded to provide Precision Location and Identification (PLAID) technology. With this modification the system will have improved azimuth and range accuracy which supports a planned geo-location capability for increased situational awareness. The system will also have increased capability to operate in dense signal environments. This mod completes the C-130 fleet for all aircraft already equipped with airlift defensive systems. A total of 379 aircraft will be modified.

C-130 Generator Disconnect

This modification will install a generator disconnect and switch as recommended by the C-130 Broad Area Review. In the event of generator failure, the disengage mechanism is required so that the failed generator does not adversely impact engine performance. USAF aircraft prior to 68-00225 do not have the external sandwich type generator disconnect installed. The disengage mechanism has been included in production aircraft after 68-00225. A total of 129 aircraft will be modified.

Synchrophaser Wiring (BAR)

This modification will replace old and aging synchrophaser wiring on all C-130E and C-130H model aircraft as identified by the C-130 BAR. Safety reviews of the aircraft have revealed chaffed and worn wiring problems that could potentially cause flight safety problems (causing synchrophaser operation malfunctions). This mod will use the existing design for aircraft wiring, but will modify the placement of the existing synchrophaser box within the station racks on the bulkhead. A total of 606 aircraft will be modified.

Service Bulletins

The C-130 fleet requires funding to comply with contractor product improvements incorporating Lockheed and other outside organizations' service bulletins, identified as items recommended for USAF compliance (under $900K each). Program funds 700 aircraft.

Low Cost Modifications

Low cost modifications necessary to improve reliability, maintainability, safety, and mission performance of C-130 aircraft.

Link-16, Joint Tactical Radio System (JTRS) [C-130 E/H/J]

JTRS is a joint program that is using spiral development to produce a software compliant architecture radio supporting multiple waveforms. OSD has issued a mandate that no more aircraft radios can be purchased that are not JTRS, or JTRS compliant. They've also tasked the

AF to develop a migration schedule to JTRS for all platforms. The AMC plan is to initially migrate to JTRS as a replacement for the ARC-210 radio under the C-130 Avionics Modernization Program. Installation is projected to start in FY08 when the JTRS airborne/maritime/fixed (AMF) cluster is available. JTRS is the enabling technology for Airborne Network Integration that will provide AMC new capabilities like Tactical Datalink (Link-16) and Ultra High Frequency (UHF) Satellite Communications (SATCOM) across the fleet.

Global Air Traffic Management (GATM) [C-130 J]

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management (ATM). The ability to reduce aircraft separation and implement other new ATM procedures, while maintaining or improving safety standards, is based on the use of new technology.

2.3.13 C-141 Roadmap

OPR: AMC/A58

Weapon System Assessment

The C-141 fulfills the vast spectrum of airlift requirements through its ability to airlift combat forces over long distances, inject those forces and their equipment either by airland or airdrop, resupply employed forces, and extract the sick and wounded (103 litter patients, 113 ambulatory patients, or a combination of the two) from the hostile area to advanced medical facilities. It offers worldwide, night/day, inclement-weather cargo/troop delivery. It provides low-altitude delivery of paratroops and equipment and high-altitude delivery of paratroops. It can also airdrop equipment and supplies using the container delivery system. It is compatible with the 463L material handling system, which permits offloading 68,000 pounds (30,600 kilograms) of cargo, refueling and reloading a full load, all in less than an hour. The cargo compartment is quickly reconfigurable to allow rapid mission changes.

The mission of the C-141 is intertheater delivery of cargo and passengers via airland, airdrop, and aeromedical evacuation. The C-141 was the primary strategic special operations and airdrop platform until 2002 when the C-17 assumed this role. The C-141 represents 5% of the total military organic airlift capability (FY02: 1.33 million ton-miles per day (MTM/D) of 46.9 MTM/D).

-- First flight: December 1963. Original service life: 30,000 hours.
-- Stretched 23 feet and air refueling receptacle added between 1979-1982.
-- Average Age of Fleet: 31 years. Average Actual Hours: 37,552 (38,191 equivalent damage hours).
-- Payload/Range: 68,000 pounds (max) at 2,270 nautical miles (NM); 32,000 pounds at 3,200 NM; max ferry range--4,600 NM.
-- Crew Ratio: Active, 1.0; Associate Reserve, 1.8; Unit-Equipped (UE) Guard and Reserve, 2.0.
-- Scheduled for complete retirement from the Total Force inventory in FY06.

(b)(5)

(b)(5)

(b)(5)

C-141 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed Funding				Estimated Completion FY
	FY04	FY05	FY06	FY07	FY08	FY09	
None.							Pending

Program/Modification Funding Chart
(Non-Inclusive, Unprioritized List as of September 2004)

Modification Explanations

None.

2.3.14 UH-1 Roadmap

OPR: AMC/A58

Weapon System Assessment

The UH-1N is a light-lift Air Force utility helicopter user for support of Department of Defense contingency plans. The helicopter has a number of uses. Its primary mission includes airlift of emergency security and disaster response forces, medical evacuation, security surveillance of off-base movements of nuclear weapons convoys and test range areas during launch conditions. It is also used for space shuttle landing support, priority maintenance dispatch support, and search and rescue operations. Other uses include airlift of missile support personnel, airborne cable inspections, and distinguished visitor (DV) transport.

The movement of key government officials around the National Capital Region in support of a contingency operation requires a quick-reaction airlift capability. AMC provides that with the UH-1N stationed at Andrews AFB. Unfortunately, the UH-1N is 33 plus years old and falls short of meeting operations plan (OPLAN) requirements for range, speed, and payload capacity. It also has many tactical shortfalls, necessitating a replacement aircraft.

-- First Operational Aircraft Delivered: 1970.
-- Average Age of Fleet: 33 years.
-- Range/Payload: 200 nautical miles (NM)/6-8 passengers.
-- Crew Ratio: 1.23.

(b)(5)

[redacted]

**REPLACEMENT/MODERNIZATION FORECAST

AFSPC, as lead command for the UH-1N, is working on a requirement document to replace this aging helicopter. The proposal is to replace the aircraft with a more advanced, commercial-derivative helicopter, similar to Air Combat Command's (ACC) personnel recovery vehicle (PRV). This helicopter is replacing the HH-60 and will meet and exceed all requirements that AMC has for DV lift requirements around Washington DC. The Chief of Staff of the Air Force (CSAF) directed ACC to produce a vertical lift roadmap (VLR), with results showing a $600 million savings by moving toward an Air Force-wide common medium-lift replacement. Since AMC has only 19 aircraft, our intentions are to tag along with this USAF initiative. AMC/A58 is currently working with AFSPC/DRM to prepare an annex to the Combat Air Forces (CAF) PRV operational requirements document (ORD) that dictates a medium-lift replacement for the UH-1N beginning in the FY09 time frame.

(b)(5)

(b)(5)

(b)(5)

UH-1 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5) [redacted]	
Traffic Alert and Collision Avoidance System (TCAS)						
Low Cost Modifications	X	X	X	X		

(b)(5) [redacted]

Modification Explanations

Traffic Alert and Collision Avoidance System (TCAS)

The UH-1s at Andrews fly within the heavily congested low-level environment surrounding the Washington D.C. area. The UH-1 has no traffic avoidance system that allows the 1st Helicopter Squadron (1 HS) to operate safely in the area. This proposal would modify 1 HS UH-1N helicopters with a TCAS IAW SAF/AQ and USAF/XO memo dated 9 Sep 96, subject: SECDEF - Directed Navigation and Safety Modifications.

Low Cost Modifications

Aircraft procurement (3010) funds set aside for small modifications where costs do not exceed $2M each year.

2.3.15 Special Air Mission Roadmap

OPR: AMC/A58

Weapon System Assessment

Very important person special air mission (VIPSAM) aircraft provide safe, comfortable and reliable air transportation for the President, Vice President, Cabinet, Members of Congress, and other high-ranking American and foreign dignitaries. Flying worldwide, VIPSAM aircraft represent the highest level of distinguished visitor (DV) travel and must meet stringent schedule and protocol requirements under intense media scrutiny. AMC provides this service as lead command with 25 aircraft dedicated to VIPSAM: C-9C, C-20B/H, C-37, C-32, C-40B, and VC-25.

VIPSAM aircraft are especially essential in wartime when diplomacy and negotiation become critical elements of national security strategy. World events may, at any given time, require the Nation's leaders to be dispatched simultaneously on diplomatic missions around the world. VIPSAM passengers conduct highly sensitive business while en route, and their objectives must not be compromised. Because VIPSAM aircraft are the official transportation for leaders of the United States Government, they are a highly visible symbol of the United States of America. National pride dictates these aircraft portray the highest American standards.

To that end, following the events of 9/11, an increase in the communications capability of the VIPSAM fleet was put on the fast track. The VC-25, C-32, and C-40B will get an “office in the sky” upgrade. This provides passenger access to office local area networks (LANs), e-mail, and World Wide Web. The C-20B, C-37, and C-9C will get mission computer and aircraft radio modifications allowing a more robust communication capability. In addition, the VC-25 will also undergo an Avionics Modernization Program (AMP) upgrade. AMP will replace aging equipment and introduce systems that enhance situational awareness such as an onboard electronic library that includes navigation charts and airport maps and an enhanced Ground Proximity Warning System. AMP will also add a dual head-up display (HUD) for flight information. This program represents an extension of existing programs to upgrade cockpit displays and navigation capabilities begun under the Air Force’s Global Air Traffic Management (GATM) initiative, and it parallels comprehensive cockpit modernization programs for other airlift aircraft. Also, the Airborne Information Management System (AIMS) upgrade for the VC-25 addresses specific deficiencies for current communications systems. The AIMS program will identify specific requirements for communications switching and delivery of services to the passengers traveling onboard the VC-25. The AIMS architecture should not only meet current needs and deficiencies, but also provide a growth path for future technology upgrades during the remainder of the aircraft’s service life.

(b)(5)

(b)(5)

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[redacted]

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

Special Air Mission Program/Modifications

Program/Modification	Past FY04	Exe-cution FY05	Programmed Funding FY06	FY07	(b)(5) Estimated Completion
C-20 Airworthiness Directives/Service Bulletins	X	X	X	X	
VC-25 GATM	X				
VC-25 Airworthiness Directives/Service Bulletins	X	X	X		
C-37 Airworthiness Directives/Service Bulletins	X	X	X	X	
C-32 Comm Update					
C-32 Airworthiness Directives/Service Bulletins	X	X	X	X	

(b)(5)

Modification Explanations

C-20 Airworthiness Directives/Service Bulletins

C-20 Airworthiness Directives/Service Air Worthiness Directives/Service Bulletins. The C-20 is an Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

VC-25 GATM

This modification includes the installation of equipment to bring aircraft into full GATM compliance.

VC-25 Airworthiness Directives/Service Bulletins

The VC-25 is an Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-37 Airworthiness Directives/Service Bulletins

The C-37 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-32 Comm Update

The communications upgrade consists of installing a communications management system and integration with the Communication System Operator (CSO) functions. The upgrade will allow management of secure and non-secure voice, data, and facsimile (transmit and receive) for 42 telephone stations within the aircraft. These aircraft support the President, Vice President, the Secretary of State, the Secretary of Defense, and other senior government officials, as well as their staffs, allowing them to conduct business while airborne, utilizing the on-board communications system. The C-32 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-32 Airworthiness Directives/Service Bulletins

The C-32 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

2.4 AIR REFUELING AND WEAPONS SYSTEM ROADMAPS

The Mobility Air Forces (MAF) air refueling mission provides daily support to deploy, employ, and sustain a wide range of operations worldwide. The air refueling mission also supports operations plan (OPLAN) 8044. Recent operations, such as ALLIED FORCE in the Balkans, ENDURING FREEDOM, and IRAQI FREEDOM, highlighted challenges confronting the air refueling mission in the future. Two studies, the Tanker Requirements Study - 2005 (TRS-05) and the KC-135 Economic Service Life Study (ESLS), provided insight into air refueling requirements and the capability of the MAF to meet those requirements in the future. Future requirements continue to rise as the number of global missions for air refueling assets increase. New ancillary missions, such as using platforms as warfighting network nodes, combined with the greater air refueling demands on an aging fleet will require new assets in the near future.

The following sections provide more detailed information on the specific mission categories and weapon systems comprising the air refueling mission. An overview of air refueling mission requirements precedes more detailed information on the air refueling and OPLAN 8044 Support mission category roadmaps, respectively. Weapon-system-specific information is found in the KC-10 and KC-135 roadmaps.

Air Refueling Requirements. Air Mobility Command, in partnership with the Office of the Secretary of Defense, Program Analysis and Evaluation Division, completed the TRS-05. The primary objective of TRS-05 was to determine the number of tanker airframes and aircrews needed to support the National Military Strategy of conducting two nearly simultaneous major theater wars (MTW). The requirements are based on various mixes of the following scenarios: 1) MTW in Southwest Asia; 2) MTW in Northeast Asia; 3) OPLAN 8044; 4) Commander-in-chief-directed Special Operations Forces (SOF) mission; 5) Small scale contingency (SSC).

The constraining factors for the air refueling mission can be different for the deployment and employment phases of an operation. In general, fuel offload capacity is the primary constraining factor when supporting the deployment of combat and combat support forces. During the employment phase, the primary constraining factor is the number of aircraft/booms available to refuel combat and combat support aircraft. The air refueling requirement for each phase must meet both receiver fuel offload and aircraft/boom availability demands.

(b)(5) [redacted]

The TRS-05 requirement is echoed by the Quadrennial Defense Review (QDR) and Fork In The Road (FITR) analysis. Post QDR and 9/11 require a defense strategy changes requirements complexity. (b)(5) [redacted] (b)(5) [redacted].

2.4.1 Air Refueling Roadmap

OPR: Air Refueling Mission Area Team

MAF Capability Statement

Provide the capability to refuel inflight multiple aerospace vehicles simultaneously, across the spectrum of conflict, and in all operating environments.

Roadmap Assessment

The ability of the MAF to conduct the air refueling (AR) mission has been stressed in recent years. Although Total Force contributions have enabled success in previous air campaigns, shortfalls exist to meet the requirements of our National Military Strategy. We currently face a shortage of KC-135 crews and maintenance personnel and are addressing this in the Program Objective Memorandum (POM) process. The KC-135 System Program Director developed a Programmed Depot Maintenance (PDM) Improvement Plan that reduced the number of depot-possessed aircraft. However, the improvement initiatives do not fully overcome the current tanker shortfall. (b)(5) [redacted]
(b)(5) [redacted] A
requirements document have been developed. An initiative to recapitalize the tanker fleet is curently being pursued.

Capability Objective

Provide the capability to inflight refuel various aircraft types and multiple aircraft simultaneously (including the ability to conduct AR operations in most operational atmospheric conditions). Field the capability to onload fuel inflight and the ability to offload by both boom and drogue on the same sortie. Automatically identify all aircraft (friend or foe) in the vicinity, reduce detection from hostile radio frequency (RF) and infrared (IR) defensive systems, and provide the ability to counter RF, IR, directed energy (DE) and command, line-of-sight, man-portable air defensive systems (MANPADs). Improved connectivity and data transfer will provide the capability to seamlessly and automatically push and pull aircraft and aircrew voice, video, and data to permit near-real-time information flow and improved decision making. This includes timely information transfer of aircraft systems performance data, mission data (i.e., AR offloads and cargo/passenger), aircrew flight times, and currency data. Enhanced capability will also provide automated systems for push-pull information transfer of dynamic retasking information, common operating picture, and predictive battlespace awareness. Scalable, modular, airborne, relay terminals (SMART) will provide digital battlespace awareness beyond line of sight tactical radios.

Milestones

Short-Term (FY05-12)

(b)(5)
[redacted]

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

[redacted]

Related Roadmap Information

Other information related to the air refueling mission can be found on the KC-135 and KC-10 roadmaps.

2.4.2 OPLAN 8044 Support Roadmap

OPR: Air Refueling Mission Area Team

MAF Capability Statement

Provide the capability to refuel inflight strategic assets for bomber force execution, employment, and subsequent bomber survival, recovery, and reconstitution, including US Strategic Command (USSTRATCOM) command and control (C2) aircraft, as directed by national leadership and the Nuclear Posture Review in all operating environments.

Roadmap Assessment

Due to the high priority given to the operations plan (OPLAN) 8044 mission, the MAF is capable of meeting OPLAN 8044 mission requirements. However, other campaigns conducted concurrently during OPLAN 8044 execution may suffer due to the commitment of refueling aircraft to OPLAN 8044. Additionally, current refueling aircraft are vulnerable to electromagnetic pulse (EMP) damage and need EMP protection for critical navigation, communications, air refueling, and other mission-critical systems. These systems are being identified, and solutions for EMP protection will be determined.

Capability Objective

Provide the capability to refuel strategic bomber assets and USSTRATCOM C2 aircraft executing OPLAN 8044 in adverse weather conditions. Automatically identify all aircraft (friend-or-foe) in the vicinity, reduce detection from hostile radio frequency (RF) and infrared (IR) defensive systems, and provide the ability to counter RF, IR, directed energy (DE), and command, line-of-sight man-portable air defensive systems (MANPADs). Sustain flight operations and ensure continuous communications with higher headquarters in an electromagnetic pulse (EMP) environment during and after OPLAN 8044 execution. Provide the ability to operate autonomously from austere airfields.

Milestones

Short-Term (FY05-12)

None.

Mid-Term (FY13-19)

(b)(5)

[redacted]

Long-Term (FY20-26)

None.

(b)(5)

2.4.3 KC-10 Roadmap

OPR: AMC/A58

Weapon System Assessment

The Global Mobility CONOPS (Concept of Operations) describes the primary mission of Air Refueling (AR) as providing worldwide, day/night, adverse weather, probe/drogue, and boom AR on the same sortie to receiver capable United States (US), allied, and coalition military aircraft (including unmanned aircraft). Air Refueling Aircraft (ARA) may be employed to support global attack, air bridge, deployment, redeployment, homeland defense, theater support to joint, allied, and coalition air forces, and specialized national defense missions. The KC-10A is capable of conducting simultaneous cargo and air refueling missions using the air refueling drogue or boom, or wingtip drogues. The KC-10A represents about 10% of the AF tanker fleet. The KC-10A is a commercial derivative of the McDonnell Douglas DC-10-30 that had 88% of its design and components in common when delivered in 1981.

USAF has 12 KC-10 aircraft that are command and control module (CCM)-capable. These 12 aircraft have been modified to accept the Commander-Joint Task Force (C-JTF) portable CCM. They provide deploying commanders an en route, immediate communications-type platform with the range and speed to arrive on scene with deploying USAF forces.

To ensure the KC-10 can fulfill required mission capabilities, operation in the chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment must be addressed. Refer to the CBRNE Roadmap located in this document for deficiencies and solutions that apply to weapon systems.

-- First Flight: 1979.
-- First Operational Aircraft Delivered: 1981.
-- Last Operational Aircraft Delivered: 1990.
-- Average Age of Fleet: 19 years.
-- Range (unrefueled): More than 11,500 miles.
-- Crew Ratio: Active, 2.0; Associate Reserve, 1.5.

(b)(5)

[redacted]

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

KC-10 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07 (b)(5)		
Flight Data Recorder/Cockpit Voice Recorder Replacement (AMP)			X	X		
Digital Weather Radar (AMP)			X	X		
KC-10 Global Air Traffic Management (GATM)	X					
Fuel Pressure Control Unit/Boom Control Unit (FPCU/BCU) Replacement						
Power Requirements and Upgrade with 110V AC Outlets (AMP)			X	X		
Cargo Barrier Replacement						
Center Instrument Panel Replacement (AMP)			X	X		
Cockpit Digital Instruments Conversion (AMP)			X	X		
Joint Chemical Agent Detector (JCAD)						
Joint Tactical Radio System (JTRS)						
Airborne Broadcast Intelligence (ABI)	X					
Thrust Reverser (TR) Modification	X	X	X	X		
KC-10 Aircraft Modernization Program (AMP)			X	X		
Inertial Navigation System (INS) Reliability and Supportability Upgrades (AMP)			X	X		
Defensive Systems and Protective Equipment (*AMP)						
Mode S Elementary (ELS)/Enhanced (EHS) Surveillance	X	X				
Mode 5 (AMP)			X	X		
Iridium Radio Antenna						
Real Time Information to the Cockpit (RTIC) [Airborne Network Intelligenc (ABI), Combat Track II, Link 16, UHF SATCOM antenna] (AMP)			X	X		
Fuel Tank Fire Suppression (*AMP)						
Precision Area Navigation (PRNAV)	X	X	X	X		
Airborne Network Integration (ANI)						
Night Vision Imaging System (NVIS) (*AMP)						
Maintenance Training System (MTS)(*AMP)						

(b)(5)

(* Under Consideration for AMP Program)

Modification Explanations

Flight Data Recorder/Cockpit Voice Recorder Replacement (AMP)

This modification program will provide the KC-10 with a digitally formatted, expandable Flight Data Recorder/Cockpit Voice Recorder (DFDR/CVR) capability to ensure its compliance (now and in the future) with an increasing requirement to record additional flight data. This program will ensure maintaining Supplemental Type Certificate (STC) compliance. Replacement of existing analog Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) is required to satisfy FAA mandated number of captured parameters.

The KC-10 is currently in violation of FAA requirements to record 22 parameters of flight on the FDR. The KC-10 currently records only 18 parameters. Also, with federally mandated CNS/ATM approaching, there are more - yet unspecified - parameters to be captured by the FDR and CVR. This modification will ensure FAA compliance and provide for future requirements of the KC-10 FDR/CVR.

Digital Weather Radar (AMP)

This modification program will provide KC-10 pilots with the most critical information, in the most critical phase of flight; approach and landing. This modification will bring the KC-10 up-to-date with current technology and will improve commonality with current USAF organic weather radar modernization programs, and commercial derivatives.

Replacing the analog weather radar is required to upgrade to digital format and obtain predictive windshear capability. The KC-10 will obtain the capability with the AMP modification to display/overlay a digital picture of weather phenomena onto the forward primary flight display (size-D multi-function display units). Digital weather radar is capable of predicting potential windshear conditions in radar returns and will represent a considerable upgrade over the existing KC-10 weather radar.

KC-10 Global Air Traffic Management (GATM)

(Program Terminated) During the AMC FY 06 POM preparations in Jan 04, AMC/A5 directed a Business Case Analysis (BCA) to assess the then current approach against evolving KC-10 operational requirements and anticipated obsolescence issues. The BCA reaffirmed the need for a long term approach to modernize the platform. While the original GATM architecture provided processor growth and throughput to support selected GATM mods a significant continuous development effort would still be required to take the platform beyond 2010. The resulting architecture would also retain much of the legacy analog equipment and create a unique DC-10 based configuration limiting commonality with similar commercial fleets. This approach did not address the obsolescence issues and significantly limited the platform's growth path (life expectancy estimated to 2040).

Continued delays and cost growth in the KC-10 Global Air Traffic Management (GATM) program coupled with evolving requirements and obsolescence issues led AMC to reassess the modernization plans for the KC-10 fleet. Results of the BCA were presented to AMC/CC on 9 Mar 04 with a recommendation to terminate the current effort and pursue an Aircraft Modernization Program (AMP) which will produce a digital backbone with growth capability, potentially reduce crew size and improve reliability/maintainability. AMC/CC approved the recommended approach.

A stop gap effort is required to meet near term requirements until a new solution is selected. The stop gap (present out to FY09) will address the following: Elementary Mode S, RNP 4, PRNAV, and data link or Iridium Communications to support Mobility for 21st Century

The original GATM solution for the KC-10 only replaced the bare minimum equipment required to comply with the near-term CNS/ATM and freeflight standards. Original cost estimates and program direction did not take into account the additional effort required to integrate the new equipment with the old cockpit. This significantly inflated the original cost for KC-10 GATM and made the original GATM program underfunded, unique in design, and inadequate for the future needs/requirements of the KC-10.

The CNS/ATM surveillance modification is the backbone of Automated Dependent Surveillance (ADS). Automated Dependent Surveillance-Broadcast (ADS-B) Datalink provides the ability to request and approve non-voice clearance requests and Air Traffic Control (ATC) instructions, gather weather information, and furnish automated position reports. This program will provide the KC-10 with the ability to operate in a non-voice environment.

Fuel Pressure Control Unit/Boom Control Unit (FPCU/BCU) Replacement

This program will replace the KC-10 FPCU and BCU. The only other user of these items is the RNLAF KDC-10. The AMC repair cost of the KC-10 fuel pressure control unit has risen to that of the purchase cost of a newer, more reliable replacement unit after NRE is accomplished which is estimated to be $3 – 4M. In addition to reliability improvement, this will reduce total spares and expenditures for support. Replacing these items will save funding and increase overall reliability and readiness.

Power Requirements and Upgrade with 110V AC Outlets (AMP)

Installation of 110V AC outlets in the cockpit and cabin will facilitate the use of aircrew laptop computers for various uses and support the AE and VIPSAM missions. This program will reduce clutter on the flight deck and provide easy access to electrical connections.

Cargo Barrier Replacement

This modification program will replace the KC-10 cargo safety net and smoke barrier curtain. The KC-10 cargo net is very expensive to procure, maintain, and repair. The smoke barrier curtain is very labor intensive to move into different aircraft configurations. Cargo load time and labor could exhibit significant savings if upgraded to a current commercial curtain/net. The upgraded commercial version, available today, combines both items in one unit for the same function. This program will reduce cost of AMC ownership through fewer components to maintain and spares to keep on hand.

Center Instrument Panel Replacement (AMP)

The panel consists of all the engine monitoring and control instrumentation and other analog instruments replacing them. This modification program will replace the KC-10 pilot's forward center instrument with D-size displays consistent with CNS/ATM. The DC/KC-10 type analog engine instruments are becoming increasingly expensive to procure and/or maintain and will require replacement in the near term. As the commercial aircraft continue to digitize and automate their systems, the KC-10 will soon become a sole-user of this older technology and its continued use will become cost-prohibitive for the 59 AMC KC-10s.

The KC-10 AMP "open architecture" design will permit virtual plug and play of additions such as this component and will allow the KC-10 to continue toward commonality with commercial derivatives. This program, and future programs to align the KC-10 with a commercial derivative, serves AMC and the Air Force with significant cost-savings in procurement and overall operational costs.

Cockpit Digital Instruments Conversion (AMP)

This modification program will convert all remaining analog cockpit instrumentation to a digital format as part of AMP. It will also deliver a digital autopilot and replace the existing analog Inertial Navigation Units (INUs). This program is intended to complete the conversion of the KC-10 to a digital format and to provide AMC and the USAF with a modern major weapon system throughout the remainder of useful life of the airframe. DC/KC-10 type analog instruments are becoming increasingly expensive to procure and/or maintain and will require replacement in the near term. As the commercial aircraft continue to digitize and automate their systems, the KC-10 will soon become a sole-user of this older technology and its continued use will become cost-prohibitive for the 59 AMC KC-10s. This program serves AMC and the Air Force with significant cost-savings in procurement and overall operations costs.

Joint Chemical Agent Detector (JCAD)

This program will provide a capability/system installed on the aircraft to detect, identify, quantify, and warn personnel of the presence of vapor chemical warfare (CW) agents. The platform owner is responsible for mounting the JCAD(s) onto their platform and responsible for installation costs.

Joint Tactical Radio System (JTRS)

JTRS is a joint aircraft communication system. OSD has issued a mandate that no more aircraft radios can be purchased that are not JTRS or JTRS co [redacted] develop a migration schedule to JTRS for all platforms. (b)(5) [redacted]

Airborne Broadcast Intelligence (ABI)

This small program procures and sustains a carry-on device that provides crews with an intelligence feed while in flight. ABI receives ground, air, and water threat updates. ABI can be used on a KC-10 equipped with an UHF SATCOM antenna. ABI CONOPS projects four sets at McGuire AFB and four sets at Travis AFB to support the KC-10.

Thrust Reverser (TR) Modification

The TR modification is required by the FAA to prevent unwanted deployment of TRs. Modification consists of three separate FAA Service Bulletins. The first SB repositions indication light to the pilot station and is completed. The remaining two SBs (wiring and installation of an additional locking system) must be completed by Oct 06 and are fully funded.

KC-10 Aircraft Modernization Program (AMP)

HQ AMC and KC-10 SPO conducted a Business Case Analysis (BCA). The BCA recommended approach is a competitive acquisition strategy that will improve the fleet's ability to meet future enhancements. This acquisition approach requires development of an Initial Capabilities Document, a Capabilities Development Document, refinement of cost estimates, a new, competitive acquisition strategy, and AMC and AF support in the FY 06 POM. The competition could benefit the AF by further reducing costs and could produce new technology solutions (e.g. open architecture, color MCDUs, digital local area network).

KC-10 AMP supports four main requirements areas in addition to CNS/ATM:

-Airspace access capabilities (mandated National Airspace System and International Airspace Requirements)
-Safety capabilities (FAA mandated safety requirements)
-Military capabilities (C4I, ABI, Multi-mission payload, and aircraft survivability)
-Reliability/maintainability/supportability capabilities (to counter excessive failure rates, non-maintainable and obsolescence issues)

Inertial Navigation System (INS) Reliability and Supportability Upgrades (AMP)

INS will become unsupportable in the FY08-09 timeframe due to limited parts availability. Plan is to include an INS upgrade as part of the AMP.

Defensive Systems and Protective Equipment (*AMP)

Install a system such as LAIRCM to protect KC-10 from IR and RF threats to reduce vulnerability from hostile systems. Plan is to incorporate into AMP as a separate priced option.

Mode S Elementary (ELS)/Enhanced (EHS) Surveillance

ELS: Eight countries have stated plans to implement elementary surveillance (Belgium, Denmark, France, Germany, Luxembourg, Switzerland, Netherlands, and United Kingdom.)

EHS: The UK, France, and Germany are developing plans to implement enhanced surveillance independently under the three states project-Master Plan. The enhanced surveillance functionality includes eight downlink access parameters. European civil aviation authorities plan to mandate new/upgraded aircraft surveillance capabilities with Mode S Elementary surveillance and Mode S Enhanced surveillance required by 31 March 2009. Failure to comply with Eurocontrol requirements will result in ATC handling delays and potential exclusion from airspace.

Mode 5 (AMP)

A new military equipment identification program that is being implemented AF wide. (b)(5) [redacted] The enhancement improves performance and fixes shortfalls i.e. Mode 5 provides longer range and improved accuracy, increases security against exploitation, and spoofing, improves ID of friends, reduces garbling and mutual interference from multiple interrogation replies, and reduces IFF interference with civil air traffic control systems.

Iridium Radio Antenna

AMC purchased Iridium radios for aircrews use during ground operations and inflight use to communicate with TACC. KC-10 aircraft lack of compatible antenna presently does not presently support inflight use. Installation of an iridium radio antenna will provide capability for beyond line of sight secure communications in flight.

Real Time Information to the Cockpit (RTIC) [Airborne Network Intelligenc (ABI), Combat Track II, Link 16, UHF SATCOM antenna] (AMP)

Identified as a requirement during Operation Iraqi Freedom (OIF) hot wash. Impact is lack of real time situational awareness to aircrews. The production units of ABI and CT II are available for operational use. ABI and CT II interface to SATCOM antenna on 12 of the 59 aircraft fleet. Plan is to proceed with a 3-phase approach. Phase 1: Install UHF SATCOM antennas on all 59 KC-10s. Phase 2: install ROBE Link 16 antennas and interface panel. Phase 3: Fully integrate into cockpit as part of KC-10 AMP.

Fuel Tank Fire Suppression (*AMP)

Provide a means to prevent explosion or fire caused by small arms fire. A lack of fuel tank protection could result in catastrophic loss of aircraft, crew, and passengers. Plan is to incorporate into AMP as a separate priced option.

Precision Area Navigation (PRNAV)

PRNAV is an emerging requirement and is included in the follow-on Stop Gap plan from the terminated KC-10 GATM program. Europe will be mandating PRNAV compliance starting in FY05 in high-density traffic areas. KC-10 SPO is engaged with ESC/GAT to obtain a performance assessment to determine if the current KC-10 avionics baseline is acceptable. If present architecture is self certified there will be $0 cost to comply; if upgrade is needed estimate (b)(5) [redacted] ew GPS sensors along with upgrades to present software and completion no earlier than (b)(5) [redacted]

Airborne Network Integration (ANI)

AMC has a global secure and non-secure communications requirement to meet AMC missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the Global Information Grid (GIG) to support C2 voice and data requirements, transfer aircraft status and position information to secure TDL, and provide aircraft Internet Protocol (IP) addressability within the GIG for sharing of operational data. AMC's plan is to use JTRS Program radios to provide required capabilities not provided by CNS/ATM modifications or Avionics Modernization Programs

(e.g. Airborne Networking, wide-band applications, etc). ANI will satisfy requirements in Real Time Information to the Cockpit (RTIC) AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3), Joint Tactical Radio System (JTRS) ORD Version 3.2, JROCM 087-03, 9 April 2003, and Advanced Situational Awareness/Countermeasures (ASA/CMS) CDD (Draft currently in AFROC coordination). (b)(5) [redacted]
(b)(5) [redacted]

Night Vision Imaging System (NVIS) (*AMP)

The MAF lacks a standard NVIS for MAF tanker cockpits and boom operator positions. KC-10 exterior lighting is not night vision compatible, limiting the receiver's ability to utilize their existing night vision systems. This limits the ability to perform light's out AR operations at night. Also, the modification must address NVIS compatibility on the KC-10 flight deck, cargo compartment, and boom pod.

Maintenance Training System (MTS)(*AMP)

Develop, deploy, and integrate a KC-10 MTS that supports a balanced mix of on/off aircraft maintenance training, implements the most appropriate and efficient medium for each off-aircraft training requirement, injects computer-based technologies in the classroom, and provides current, web-based training to maintainers worldwide. The MTS requirements will be identified through the Instructional System Development (ISD) process and maximize the use of interactive multimedia instruction (IMI), will include aircraft use, and may also include limited part-task trainers (PTTs) and maintenance training devices (MTDs). The KC-10 MTS will be integrated into the existing AMC/AETC courseware at two KC-10 Main Operating Bases (MOBs).

2.4.4 KC-135 Roadmap

OPR: AMC/A58

Weapon System Assessment

The KC-135 Stratotanker is Air Mobility Command's (AMC) primary platform for air refueling (A/R). It provides approximately 90% of the command's A/R capability. The aircraft provides air refueling support to receiver-capable United States (US), allied, and coalition military aircraft. The KC-135 is employed to support global attack, air bridge, deployment, redeployment, homeland defense, theater support to joint, allied, and coalition air forces and specialized national defense missions. It also supports special operations and U.S. nuclear forces. To fully support nuclear and special operations, aircraft are equipped with additional capabilities such as electro-magnetic pulse (EMP) protection and specialized communication equipment. Although not its primary mission, the KC-135 is employed for opportune airlift and aeromedical evacuation.

Fleet Facts:

-- First Flight: 1956; First operational aircraft delivered: 1957
-- Total aircraft delivered: 732
-- Average Age of Fleet: 37-47 years.
-- Range (unrefueled): 6,300 nautical miles (NM); 1,500 NM with 150,000 pounds transfer fuel
-- Crew Ratio: Continental United States (CONUS) active, 1.36; CONUS Air National Guard (ANG) and Air Force Reserve Command (AFRC), 1.27; Outside the CONUS (OCONUS) active (RAF Mildenhall and Kadena), 1.27.

To ensure its viability into the 21st Century, the KC-135 has completed, and is undergoing, several modifications.

-- Block 30 Modification: Pacer CRAG (Compass, Radar, and Global Positioning System) completed in FY02. It was a comprehensive cockpit avionics modernization program that replaced most of the obsolete electro-mechanical cockpit instrumentation and radar with state-of-the-art equipment and displays. The compass replacement program provided an additional inertial navigation unit (INU). The radar replacement program provided a color weather radar and electronic horizontal situation indicators (HSI). The Global Positioning System (GPS) program provides a receiver, antenna, flight management computer, smart control display units (CDU), and a data loader. In addition, the Pacer CRAG program included installation of a Traffic Alert and Collision Avoidance System (TCAS), standby attitude directional indicator (ADI), Reduced Vertical Separation Minima (RVSM), and Nav Safety (cockpit voice recorder, flight data recorder, and emergency locator transmitter). The RVSM modification is significant since it provides the KC-135 unrestricted access to all global vertical altitudes.

-- Block 40 Modification: Block 40 consists of the Global Air Traffic Management System (GATM) modification and the circuit breaker (CB)/transformer rectifier (TR) replacement. The KC-135 GATM program modifies communications, navigation, and surveillance systems to meet future global airspace requirements. To meet future communications requirements, GATM adds satellite communications (SATCOM) voice for direct pilot/controller communication, and data link supporting aircraft to air traffic control communications, flight management services, and command/control communications between the aircraft and Tanker Airlift Control Center (TACC) (M21). It also adds a second HF radio which has data link capability. To meet the navigation requirement, GATM adds/upgrades dual flight management system (FMS) with integrated GPS/INS to allow continued access to global airspace by improving the required navigation performance (RNP) capabilities of the aircraft. To meet the future surveillance requirement, GATM adds new and upgraded equipment that will allow the aircraft to automatically transmit its GPS position to air traffic control (ATC). The AMC Commander declared Initial Operational Capability (IOC) on 30 Apr 04.

-- Multipoint Refueling System (MPRS) provides the capability to air refuel receptacle and probe-equipped receivers on the same mission. Twenty KC-135s are equipped with a wing-mounted MPRS capability.

-- Roll-On-Beyond-Line-of-Sight Enhancement (ROBE) program modifies 40 KC-135 with tactical datalink (Link 16) to enable the tanker to act as an airborne node with relay and “gateway” functions.” The airborne gateway mission will be adjunct to the air refueling/mobility mission. It will be tasked by the Air Component Commander for the theater of operation. The primary objective is to connect battle directors in the Air and Space Operations Center (AOC) to Link-16 participants in-theater or en route. This is a SECAF/CSAF-directed Air Force transformational effort to increase the utilization/effectiveness of tankers that are “always there” and give these tankers an adjunct C2ISR mission.

-- Control Column Actuated Brake program installs a control column stabilizer trim brake to prevent pitch trim runaway. This stabilizer trim brake mechanically arrests stabilizer movement opposite of column movement. This program is based upon a KC-135E Class A mishap at Geilenkirchen Air Base in Jan 99. The mishap safety board recommended modification to the pitch trim control system.

The KC-135 fleet is aging and is undergoing modernization to extend its life cycle well into the 21st Century. At the same time, AMC is currently pursuing a recapitalization effort with the intent to retire the aging and maintenance expensive KC-135E model aircraft, and add a modern tanker aircraft to the inventory.

Several studies are completing, or are on-going, to determine the KC-135 fleet’s viability and add a modern tanker to the AMC inventory.

A recent KC-135 aging aircraft study addressed the aircraft’s life in terms of three variables – usage, age, and utility. Aircraft age is measured in flight hours. As the aircraft structure flexes during flight, it eventually begins to crack; this can be termed “fatigue.” Age can also be simply measured chronologically. Exposure to the environment over time induces corrosion and material degradation; this variable requires repairs. The third variable is utility, assessed in usefulness. As the operational environment changes, aircraft capabilities and availability become insufficient to meet mission needs. This variable drives aircraft modifications. The combination of these variables results in an increase in maintenance, increase in costs, and decrease in aircraft availability.

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KC-135 Program/Modifications

Program/Modification	Past FY04	Execution FY05	Programmed FY06	FY07	Funding	Estimated Completion
Airline Style Passenger Seats					(b)(5)	
Control Column Actuated Stabilizer Trim Brake	X	X	X	X		
Global Air Traffic Management (GATM) Modification	X	X	X	X		
Reduced Pressure Autobrake Actuator						
Control Column Potted Yoke Switches						
Large Aircraft Infrared Countermeasures (LAIRCM)						
Mode S (Elementary and Enhanced) Mode 5	X	X				
Airborne Network Integration (ANI)						
Roll-On Beyond-Line-of-Sight Enhancement (ROBE)	X	X				

(b)(5)

Modification Explanations

Airline Style Passenger Seats

The current airline-style passenger seats are no longer manufactured, since they do not meet FAA standards for crashworthiness. Consequently, parts are increasingly scarce and no more spare seats are available, making the seats unsupportable. The new seats meets all FAA requirements.

Control Column Actuated Stabilizer Trim Brake

Addressed pitch trim runaway prevention and control by adding a brake similar to commercial 707 installation. Proposed solution requires redesign of floor structure to mount brake, design control.

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Global Air Traffic Management (GATM) Modification

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management (ATM). The ability to reduce aircraft separation and implement other new ATM procedures, while maintaining or improving safety standards, is based on the use of new technology. (b)(5)

Reduced Pressure Autobrake Actuator

The pressure of the installed autobrake actuator is higher than the OEM now recommends. The higher the pressure actuator can and does induce a pitch of the main landing gear (MLG) truck resulting in the MLG contacting the MLG oleo. This contact can induce a stress riser, which can result in a cracked MLG truck.

Large Aircraft Infrared Countermeasures (LAIRCM)

Provides a highly effective defensive capability for transport and tanker aircraft against infrared (IR) surface-to-air missiles (SAM). System consists of a missile warning system and directed laser countermeasures. Current plans call for equipping 22 KC-135s with LAIRCM to support two small-scale contingencies (SSC). LAIRCM funding for KC-135 was withdrawn and moved to other AMC aircraft platforms.

Control Column Potted Yoke Switches

Addresses design of existing stabilizer trim switch installation in the control wheel, which has maintainability problems, and can induce short circuits. Two design approaches provided: switches potted with individual wire splices, or switches potted with integral wire disconnect block. Installation is complete on one prototype aircraft. (b)(5)
(b)(5)

Mode S (Elementary and Enhanced) Mode 5

The current KC-135 APX-100 Mode S transponder does not meet Eurocontrol requirements for elementary surveillance established by ICAO Standards and Recommended Practices (SARPs), Annex 10, Amendment 73. This requirement is currently scheduled to be implemented in Mar 05. To meet elementary surveillance requirements, a software upgrade to the currently installed APX100 is required. This is a “late-to-need” requirement. Air Staff provided funding in FY04/05 to upgrade the APX-100 to meet the Elementary Mode S requirement. However, the KC-135 APX-100 Mode S analog transponder does not meet anticipated Eurocontrol requirements for enhanced surveillance (anticipated for FY08), nor the DOD requirement (per AF/XO message 15 May 02) to upgrade Mode 4 (to Mode 5) military identification friend or foe (IFF) systems.
(b)(5)
Recommended solution is to procure a new transponder such as the APX-119.

Airborne Network Integration (ANI)

AMC has a global secure and non-secure communications requirement to meet AMC missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the Global Information Grid (GIG) to support C2 voice and data requirements, transfer aircraft status and position information to secure Tactical Data Link (TDL), and provide aircraft IP addressability within the GIG for sharing of operational data. AMC’s plan is to use Joint Tactical Radio System (JTRS) Program radios to provide required capabilities not provided by Global Air Traffic Management modifications or Avionics Modernization Programs (e.g. Airborne Networking, wide-band applications, etc). ANI will satisfy requirements in Real Time Information to the Cockpit (RTIC) AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3), JTRS ORD Version 3.2, JROCM 087-03, 9 April 2003, and Advanced Situational Awareness and Countermeasures (ASACMS) CDD (Draft in AFROC coordination). ANI development is contingent upon availability of JTRS low rate initial production projected in late (b)(5)

Roll-On Beyond-Line-of-Sight Enhancement (ROBE)

SECAF/CSAF directed development of a roll-on/off communication system to be used on tanker aircraft, enabling range extension and translation of tactical data links as a near-term, data relay gateway capability. The primary objective is to connect battle directors in the Air and Space Operations Center (AOC) to Link-16 participants in-theater or en route. KC-135 ROBE is the first generation of the Scalable, Multi-function, Automated Relay Terminals (SMART) Tanker gateway initiative. Forty KC-135 ROBE Spiral 1.0 aircraft modifications (A Kits) are complete and 20

ROBE Spiral 1.0 communication suites (B Kits) have been delivered. Electromagnetic Compatibility/Interference (EMC/I) flight test on Global Air Traffic Management/ Multipoint Refueling System (GATM/MPRS) KC-135 was completed on 19 May 04. ROBE Spiral 2.0 will upgrade the existing 40 A-Kits and 20 B-kits with recommended changes from test and Situational Awareness Data Link/Enhanced Position Location and Reporting System (SADL/EPLRS) capability.

2.5 AIR MOBILITY SUPPORT ROADMAPS

Air Mobility Support Processes are those activities that endure, cut across every mission category, and are essential for air mobility operations. They require talented and dedicated professionals trained to task at all levels of the Mobility Air Forces (MAF). The 12 fundamental air mobility support processes essential to the accomplishment of the air mobility mission, and roadmaps covering weapons of mass destruction and technology, include:

-- En Route
-- Information Resources Management/Command, Control, Communications, Computers and Intelligence Systems
-- Information Operations
-- Command and Control
-- Intelligence
-- Logistics
-- Force Protection
-- Operations Support
-- Medical
-- Cargo and Passenger Handling
-- Base Operating Support
-- Modeling, Simulation, and Analysis
-- Chemical, Biological, Radiological, Nuclear, and High Yield Explosive
-- Advanced Technology

The roadmaps that follow describe these challenges in more detail providing possible solutions that, once implemented, will ensure the MAF's ability to support both current and future air mobility operations.

2.5.1 Global En Route Support Roadmap

OPR: AMC/A55

MAF Capability Statement

Provide worldwide capability to support mobility operations through established or expeditionary en route airfields, capable of supporting sustained mobility operations using in-place infrastructure or deployable assets and personnel, across the full spectrum of conflict and in all operating environments.

Roadmap Assessment

Global En Route Support will face the following challenges in the short-term: insufficient maintenance manpower to support aircraft defensive systems; inadequate materials handling equipment (MHE) to meet wartime closure; and an inability to meet Global Reach Laydown deployable equipment requirements including communications, weather, intelligence, intransit visibility (ITV), vehicles, shelters, and workspace. Obsolete command and control (C2) systems are currently used to communicate between deployed units and aircraft. Deploying single-function aerospace ground equipment (AGE) consumes valuable airlift space. Infrastructure projects are programmed for construction, but deficient in military construction (MILCON) recapitalization rate and real property maintenance (RPM) for preservation and maintenance. Improvements are expected in the mid-term, however significant challenges in the Pacific area of responsibility (AOR) will continue throughout the long term.

Capability Objective

Provide the capability to support mobility operations through established or expeditionary airfields, using in-place mobility infrastructure or deployed mobility assets and personnel, across the spectrum of conflict. This includes: the ability to operate in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment; the ability to operate in adverse weather conditions; the ability to service, repair, and load/offload all participating aircraft; interoperability within AMC, with the rest of DOD, our allies, and our commercial partners; multi-level security; timely receipt of C2, intelligence, and weather data; and the ability to receive and transmit C2 instructions, order-of-battle information, and mission directives to supported headquarters and participating forces.

Milestones

Short-Term (FY05-12)

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[redacted]

Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.2 IRM/C4I Roadmap

OPR: AMC/A65

MAF Capability Statement

Provide superior and effective command, control, communications, computers, and intelligence (C4I) capabilities that are pervasive throughout all functions at every echelon of command (fixed, airborne, and deployed); cut across the entire spectrum of conflict; and provide a flexible, responsive, secure, survivable, integrated global information infrastructure. These superior C4I capabilities and the supporting infrastructure are maintained in peak performance by a fully manned, well-trained, and skilled base of information resource managers. Information resource management (IRM) ensures the right information is provided in the right format, to the right place, at the right time to support decision makers at all levels. Information must be timely, accurate, relevant, and secure—assuring mission success across the conflict spectrum and in all operating environments.

Roadmap Assessment

Information resource management/command, control, communications, computers, and intelligence (IRM/C4I) systems are experiencing funding shortfalls for communications infrastructure deficiencies at AMC bases. Current infrastructure is inadequate to meet present and future command needs and is vulnerable to information operations (IO) attack. Other short-term issues include: current "as-is" C4 systems architecture is inadequate to support global intransit visibility (ITV) and command and control (C2) requirements; systems are not interoperable, do not meet open systems standards, and cannot guarantee data integrity; global high frequency (HF) system is inadequate to meet C2 requirements; inadequate electronic records management; lack of integrated electronic tasking, coordination, and document management; and lack of enterprise licenses for a standardized electronic mail and network operating system. Significant improvements are projected by the mid-term as solutions will be in place to overcome many of our deficiencies. Our ability to command and control MAF, Civil Reserve Air Fleet (CRAF), and ground forces worldwide will be greatly improved, as well as ITV of patients, passengers, cargo, personnel, aircraft, and equipment. We will be well on our way to achieving data standardization and compliance with open systems standards and defense information infrastructure common operating environment (DII COE), allowing interoperability within AMC, the rest of DOD, our allies, and our commercial partners. Our bases will have standardized electronic mail and network operating systems, and the ability to conduct unclassified and classified video teleconferencing (VTC). Our C4 systems fixed infrastructure will be in place to meet our target architectures. Additionally, our deployed forces will have secure, high capacity day 0 and sustaining voice and data service for common users; and the global HF voice and data ground-air-ground connectivity will be on line. All of these capabilities together will provide global C2 voice and data capability and allow timely receipt of C2, intelligence, and weather data whenever and wherever required.

Capability Objective

Provide C4I capabilities that are pervasive throughout all functions, at every echelon of command (fixed, airborne, and deployed); cut across the entire spectrum of conflict; and provide a flexible, responsive, secure, survivable, integrated global information infrastructure. These ensure:

-- Interoperability within AMC, with the rest of DOD, our allies, and our commercial partners.

-- Total asset visibility (TAV), worldwide (includes passengers, cargo, patients, personnel, aircraft, equipment, etc.).

-- Global C2 voice and data capability with all AMC fixed and deployed assets, air mobility and CRAF aircraft, Air and Space Operations Centers (AOCs), air traffic control agencies, and other DOD agencies.

Milestones

Short-Term (FY05-12)

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Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.3 Information Operations Roadmap

OPR: AMC/A32

MAF Capability Statement

Provide information superiority and preeminent situational awareness to seize and maintain the tactical and operational initiative and to influence the enemy's actions, while denying the adversary the ability to do the same, across the spectrum of conflict and in all operating environments.

Roadmap Assessment

The Information Warfare Flight (IWF) has basic functionality and has reached initial operational capability (IOC). The IWF also lacks sufficient secure voice, fax, video and e-mail capability required to support secure command and control with in-garrison and deployed units. (b)(5) [redacted] (b)(5) [redacted] (b)(5) [redacted] As these [redacted] ll be sufficient for the [redacted] foreseeable future.

Capability Objective

Provide the capability to use information operations (IO) to counter increasing threats from criminal activity, terrorism, and covert operations employed against the MAF; to participate in defense against full-scale, strategic information attacks; to attain information superiority through the conduct of both defensive and offensive IO; to supply warfighters immediate access to fully integrated IO across the full spectrum of conflict; to integrate Joint doctrine for IO into all future MAF operations; to detect and defend against intrusion/attack of command, control, communications, computers, and intelligence (C4I) systems and networks, with insight into MAF critical information systems; to develop and retain a fully trained MAF IO workforce; and to allow time-critical re-tasking.

Milestones

Short-Term (FY05-12)

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Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.4 Command and Control Roadmap

OPR: AMC/A38

MAF Capability Statement

The ability to successfully command and control forces across any environment or spectrum of conflict will remain a high priority for AMC. MAF forces will therefore require the capability to perform command and control, monitor and assess global conditions and events, and plan and execute missions across the full range of conflicts around the globe. Effective, secure, robust, and flexible voice and data communication are the foundation to deliver the capability.

Roadmap Assessment

M21, Mobility for the 21st Century, (M21 is an AMC concept which has evolved into a broader vision than as it originally had started in the Tanker Airlift Control Center (TACC) as M2K), is AMC's vision of short-term to long-term needs and capabilities required to achieve global mobility goals and desired effects. Highly effective solutions, integrated across processes, systems, commands, and forces, and projected globally, will provide the capability. Solutions must incorporate Air Force, Joint, and coalition forces and civil agency concepts, processes, and equipment modernization to become truly interoperable; M21 concepts are linked to those in the Global Mobility Concept of Operations (CONOPS) and Joint Vision (JV) 2020 and reflect consistent objectives. Network-centric versus stovepipe technological and communication solutions are essential for providing the right information at the right time to the warfighter anywhere in the world and delivering time-sensitive responses to changing threats. Information resource management, architectures, standards, and data management must drive the integration of systems and applications into a corporate structure in order to provide all echelons of command accurate and timely decision-quality information. Deployable capability must ensure survivability of the force and the ability to quickly establish airheads in austere operating locations while assuring connectivity to Joint force commanders and the TACC. Business process integration will steer development of “tasking to billing” information technology to deliver automated tools for planning, allocation, and execution of missions. M21 defines the enterprise architecture philosophy and management processes required to effect the solutions to give MAF forces the capabilities to meet worldwide challenges.

M21 is a comprehensive transformation initiative to seamlessly modernize and integrate processes and systems with assured connectivity to deliver premier mobility support for warfighters and other customers, from force level down to unit level. M21 leverages existing capabilities with emerging procedures and technologies into an enterprise architecture based on three main pillars: Seamless Processes, Seamless Systems, and Assured Connectivity.

-- Seamless Processes: Numerous processes are in place throughout the MAF, from force level to the unit level. Integrating, and automating when practical, the processes used to move the mission so that information and decision flow transparently is the focus of seamless processes. For example, integrated flight management (IFM) is the centerpiece for TACC's new process to plan and execute air mobility missions. Through the integration of air mobility mission planning and execution processes and systems, IFM seeks to improve combat capability, flexibility, and flight safety. Other advances will focus on improving other processes, such as with requirements, aircraft servicing, and technology transitions.

-- Seamless Systems: Capabilities-based requirements and enterprise architecture standards will encompass all system development to ensure system interoperability and new developments can integrate at the applications level in a shared architecture environment. The goals are to reduce duplicate data entry; manage data as a corporate entity; eliminate homegrown, stovepipe applications; and provide responsive data mining results to put information at the fingertips of planners, managers, decision makers, and other users.

-- Assured Connectivity: MAF forces need global, seamless, secure and nonsecure voice, video and data communications capabilities between mobility assets (aircraft, forward operating locations, and command and control functions) and other forces (Combat Air Forces [CAF], Joint, coalition) and civil agencies. The M21 initiative, in concert with other Air Force and Joint communication programs, will increase capabilities and develop the necessary links and methods to ensure seamless interoperability, bandwidth, and security.

Desired Effects:

MAF forces must be able to achieve the following operational effects to fight and win:

-- Minimum time lapse between the initiation of crisis action planning and the projection of Joint US military power.
-- Seamless integration and effective conduct of air mobility operations on global and theater scales.
-- Assured ability to seamlessly mesh with CAF, Joint, and coalition forces.
-- Full range of air operations and support from a wide spectrum of airfields, including austere, cold, warm, and hot bases.

Principles:

To meet the goals of the Quadrennial Defense Review and the Air Force Communications and Information Strategic Plan, we must leverage technology and innovative concepts to develop interoperable, Joint command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) architecture and capability that include a responsive and effective Joint operational picture useable by the warfighter. The following four principles on capabilities from the Air Force Communications and Information Strategic Plan are adopted into the MAF's approach to information development. Beyond these principles, fully qualified and trained professionals are needed to perform communications and information operations.

-- Information Transport: Create one virtual network (transport layer, network management, delivery services) that spans the globe and extends into space to disseminate and access information necessary for proper task performance.

-- Information Computing: Provide the means to input, store, process, and output information. Information computing includes many technology initiatives designed to provide the power behind battlespace awareness and decision superiority for Air Force warfighters.

-- Information Assurance: Protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and nonrepudiation. This includes providing for the restoration of information systems by incorporating protection, detection, and reaction capabilities.

-- Information Management: Provide the tools and mechanisms for operational commanders to manage their data, information, and knowledge for making decisions. It includes providing business processes and architectures for managing official records, fusing and disseminating information, and supporting collaborative decision making across the enterprise.

Capability Objective

M21 establishes the basis for MAF planning, programming, and acquisition to transition to capabilities-based versus program-centric programming. The objective is to get the best capabilities to the warfighters in the shortest time. The focus is oriented on capabilities, not systems or particular programs, to meet projected needs and thereby better define requirements for future research, programming, and acquisition.

In order to meet the goals of global mobility, Air Mobility Command must project globally; interact and operate with theater command and control centers and aircraft; and survey, open, and operate out of austere airfields. Within constraints of limited assets, high demand and tempo, multiple participants, and worldwide operations, MAF forces must provide air refueling and rapidly deliver cargo and personnel on schedule to any location required by the Joint Force Commander.

Integrated and automated crisis planning leverages scarce resources for optimal allocation and execution of the mission. The MAF must be able to plan and manage airlift and air refueling taskings in a manner that maximizes use of resources. The objective is to process validated requests; plan and allocate missions; then control mission execution through proactive command and control with mobility forces, civil organizations, and military control centers on a global scale. This also calls for communication, information exchange, and coordination with theater command elements.

Rapid global and theater air refueling and delivery of cargo, passengers, and medical patients ahead of force commanders' need dates are an enormous challenge. MAF must integrate with CAF and operate into austere locations to deliver cargo and personnel within the prescribed timing, in spite of weather and threat conditions. Command and control is an essential element. Reliable, secure communications are required to provide voice and data connectivity to aircraft and deployed forces.

To support operations, MAF will establish airfields, even in austere environments, and provide force protection, communications, weather, and support services (food and shelter) for successful loading operations. History has shown that air mobility forces will operate deep into theaters, often as the first forces on the scene. Presurveyed airfield data, gathered in coordination with theater commands, are essential deliberate planning information for crisis planning and mobility operations. Reliable voice and data communications to these forces are essential for command and control.

Milestones

Short-Term (FY05-12)

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Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.5 Intelligence Roadmap

OPR: AMC/A26

MAF Capability Statement

Provide the capability to collect, analyze, and disseminate timely, relevant, and actionable intelligence on potential hostile capabilities, activities, or intentions to assist the planning, execution, and force protection of worldwide mobility missions, across the spectrum of conflict and in all operating environments.

Roadmap Assessment

Intelligence faces significant challenges in the short term in the following areas: shortfalls in 5 and 7 levels; unfunded individual mobilization augmentees (IMAs); insufficient manning for mission requirements; lack of geospatial information and services (GI&S) personnel; funding shortfall for life-cycle replacement of intelligence systems equipment; and limited communications bandwidth available during deployments and contingencies.

In the mid-term, shortfalls in 5 and 7 levels, unfounded IMAs, and problems with bandwidth availability for deployments and contingencies are expected to continue. Significant improvements are expected in the long term as these challenges are overcome.

Capability Objective

Provide the appropriate number of intelligence professionals with the requisite training and tools to collect, analyze, and disseminate timely, relevant, and actionable intelligence on potential hostile capabilities, activities, or intentions to assist the planning, execution, and force protection of worldwide mobility missions. This includes the ability to use intelligence production and dissemination technologies to support MAF intelligence operations. Intelligence forces must keep pace with demands to fuse information derived from space systems and other collection assets and automatically generate threat forecasts, courses of action, and best responses for consideration by decision makers. Achieving this objective requires a globally vigilant intelligence enterprise of personnel and systems that are able to operate in a complex environment against an increasing number of potential opponents with increasingly sophisticated technology.

Milestones

Short-Term (FY05-12)

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Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.6 Logistics Roadmap

OPR: AMC/A45

MAF Capability Statement

Provide the capability to prepare units for deployments, maintain supplies, provide maintenance in joint operations area, and manage personnel and equipment movement in support of Air and Space and other DOD Forces, across the spectrum of conflict and in all operating environments.

Roadmap Assessment

Logistics will face significant challenges in the short-term for the following reasons: logistics maintenance manpower shortages resulting from a significant expansion in the role of conventional air refueling; increasing mission demands upon operational aircraft requiring the MAF to procure maintenance training devices (MTDs) for the hands-on qualification and certification of aircraft maintenance personnel; deployment of single-function aerospace ground equipment (AGE) consumes excessive airlift space; congressionally added C-130s without sufficient funds for adequate depot logistics support; obsolete capabilities for de-icing aircraft that do not support MAF requirements for high-throughput locations; continually aging materials handling equipment (MHE) and special purpose (SP) and base maintenance fleet which require replacement at a rate exceeding the ability of the laid-in funding line to procure new assets; loss of general purpose (GP) vehicle lease funding, hindering the MAF's ability to replace an aging GP vehicle fleet; inadequate connectivity between flightline, supply, data bases, and source documents.

Improvements are projected for the mid- and long-term; however, without adequate funding to overcome deficiencies, MAF logistics capability could deteriorate rather than improve.

Capability Objective

Provide logistics capabilities to prepare units for deployments, maintain supplies, provide maintenance in Joint operations areas, and manage personnel and equipment movements in support of Air and Space Expeditionary Force (AEF) forces and other military forces, as required. These logistics capabilities will be achieved by developing the ability to:

-- Access real-time, time-phased force deployment document (TPFDDs).
-- Integrate logistics functions within the air and space force structure.
-- Optimize technology to operate with a reduced logistics footprint.
-- Develop a smaller, more versatile, technically proficient logistics force.
-- Operate a seamless logistics system responsive to customer needs.
-- Work with allied and coalition personnel, equipment, and aircraft.
-- Respond to shortened life-cycle demands.
-- Provide time-definite deliveries of weapon systems spares directly to fielded units to support sustained combat operations.
-- Utilize high-velocity, just-in-time processes to manage mission and logistics uncertainty in lieu of larger safety stock levels.

Milestones

Short-Term (FY05-12)

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Mid-Term (FY13-19)

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Long-Term (FY20-26)

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2.5.7 Force Protection Roadmap

OPR: AMC/SFX

MAF Capability Statement

Provide the capability of activities that prevent or mitigate successful hostile actions against Air Force people and resources when they are not directly engaged with the enemy. Force Protection is accomplished by a commander program designed to protect service members, civilian employees, family members, facilities, and equipment in all locations and situations. Force Protection must exist across the spectrum of conflict and in all operating environments.

Roadmap Assessment

Force Protection is an area that cuts across virtually every MAF mission category and support process. Each category and support process must consider the impact force protection has on the ability to successfully conduct its particular mission. Some of the major deficiencies considered during this review are included on other roadmaps; i.e., MAF Weapon Systems, Base Operating Support, Aeromedical Evacuation, Combat Delivery, and Command and Control.

Force Protection lacks nonlethal weapons for use in military operations other than war (MOOTW), and an armored tactical vehicle for use during contingency/humanitarian/peacekeeping operations. Personal protective equipment for security forces (such as ballistic vests that provide both ballistic and flak protection), portable defensive fighting positions, and a counter-sniper capability are needed. Advanced small arms capable of defeating current and advanced enemy personal protective equipment are also lacking. There are insufficient training simulators for conducting force-to-force training. The Office of Special Investigation (OSI) lacks sufficient force-protection equipment. Flyaway kits contain the equipment necessary for agents providing counterintelligence support for force protection while deployed. Force Protection will face funding challenges in the short-term to overcome vulnerability assessment deficiencies, including inadequate perimeter fencing, perimeter security lighting, standoff distances from key buildings, and fragment-retention film on windows at AMC bases; all have yet to be resolved. AMC also lacks sensor systems for protection of Air Force Level 1, 2, and 3 resources, as required by Air Force instructions. Supporting forces and owner/user personnel provide internal control and surveillance for aircraft parking areas. There is no intrusion detection and surveillance at the restricted area boundary. AMC lacks a real-time chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) battle management system, including warning and reporting, local weather, and intelligence. Protection systems do not provide integrated protection against all CBRNE threats. Collective protection capability is limited and does not provide integrated protection against all CBRNE threat agents and ballistic threats. Aeromedical crewmember masks are not standard across MAF. MAF aircraft need to capitalize on low-observable technologies to reduce emissions and the probability of detection, and to improve the capabilities of aircraft self-protection countermeasures. MAF aircraft lack an autonomous capability to airdrop equipment and personnel precisely, and current CBRNE detection systems are resource-intensive and require excessive time to be effective.

Capability is projected to improve in the mid- and long-term, as Force Protection challenges, Force Protection equipment challenges, and infrastructure deficiencies are overcome.

Capability Objective

Provide the capability of activities that mitigate successful hostile actions against Air Force people and resources when not directly engaged with the enemy, including detecting, assessing, and countering threats, including weapons of mass destruction (WMD); the ability to respond with nonlethal technology; and the ability to communicate real time with all Force Protection personnel, including local authorities.

Milestones

Short-Term (FY05-12)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

(b)(5)

(b)(5)

2.5.8 Operations Support Roadmap

OPR: AMC/A38

MAF Capability Statement

Provide the support capabilities that directly impact air mobility operational missions, including airfield operations, weather, life support, operations resource management, inspections, and safety, across the spectrum of conflict and in all operating environments.

Roadmap Assessment

In the short term, Operations Support will face significant challenges in the following areas: manpower shortfalls in weather; enlisted retention impacting air traffic control; inadequate life support equipment (i.e., costly passenger and aircrew flotation devices that are prone to failure and difficult to obtain, aircrew flak vests that do not integrate with other protection equipment, aircrew medical crew masks that do not integrate with other protective equipment, nonejection seat parachutes that are beyond their original design life, and inadequate aircrew laser eye protection); deficiencies in accurate weather forecasts, contingency approach and landing systems (i.e., lack of a rapidly deployable, easy to set up, jam-resistant precision approach system); and a Civilian Reserve Air Fleet (CRAF) compatible nonprecision and en route navigation system. Current mission-planning systems lack adequate data transfer capabilities and are not available or up-to-date on all weapon systems, and the current facilities investment strategy is not sufficient to correct problems. Operations and maintenance (O&M) dollars are decreasing. As a result, our facilities are not getting repaired at an acceptable rate for the command. Military construction (MILCON) through the Future-Years Defense Program (FYDP) is at all time lows.

In the mid term, manning and retention are projected to improve; and major equipment issues should be resolved. However, our infrastructure investment shortfalls are projected to extend throughout the long term.

Capability Objective

Provide the capability to generate missions in a chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) environment to field and operate deployable airfield equipment to support all-weather contingency operations; ensure interoperability across the MAF, DOD, and our allies and commercial partners; ensure airfield data availability; ensure accurate weather information and operations resource management data accessibility by participating forces; ensure multi-level security for all operations support data systems, timely transmission of command and control (C2), intelligence, weather data, and mission directives; and ensure the ability to transmit C2 instructions, order-of-battle information, and mission directives to generate mobility missions.

Milestones

Short-Term (FY05-12)

(b)(5)

[redacted]

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

2.5.9 Medical Roadmap

OPR: AMC/SGX

MAF Capability Statement

Provide a managed community health care system that delivers a seamless uniform health benefit that focuses on disease prevention, health promotion, force health protection, and personnel physical fitness with medically appropriate access to the right level of care, at the right time, and at a reasonable cost, commensurate with the operation of a dual peacetime/readiness-capable infrastructure.

Roadmap Assessment

(b)(5) [redacted]
(b)(5) [redacted] Medical logistics also lacks sufficient technology to support the resupply process. The Air Force Medical Service (AFMS) has a concept of operations known as Expeditionary Medical Logistics (EML). EML is defined by intense supply chain management, time-definite delivery, resupply using a "pull" process, reduced inventory, and reduced airlift requirements. The equipment will require continuous exercising to refine and integrate EML into the present Joint medical logistics system. Continued funding is needed in development, acquisition and Joint research to overcome threats posed by the use of weapons of mass destruction (WMD). AFMS information management (IM)/information technology (IT) is responsible for supporting the management of information for the medical readiness and managed care missions. Funding support is vital to allow the AFMS to keep pace with the latest in technology, through research, development, and procurement. I [redacted] mid term, funding shortfalls identified in Short-Term Milestones; should be rectified by (b)(5) [redacted]. Proper funding will allow the AFMS to keep current in equipment and weapons of mass destruction (WMD) threat protection technologies. In the long term, assumed funding will allow the AFMS access to the latest in development and technology.

Capability Objective

Provide the capability for a managed community health care system that includes the ability of the AFMS to respond, survive, and operate in a directed energy (DE) and WMD environment; the ability of the AFMS to react quickly to changing technological requirements and opportunities; the ability for medical personnel to integrate into Air and Space Expeditionary Force (AEF) functions; an integrated medical logistics system, which is capable of supporting Joint Service requirements and providing full-spectrum supportability; and a modularized, right-sized, deployable medical support system capable of meeting AEF and Joint force service requirements.

Milestones

Short-Term (FY05-12)

(b)(5) [redacted]

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

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(b)(5)

[redacted]

(b)(5)

(b)(5)

2.5.10 Cargo and Passenger Handling Roadmap

OPR: AMC/A43

MAF Capability Statement

Provide the capability to process, upload, and download authorized cargo and passengers, across the spectrum of conflict and in all operating environments.

Roadmap Assessment

Cargo and Passenger Handling will face challenges in the short term, because current materials handling equipment (MHE) does not meet surge requirements for supporting the DOD 1-4-2-1 Force Sizing Construct. Movement of passengers and cargo between biological/clean environments has not been tested, and there is no capability to screen inbound cargo for explosives and/or improperly packaged hazardous material without tearing down pallets. Additionally, in the short-term, there is insufficient intransit visibility (ITV) to track the status of cargo, passenger, and patient movement throughout the Air Mobility system. Infrastructure problems with en routes also hamper our cargo and passenger handling capability. The greatest impact noted is deterioration of fuel systems, and required airfield pavement and port facilities modernization. Improvements are projected in the mid term, if funding is secured to keep the Tunner production line open, and our MHE shortfalls are overcome. However, maintaining this capability will be challenged, because not all of our MHE inventory is being replaced with the Tunner or Halvorsen loader. Existing MHE that is not scheduled to be replaced by either Tunners or Halvorsens must be retained to meet the DOD 1-4-2-1 Force Sizing Construct. By the mid-term, these pieces will be two decades old and difficult to maintain, and there is no replacement date secured. Good capability is projected in the long-term as challenges facing cargo and passenger handling are met and solutions implemented to overcome them.

Capability Objective

Provide the capability to process, upload, and download authorized cargo and passengers across the spectrum of conflict, including the ability to take advantage of "containerized cargo," the ability to integrate cargo onload and offload with allied and coalition aircraft, and the ability to onload/offload aircraft day/night, during adverse weather, under all conditions.

Milestones

Short-Term (FY05-12)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

2.5.11 Base Operating Support Roadmap

OPR: AMC/A75

<u>MAF Capability Statement</u>

Provide critical base operating support services (civil engineering [CE], services, chaplain, contracting, personnel, staff judge advocate, etc.) at CONUS and deployed locations, across the full spectrum of conflict and in all operating environments.

<u>Roadmap Assessment</u>

Base Operating Support (BOS) will experience significant challenges in the short-term because of the impact of chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) deficiencies. Reliable, effective, real-time CBRNE detection capabilities do not exist against the full range of CBRNE threats at the sensitivity levels required. Current decontamination systems are resource-intensive and require excessive time to be effective. Also collective protection capability is limited and does not provide integrated protection against all CBRNE threat agents and ballistic threats. BOS infrastructure will also face significant challenges for the following reason: current shortfalls in funding are expected to lead to increased infrastructure/facilities degradation. However, we might start to see improvements with projected funding towards the end of the short-term.

In the mid-term, funding is projected to reach a level that enables the overall condition of infrastructure to improve significantly. This should enable us to meet mission needs.

<u>Capability Objective</u>

Develop the capability to transition quickly from providing full BOS services under normal peacetime conditions to simultaneously providing contingency BOS services (clothing, feeding, housing, legal, spiritual, financial, and other critical support services) required for mission accomplishment under crisis conditions in environments contaminated by weapons of mass destruction or in increased threat conditions. Deliver these services at home, abroad, and in austere locations. Personnel must be trained and equipped for worldwide deployment.

Milestones

Short-Term (FY05-12)

(b)(5)

[redacted]

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

[redacted]

(b)(5)

[redacted]

(b)(5)

(b)(5)

(b)(5)

(b)(5)

2.5.12 Modeling, Simulation, and Analysis Roadmap

OPR: AMC/A59

MAF Capability Statement

Provide capability for modeling simulation and analysis (MS&A) support to analyze worldwide mobility operations moving through established or expeditionary en route airfields, capable of supporting sustained mobility operations using in-place infrastructure or global laydown deployable assets and personnel. Capability must provide MS&A support to decision makers and warfighters for airlift and tanker operations across the full spectrum of mobility operations in all operating environments and in training environments to include live, virtual, and constructive simulations. Provide capability for MS&A to support commanders at all levels, war games, exercises, planning, operations, distributed mission operations (DMO)/training, experimentation, and acquisitions with robust and timely analyses to support the decision makers and assure the most effective decisions for the utilization of MAF forces.

Roadmap Assessment

Current capability allows MS&A to answer senior leadership's questions in exploring policy and decision options. In addition, MS&A is extensively used in exercises and war games for mobility and tanker simulations and visualizations for both red and blue players.

The near vision for mobility MS&A is to provide more detailed and robust capability for analysis of material and personnel movement, airframes, fuel, crews, infrastructure support, command and control, information flow, integration of airlift and tanker operations, etc. to support war games, exercises, planning, and operations on a daily basis, and to explore the capability for analysis tools use within the developing Joint Synthetic Battlespace (JSB).

Capability Objective

Provide a capability for global MS&A support for worldwide mobility planning and operations by maintaining a robust modeling capability with fidelity to portray individual personnel, logistical items, airframes, aircrews, infrastructure limiting factors, training factors, and other factors that may affect planning or operations for the deployment, movement, sustainment, and redeployment of personnel and equipment to open and support an expeditionary en route operation anywhere in the world for Air and Space Expeditionary Forces (AEFs) within the various Concept of Operations (CONOPS) structures. Provide capability to meet DOD architectural standards so that models may interact with each other and operate within the JSB.

Milestones

Short-Term (FY05-12)

(b)(5)

employment capability within JFAST. Explore the interoperability of AMC models and analysis tools within the JSB.

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

2.5.13 Counter-CBRNE Roadmap

OPR: AMC/A35

MAF Capability Statement

Provide the capability for unrestricted air mobility operations in a chemical, biological, radiological, nuclear, and high-yield explosive (CBRNE)-contaminated environment.

Roadmap Assessment

"The growing threat posed by weapons of mass destruction (WMD)--specifically chemical, biological, radiological, nuclear, and high-yield explosive (CBRNE) weapons--is one of the most serious challenges facing the Air Force today. A CBRNE attack has the potential to produce devastating results, including unacceptable loss of life and degradation of core missions."

General John P. Jumper, USAF Chief of Staff
USAF C-CBRNE Master Plan, 30 Jun 04

WMD proliferation among rogue nations, international terrorist organizations, and other non-state actors represents a growing threat to unrestricted global air mobility operations. Today's challenge is to develop the capability to continue the timely delivery of personnel and equipment and provide aerial refueling capability to the war fighter in a CBRNE-contaminated environment without significant risk to personnel or loss of limited air mobility assets. The increasing possibility of CBRNE use by potential adversaries, or even an inadvertent release of toxic industrial material or CBRNE agents, necessitates continuing improvements to MAF Counter-CBRNE (C-CBRNE) capabilities.

The cessation and rollback of WMD proliferation are key features in the President's 2002 National Security Strategy (NSS). As illustrated below, the National Strategy for Combating WMD supports the NSS through nonproliferation, counterproliferation, and consequence management capabilities (Figure 10). Air Force C-CBRNE doctrine, in turn, identifies five broad mission categories, or pillars, upon which the NSS rests. MAF capabilities support all five AF C-CBRNE pillars. However, the primary objective of this roadmap is to improve MAF "passive defense" capabilities, i.e., to reduce our vulnerability and minimize/mitigate the effects of WMD use against US forces (Figure 10).

Figure 10. Air Force C-CBRNE Pillars

Proliferation Prevention: Termed nonproliferation in national and Joint doctrine. Those actions (e.g., diplomacy, arms control, multilateral agreements, threat reduction assistance, and export controls) taken to prevent the proliferation of weapons of mass destruction that seek to dissuade or impede access to, or distribution of, sensitive technologies, material, and expertise. (JP 3-40 Preapproval draft [PAD])

Counterforce: The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances by which hostilities may be initiated. (JP 1-02) For purposes of this document, counterforce refers especially to enemy CBRNE capabilities.

Active Defense: The employment of limited offensive action and counterattacks to deny a contested area or position to the enemy. (JP 1-02) With respect to active defense against CBRNE threats, it is the detection, diversion, or destruction of enemy CBRNE weapons and delivery means while en route to their targets.

Passive Defense: Measures taken to reduce the vulnerability and minimize the effects of WMD employed against key host nation installations, any US installation and facility, and ports of embarkation and debarkation. Combatant commanders should initiate WMD consequence management planning and integration. Combatant commanders should employ measures that may include early and avoidance warning, operations security, dispersion, individual and collective protection, WMD medical response, detection, reporting, and decontamination. (JP 3-40 PAD) For the purposes of this document, the goal of passive defense is to enable forces to survive and operate in a CBRNE-contaminated environment.

Consequence Management: The deliberate response to the use and effects of a CBRNE incident and the actions required to restore essential operations and services in a permissive environment. (AFDD 2-1.8) (draft)

Roadmap Assessment (Cont)

Passive Defense: Required Capabilities. Passive defense capabilities are those that enable the Air Force to survive and sustain an acceptable level of operations in the CBRNE post-attack environment.

The operational capabilities that support this overarching capability set include:

- Shape and prepare the battlespace

-- Collect and fuse hazard and risk information throughout the battlespace to disseminate to commanders at all levels. This includes providing modeling and simulation capabilities and warning and reporting networks
-- Assess and react in a timely manner to actual and potential impacts
-- Monitor indigenous populations for diseases of operational importance to support ongoing threat assessments

- Sense CBRNE use

-- Detect and identify agents
-- Provide medical surveillance
-- Diagnose exposure to agents

- Shield personnel, equipment, and facilities from CBRNE contamination and effects

-- Protect individuals from CBRNE effects and exposure, both prior to (through medical prophylaxes) and during CBRNE events
-- Provide collective protection from CBRNE effects and exposure
-- Protect equipment from CBRNE effects and exposure

- Sustain operations through the CBRNE attack and quickly restore pre-attack operational capability

--Decontaminate individuals, equipment, and fixed sites
--Treat and transport or quarantine contaminated or contagious patients
--Execute functional operations in contaminated environments

Basic Principles of Passive Defense

Contamination Avoidance

Contamination avoidance consists of actions (pre, trans, and post-attack) to preclude the contamination of mission-essential resources and personnel, whether directly from agent deposition or by transfer from contaminated surfaces. Successful avoidance results from the combination of agent detection, identification, prediction, marking, sampling and asset dispersal, relocation, and rerouting [AFI 10-2501].

Due to deficiencies in large-frame aircraft decontamination capabilities and the potential for international flight restrictions on contaminated aircraft, contamination avoidance is the preeminent MAF passive defense measure. All reasonable steps will be taken to avoid the contamination of MAF assets.

The contamination avoidance objectives of this C-CBRNE roadmap are to pursue and encourage technologies that improve standoff and early warning, biological and chemical agent point detection, and information processing. Technology needs to focus on increased detection sensitivity, lower detection thresholds, specificity across the evolving spectrum of threat agents, reduced false alarm rates, and integration of CBRNE detectors into various mapping and communication networks to provide common warning and reporting throughout the Joint Force [Joint Service Chemical and Biological Defense Program, FY02-03 Overview].

Within the specific realm of MAF, an airborne standoff CBRNE detection capability would enable commanders to either 1) avoid the contaminated area or, should mission criticality require exposure, 2) provide the aircrew/passengers adequate preparation time, prior to entering the contaminated area, to minimize the impact of contamination on mission-essential resources and personnel.

Protection

Protection consists of those measures taken to keep chemical, biological, radiological, or nuclear hazards from having an adverse effect on personnel, equipment, or critical assets and facilities. Protection consists of five groups of activities: hardening of positions; protecting personnel; assuming mission-oriented protective posture; using physical defense measures; and reacting to attack [JP-1-02 DOD Dictionary of Military and Associated Terms].

The focus of the Air Mobility Master Plan, with reference to protection, is to encourage technologies that will provide or enhance 1) transportable collective protection structures; 2) aircrew and ground crew Individual Protection Equipment (IPE) while decreasing the physical burden on the Airmen; 3) aeromedical evacuation capabilities for contaminated or contagious patients; 4) physical barriers to the contamination of cargo and mobility assets; and 5) air mobility mission continuation in a contaminated environment.

Contamination Control

Contamination Control includes procedures to avoid, reduce, remove, or render harmless (temporarily or permanently) nuclear, biological and chemical contamination for the purpose of maintaining or enhancing the efficient conduct of military operation [AFI 10-2501]. Contamination control measures include “Split MOPP” operations—the sectoring of an installation based on the identification and marking of clean and dirty zones. Split MOPP significantly improves sortie generation in a contaminated environment. Within this context, a subgroup of contamination control includes decontamination. Decontamination is the process of making any person, object, or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents, or by removing radioactive debris/material [AFI 10-2501].

The continuum of passive defense provides that if agent avoidance is not possible and protection is limited, then contamination control, to include decontamination, will be required as quickly as possible to restore maximum operational capability. Two significant challenges are the determination of "how clean is clean" and the development of the capability to conduct "safe decontamination."

The “how clean is clean” controversy results from improvements in the sensitivity of agent detectors. Heretofore, levels of contamination that were below the detection capability of fielded detectors were determined “clean” and allowed continued used of MAF resources. As newer agent detectors register lower levels of contamination, decontamination capabilities will be challenged to achieve zero-level readings. It is anticipated that once detectors label an aircraft as contaminated, restrictions in overflight and landing clearances will preclude the use of exposed aircraft in the intertheater role. Exposed aircraft may be limited to intratheater missions into contaminated airfields or written off as battle casualties. An associated issue is the absence of international standards for the acceptance of contaminated assets. It is imperative that the international community come to an agreement as to what level of residual aircraft contamination will be acceptable to allow unrestricted overflight and landing rights.

Once an MAF aircraft are exposed to CBRNE agents, the ability to conduct “safe decontamination” becomes vital to mission accomplishment. Current methods are time consuming, manpower intensive, less than fully effective, and may damage sensitive electronic equipment. Government and civilian agencies are currently testing decontamination agents, and delivery mechanisms, that address these concerns.

Decontamination Levels

Decontamination consists of three levels: immediate, operational, and thorough [AFI 10-2501].

Immediate: Decontamination carried out by individuals immediately upon becoming contaminated. It is performed in an effort to minimize casualties, save lives, and limit the spread of contamination (JP 1-02, DOD Dictionary of Military and Associated Terms).

Operational: Decontamination carried out by an individual and/or a unit, restricted to specific parts of operationally essential equipment, materiel, and/or working areas, in order to minimize contact and transfer hazards and to sustain operations. (JP 1-02, DOD Dictionary of Military and Associated Terms).

Thorough: Decontamination carried out by a unit, with or without external support, to reduce contamination on personnel, equipment, material, and/or working areas equal to natural background or to the lowest possible levels, to permit the partial or total removal of individual protective equipment and to maintain operations with minimum degradation. (JP 1-02, DOD Dictionary of Military and Associated Terms)

The term “reconstitution” is occasionally used when defining “thorough decontamination.” Reconstitution can be described as those actions taken by a military force during or after operational employment to restore its combat capability to full operational readiness. It is anticipated that MAF aircraft will require “reconstitution” decontamination to achieve full operational readiness (unrestricted global operations).

Capability Objective

Provide the capability to perform near-normal operations in a CBRNE environment through the development of systems to enhance avoidance, protection, and contamination control. The ability to avoid contamination requires detection and identification of a CBRNE hazard at a minimum standoff range that provides time to divert assets away from the threat. Protection will enable personnel and equipment to continue the mission in a contaminated environment. The ability to control/decontaminate agents requires timely reduction/elimination of a CBRNE hazard to a level allowing for unrestricted use of the specific aircraft and cargo.

Milestones

Short-Term (FY05-12)

(b)(5)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

(b)(5)

2.5.14 Advanced Technology Roadmap

OPR: AMC/A55

Weapon System Assessment

For our planning purposes, the MAF Advanced Technology Roadmap shows the road ahead; it focuses our efforts on the near-(FY04-10), mid-(FY11-15) and far-(FY16-27) terms. In some cases, we are investigating technologies that may not be available until much later (50-75 years).

Emerging technologies can be incorporated into aircraft modernization programs where necessary or into new aircraft designs. For example, the C-130 aircraft is a very versatile aircraft that has performed the airlift mission superbly for almost 40 years and will continue to do so for the next two decades. The technology that went into this airframe was 1950's state-of-the art. Modernization improvements have included more powerful engines, modern navigation suites, communications gear, and defensive systems. All have been necessary to keep pace with evolving mission requirements. It is becoming clear, however, that the aircraft may not be survivable nor meet lift requirement challenges of 2029 and beyond—future modernization efforts may not be adequate. The majority of our refueling aircraft are of like vintage and are becoming more difficult to maintain as they age. Modernization efforts have added new engines and navigation equipment, but it appears that new technologies may be best fielded in the form of a new design.

We recognize that the technical investments we make today are an investment needed to ensure mission capability into the future. We have done excellent work in modernizing our legacy fleets and we must continue to integrate emerging technologies, where possible, in aircraft modernization programs or, when necessary, to develop altogether new capabilities and platforms. This roadmap shows us the course to follow in ensuring we capitalize on technology to meet the mobility capability needs of the future.

We have made a thorough study of the future operating environment, and the results are included in the first volume of this plan. It states, "Our future operating environment will be greatly transformed from the conflicts our military participated and excelled in during the latter half of the 20th Century. Gone are historical linear battle lines from past wars. The nontraditional battlefields of the future will likely be isolated pockets of conflict, each its own sub-battle of the overall engagement. Simultaneous advance, withdraw, and re-attack will be coordinated through a multi-dimensional air- and space-based command and control system. Mobility Air Forces will need to adapt to this fluid environment and shape it to their advantage."

With this in mind, it appears that we should concentrate on leveraging technologies that provide state-of-the-art, responsive, high-speed lift, air refueling, rapid deployment, real-time decision support tools, chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) (detection, protection, and contamination control), and information systems. Technologies that can be exploited to provide the mission capability needed for the future include opportune landing site identification; autonomous landing guidance; combat collision avoidance system; advanced infrared and millimeter wave sensors; threat avoidance planning; protection from CBRNE; offensive and defensive laser technology; short takeoff and landing (STOL) capabilities; advanced materials construction; bioengineering; intelligent engine performance; and versatile, affordable advance turbine engines. As we look beyond 2029 we need to explore hypersonic capabilities and space transportation systems.

Studies show us that technological development is more effective if it has broad application. Working with Air Force Research Laboratories (AFRL), we have learned that the most affordable option to meeting future airlift and air refueling capability requirements is the development of a family of mobility aircraft. It appears that a single transport airframe family could meet multiple needs—airlift, air refueling, special operations, gunship, and intelligence, surveillance, and reconnaissance (ISR) variants could all be based on a similar platform. Therefore, our future technology focus includes the KC-X (future tanker) and the AMC-X (medium-sized airlift aircraft). These variants will benefit from spin-off technologies originating from a “system of systems” approach. The development costs of a single airframe will be less than that needed for a number of new aircraft, and recurring logistical costs will be reduced with variants using common aircraft systems and components.

At present, there are 5 (AMC-X, KC-X, A-X, M-X and the US Army’s AMT) platform studies that share many common technology areas. It is reasonable to assume that the variants of a common transport category aircraft, could meet the mission needs of many. This design approach would capitalize on economies of scale that accompanies the production of a large fleet. Importantly, the fleet logistics sustainment costs are reduced as a function of common systems.

We are not focused entirely on new aircraft platforms; more efficient MAF support systems will also be necessary. We have found that nontraditional DOD developers have a wealth of technology for us to exploit. Examples include small, nuclear isotope-powered batteries that are human-friendly and last for years; smart, wearable clothing that integrates intelligent technology; wearable computers whose information can be displayed on eyeglasses; next-generation computer silicon nano technology; information-laden blue laser development; true x-ray vision devices; space-based micro-radar networks, and advanced, vehicle fuel cells that will generate power and provide water as a waste product. An example of this technological reach can be found within our sister service, the US Army.

The US Army is the MAF’s largest customer, and it has worked with industry to test a production-based vehicle that has the latest fuel cell (hydrogen) generators, hybrid powertrain, battlefield computers, and communication systems all in one vehicle. The maturation of this propulsion technology will have a significant impact on our combat effectiveness and how we prosecute future mobility operations. It is critical that we work closely with the Army and other partners as this technology is explored and developed to ensure any impacts on MAF operations are taken into account.

To date, air mobility operations, while using satellites for navigation and communications needs, have been limited to the atmosphere. Space is a medium that the Air Force must explore for mobility purposes. Trans-atmospheric vehicles will allow delivery to any place on the globe in less than two hours; satellites will need replenishment of stores; and in-orbit logistics support will become commonplace in the future. Air Force Space Command (AFSPC) has the lead in spacelift operations and is actively exploring technologies that will make spacelift possible. We need to continue to stay engaged with AFSPC to take advantage of technologies such as advanced propulsion systems, efficient airframes, structures, materials, and sensors with direct application to atmospheric mobility.

Overall, the MAF has performed well in integrating technology improvements into near-term aircraft modernization programs. Our C-130s have upgraded avionics; the C-5 fleet will be modified with new engines; various aircraft avionics modernization programs are under way; and we are modifying mobility aircraft with defensive systems. We understand that today’s aircraft will need technological improvements to meet mission needs of the future. Modification programs are good, yet there are limits on what technology can do for dated airframes. We've just begun the effort to look at the technological improvements that could be incorporated into the design of new platforms. For the long term, we must build upon our ongoing work with AFRL to determine which emerging technologies to exploit. It is important that we articulate our long-term mobility technology needs so industry can design platforms that provide the required capabilities.

Capability Objective

Plan, develop, and field technological solutions to known mobility deficiencies.

Milestones

Short-Term (FY05-12)

(b)(5)

Mid-Term (FY13-19)

(b)(5)

Long-Term (FY20-26)

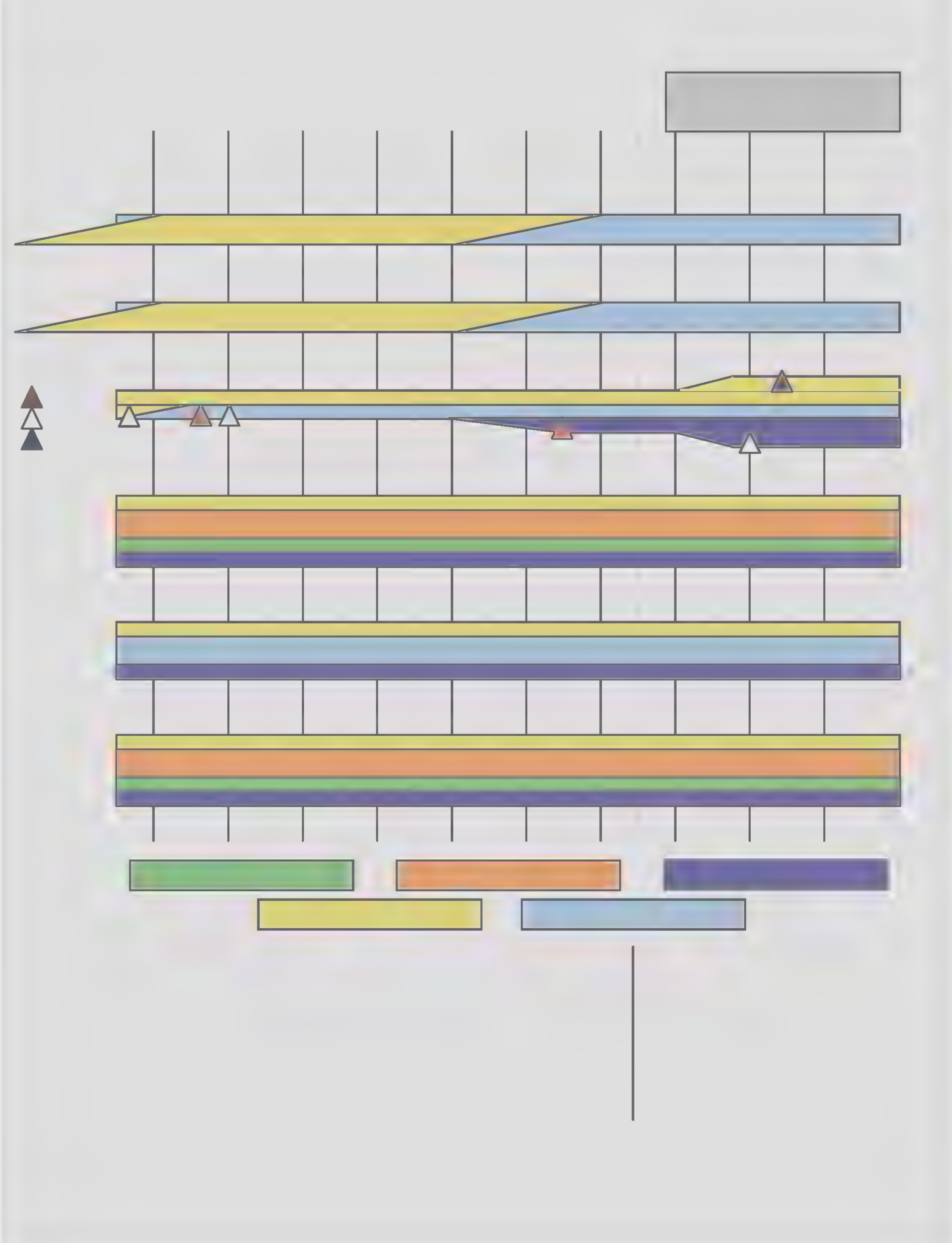
(b)(5)

[redacted]

<u>Deficiencies Needing Solutions</u>

Numerous deficiencies, with potential technological solutions, are explained in detail on various other mission area and weapon system roadmaps. There are potential technological solutions for most deficiencies, and they should be explored as necessary. A technology time line, detailed explanations for the KC-X, AMC-X, CX, and the relationship between air mobility and space follow in this roadmap. More detailed discussion on using space as a medium for mobility operations can be found on the spacelift roadmap.

(b)(5)



AMC-X, Future Air Mobility Concept Aircraft

This section describes a conceptual framework that addresses the following deficiencies: 00-CD-044, 02-KC10-283, 02-KC135-303, 02-C141-271, 02-C17-238, 02-C5-222, 02-C9-227, 02-C130-263, 02-CD-043, 02-CAL-053, 02-PAL-029, O2-CD-041, 02-AR-022, 02-AR-021.

Our current MAF aircraft can be deployed worldwide to support mobility operations wherever US interests are threatened. We also support our national military doctrine to counter forces armed with various mixes of increasingly sophisticated weaponry. Foreign governments, drug traffickers, insurgents, terrorists and problematic transnational states are pursuing advanced and conventional weaponry, Command, Control, Communications, and Intelligence (C3I) systems, and weapons of mass effects. These higher-threat scenarios are especially problematic due to the proliferation of this highly effective, low-cost, integrated weaponry.

MAF aircraft must operate throughout the entire continuum of military operations, spanning from peacetime and military operations other than war to high-intensity, conventional warfare against nation states, rogue individuals, or the disenfranchised. Further complicating this future threat environment will be the proliferation of chemical and biological weapons of mass destruction. Any mobility aircraft currently in use or developed in this quarter century must have the capability to detect and protect the crew, passengers, and equipment from the effects of chemical and biological agents. The more traditional threats could include all types of surface to air missiles, man-portable air defense systems (MANPADS), integrated air defense systems (IADS) directed weapons, enemy combat aircraft, biological and chemical terrorism, satellites, and other information warfare-gathering systems. IADS are especially problematic as they continue to grow to be more complex, lethal, and affordable. Beyond 2015, as our crews fly into conflict, we will encounter this more capable IADS with better sensors and networking. It is clear our defensive tactics, coupled with planned onboard electronic warfare (EW) systems, will not provide sufficient protection for MAF aircrews to execute the future mobility mission. Thus, it appears that we will need to consider some form of a limited, low observable “system” to protect mobility aircraft. At a minimum, we should work to reduce aircraft signatures and look at building an airframe structure that could be made low observable (LO) for specific mission categories. We should not focus solely on today’s stealth technology that is aimed at the radio frequency (RF) spectrum. Rather, recent trends indicate that we should look at stealth as a system that addresses visual, acoustic, smoke, exhaust emissions, bow wake, and background differences as well as the RF threat. Onboard low observable systems must offer a balanced approach that addresses all spectrums. We also want this platform to be supported by off-board capabilities (i.e. mobile computing and communications review [MC2R], space, electronic tactical deception, real-time intelligence and information warfare [IW]). A combination of both on- and off-board future systems will provide the MAF an aircraft able to provide the required mobility capabilities in future combat environments.

DOD anticipates our access to foreign en route bases will continue to decline. Technological improvements, to counter the access-denial strategies of our adversaries, include more fuel-efficient engines for longer-range operations, routine use of air refueling, and increased use of direct-delivery operations to forward areas. Improved defensive systems, autonomous approach and landing equipment, and automated cargo loading will make direct-delivery very effective in tomorrow’s threat environment.

In order to meet all of these new challenges, we need to begin a study that will highlight MAF capability shortfalls past 2015—in short, an advanced platform to perform a long-range mobility mission in a more dangerous world. From a baseline starting point, the MAF Concept Aircraft (AMC-X) will need to fly airliner speeds and altitudes, possess acute situational awareness, and seamlessly integrate into the command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR)/ multisensor command and control aircraft (MC2A) net. We envision that this platform will not only operate over great distances, but also will need to have short take-off and landing (STOL) capabilities, with autonomous approach and landing guidance for all weather operations onto unimproved landing areas. This aircraft must be sized for the complete range of future US Army equipment envisioned beyond 2012. The US Army is developing the family of future combat systems (FCS) for introduction by 2008 with full capability by 2012. FCS is designed to be smaller yet maintain as much lethality as the equipment it replaces. We envision that the AMC-X must to be able to carry 60,000 to 80,000 pounds of payload and have an oversize cargo capability.

The AMC-X will transform air mobility this century. As discussed earlier in this roadmap, it is logical to explore this aircraft as the first of a family of transport category aircraft. Multiple variants would be capable of performing a wide range of missions, from airlift to air refueling, from special operations to intelligence, surveillance, and reconnaissance (ISR). The capabilities of this aircraft will provide combatant commanders with quick, timely, and decisive support for future world operations.

To recap, the AMC-X should:
1. Provide medium-sized lift capability and carry oversized cargo as envisioned by the US Army objective force deployment of FCS. Have seven to nine pallet positions.
2. Possess high speed, long range (typical airliner speeds and altitudes) and be air refuelable. Possess forward area arming and refueling point (FAARP) capability.
3. Be deployable worldwide and reflect anti-access and denial considerations. Possess battlefield agility. Be totally autonomous for landing, ground operations, cargo on/offloading, on unimproved surfaces. Possess low-level flight capability.
4. Possess Synthetic and real-time information capability.
5. Be survivable against radar, infrared and visual cued threats as well as in a chemical, biological, radiological, nuclear, and high yield explosive (CBRNE) environment. Utilize both on-board and off-board aircraft masking systems.
6. [redacted]
7. (b)(5)

ACRONYMS

Acronym	Definition
3A0	Duty AFSC (Air Force Specialty Code) for Information Managers
AAA	Anti-Aircraft Artillery
AAR	Air-to-Air Refueling
AB	Air Base
ABD	Air Base Defense
ABDM	AMC Business Decision Model
ABI	Airborne Broadcast Intelligence
ACADA	Automatic Chemical Agent Detector Alarm
ACARS	Aircraft Communications Addressing and Reporting System
ACAS	Aircraft Collision Avoidance System
ACC	Air Combat Command
ACDE	Aircrew Chemical Defense Ensemble
ACL	Allowable Cabin Load
ACM	Air-Cycling Machine
ACO	Airspace Control Order
ACP	Automatic Communications Processing
AD	Airworthiness Directive
ADI	Altitude Direction Indicator
ADS	Automatic (Automated) Dependent Surveillance, Aerial Delivery System
ADS-A	Automatic (Automated) Dependent Surveillance-Addressed
ADS-B	Automatic (Automated) Dependent Surveillance-Broadcast
ADSC	Aerial Delivery System Computer
ADVON	Advance Echelon
AE	Aeromedical Evacuation
AECM	Aeromedical Evacuation Crew Member
AECT	Aeromedical Evacuation Control Team
AEF	Air and Space Expeditionary Force
AEFC	AE Flight Qualification Course
AEG	Air Expeditionary Group
AERPS	Aircrew Eye-Respiratory Protection System
AES	Air Expeditionary Squadron
AESS	Aeromedical Evacuation Shipset
AET	Aeromedical Evacuation Technician
AETC	Air Education and Training Command
AEW	Aerospace Expeditionary Wing
AF	Air Force
AFB	Air Force Base
AFCA	Air Force Communications Agency
AFCIS	Air Force Capabilities Investment Strategy
AFDMP	Air Force Dormitory Master Plan
AFHMP	Air Force Housing Master Plan
AFI	Air Force Instruction
AFM	Air Force Manual
AFMC	Air Force Materiel Command
AFMIA	Air Force Manpower and Innovation Agency
AFMS	Air Force Manpower Standard, Air Force Medical Service
AFMSS	Air Force Mission Support System
AFPC	Air Force Personnel Center
AFPD	Air Force Program Directive
AFRC	Air Force Reserve Command
AFRL	Air Force Research Laboratories
AFROC	Air Force Requirements Oversight Council
AFSC	Air Force Specialty Codes

AFSCN	Air Force Satellite Control Network
AFSOC	Air Force Special Operations Command
AFSOF	Air Force Special Operations Force
AFSPC	Air Force Space Command
AFWA	Air Force Weather Agency
AGE	Aerospace Ground Equipment
AGSEWG	Aircraft Ground Support Equipment Working Group
AIMS	Airborne Information Management System
AIT	Automatic Identification Technologies
ALC	Air Logistics Center
ALCT	Airlift Control Team
ALE	Automatic Link Establishing
ALEP	Aircraft Laser Eye Protection
ALZ	Allowable Landing Zone
AM	Airfield Management
AMC	Air Mobility Command
AMCT	Air Mobility Control Team
AMD	Air Mobility Division
AME	Air Mobility Element
AMLO	Air Mobility Liaison Officers
AMOCC	Air Mobility Operations Control Center
AMOG	Air Mobility Operations Group
AMOS	Air Mobility Operations Squadron
AMMP	Air Mobility Master Plan
AMP	Avionics Modernization Program
AMS	Air Mobility Squadron
AMU	Air Mobility Unit
AMW	Air Mobility Wing
AMWC	Air Mobility Warfare Center
ANDVT	Advanced Digital Voice Terminal
ANG	Air National Guard
ANVIS	Aviator's Night Vision Imaging System
AoA	Analysis of Alternatives
AOC	Air and Space Operations Center; Airline Operational Control
AOR	Area of Responsibility
APC	Airlift Planner Course
APMF	Aerial Port Mobility Flights
APOD	Aerial Port of Debarkation
APOM	Amended Program Objective Memorandum
APPN	Appropriation
APU	Auxiliary Power Unit
AR	Air Refueling
ARC	Air Reserve Component
ARCT	Air Refueling Control Team
ARINC	Aeronautical Radio, Inc.
ARPC	Air Reserve Personnel Center
ASC	Aeronautical Systems Center
ASETF	Air and Space Expeditionary Task Force
ASIP	Aircraft Structural Integrity Program
AT/FP	Antiterrorism/Force Protection
ATC	Air Traffic Control
ATCALS	Air Traffic Control and Landing Systems
ATD	Aircrew Training Device
ATO	Air Tasking Order
ATT	Advanced Theater Transport
AUTODIN	Automatic Digital Network

AWACS	Airborne Warning and Control System
AWE	Avionics/Weapons/Electronics
AWT	Advanced Wideband Terminal
BAR	Broad Area Review
BER	Budget Execution Review
BOLTS	Boom Offload Totalizer System
BOPTT	Boom Operator Part Task Trainer
BOS	Base Operating Support
BSA	Buffer Stop Assembly
C2	Command and Control
C2IPS	Command and Control Information Processing System
C3I	Command, Control, Communications, and Intelligence
C4	Command, Control, Communications, and Computers
C4I	Command, Control, Communications, Computers, and Intelligence
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CADRE	College of Aerospace Doctrine, Research, and Education
CAF	Combat Air Forces
CAFTOP	Comprehensive Air Force Technical Order Plan
CAM	Chemical Agent Monitor
CAMAA	Commercial Application of Military Airlift Aircraft
CAOC	Combined Air Operations Center
CARP	Computed Air-Release Point
CAT II	Category II Instrument
CB	Circuit Breakers
CBDP	Chemical and Biological Defense Program
CBRNE	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives
CBT	Computer-Based Training
C-ATCALS	Contingency Air Traffic Control, Airfield Management System
CCATT	Critical Care Aeromedical Transport Team
CCM	Command and Control Module
CCTS	Combat Crew Training School
C-CW	Counter Chemical Warfare
CDS	Container Delivery System
CDU	Control Display Units
CEA	Career Enlisted Aviator
CENTAF	Central Command Air Forces
CENTCOM	US Central Command
CES	Combat Employment Schools
CFIT	Controlled-Flight-Into-Terrain
CGAC	Combined Generator Air Conditioner
C-JTF	Commander-Joint Task Force
CLEPIR	Clear Laser Eye Protection Infrared
CLS	Contractor Logistics Support
CME	Contract Man-Year Equivalents
CMU	Communications Management Unit
CNC	Communication/Navigation Controller
CNS/ATM	Communications, Navigation, Surveillance/Air Traffic Management
COA	Course of Action
COE	Common Operating Environment
COMAFFOR	Commander, Air Force Forces
COMSEC	Communications Security
CONOPS	Concept of Operations
CONUS	Continental United States
COP	Common Operating Picture
COR	Chief of an Office of Record

COSA	Communications Open Systems Architecture
COTS	Commercial, Off-the-Shelf
CP	Collective Protection
CPDLC	Controller-Pilot Datalink Communications
CRAF	Civil Reserve Air Fleet
CRM	Crew Resource Management
CRU	Contingency Response Unit
CSAF	Chief of Staff of the Air Force
CSO	Communication System Operator
CSS	Crisis Support Staff
CTAPS	Contingency Theater Automated Planning System
CVR	Cockpit Voice Recorder
CW	Chemical Warfare, Chemical Weapons
DAFIF	Digital Aeronautical Flight Information File
DAMA	Demand Assigned Multiple Access
DARPA	Defense Advanced Research Projects
DAV	Digital Audio Video
DBS	Database Management System
DDC	Downsized Deployable Communications
DE	Directed Energy
DeCA	Defense Commissary Agency
DES	Digital Encryption System
DESC	Defense Energy Support Center, Defense Electronics Supply Center
DFDR	Digital Flight Data Recorder
DGPS	Differential Global Positioning System
DIA	Defense Intelligence Agency
DII	Defense Information Infrastructure
DIP	Diplomatic Clearance
DIRMOBFOR	Director of Mobility Forces
DISA	Defense Information Systems Agency
DISK	Deployable Intelligence Support Kit
DLA	Defense Logistics Agency
DMO	Distributed Mission Operations
DMS	Defense Message System
DMSAT	Diminishing Manufacturing Supportability and Advancing Technology
DMT	Distributed Mission Training
DOC	Designed Operational Capability
DOD	Department of Defense
DOS	Deployable Oxygen System
DRSN	Defense Red Switch Network
DRU	Direct Reporting Unit
DSCA	Defense Security Cooperation Agency
DTS	Defense Transportation System
DV	Distinguished Visitor
DZ	Drop Zone
EAF	Expeditionary Aerospace Force
EC	Environmental Compliance
ECCM	Electronic Counter-Countermeasures
ECD	Estimated Completion Date
ECI	Employment Cost Index
ECM	Electronic Countermeasures
ECS	Expeditionary Combat Support
EDC	Estimated Date of Completion
EEC	Electronic Engine Control
EELV	Evolved Expendable Launch Vehicle
EFCS	Electronic Fight Control System

EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
ELT	Emergency Locator Transmitter
EMCON	Emission Controlled
EMD	Engineering and Manufacturing Development
EML	Expeditionary Medical Logistics
EMP	Electromagnetic Pulse
EO	Electro-Optical
EOD	Explosive Ordnance Disposal
EPJS	Extraction Parachute Jettison System
ERMS	Electronic Records Management System
ERS	En Route System
ERT	Extended Range Tanks
ESC	Electronic Systems Center
ESLS	Economic Service Life Study
ESSP	Expeditionary Site Survey Process
ETCAS	Enhanced Traffic Alert and Collision Avoidance System
EUCOM	US European Command
EVS	Enhanced Vision System
EW	Electronic Warfare
F2T2EA	Find, Fix, Track, Target, Engage, and Assess
F3	Form/Fit/Function
FAA	Federal Aviation Administration
FAARP	Forward Area Arming and Refuel Point
FAM	Forward Area Manifold
FANS	Future Air Navigation System
FCS	Future Combat Systems
FDR	Flight Data Recorder
FE	Flight Engineer
FEDS	Flotation Emergency Deployment System
FIM	Facility Investment Metric
FIPS	Federal Information Processing Standards
FITR	Fork in the Road
FLE	Fixed Leading Edge
FLSC	Flexible Linear Shaped Charge
FLZ	Forward Landing Zone
FMS	Flight Management System
FN	Flight Nurse
FOC	Fully Operational Capability
FOL	Forward Operating Location
FOQA	Flight Operational Quality Assurance
FOT&E	Follow-on Test and Evaluation
FOV	Field-of-View
FP	Force Protection
FPCU/BCU	Fuel Pressure Control Unit/Boom Control Unit
FQIS	Fuel Quantity Indicating System
FSM	Facility Sustainment Model
FSTR	Full Spectrum Threat Response
FYDP	Future-Years Defense Program
GAETT	Global Aeromedical Evacuation Training Team
GAMSS	Global Air Mobility Support System
GATES	Global Air Transportation Execution System
GATM	Global Air Traffic Management
GB	Gigabyte
GBS	Global Broadcast Service
GCAS	Ground Collision Avoidance System

GCCS	Global Command and Control System
GDSS	Global Decision Support System
GIG	Global Information Grid
GI&S	Geospatial Information and Services
GIS	Geographic Information System
GOTS	Government Off-the-Shelf
GP	General Purpose
GPS	Global Positioning System
GPSENS	GPS Enhanced Navigation System
GRL	Global Reach Laydown
GSA	General Services Administration
GTN	Global Transportation Network
HA/DR/NEO	Humanitarian Assistance, Disaster Relief, Non Combatant Evacuation Operation
HAHO	High-Altitude High-Opening
HALO	High-Altitude Low-Opening
HF	High-Frequency
HPT	High-Pressure Turbine
HQ	Headquarters
HSI	Horizontal Situation Indicators
HUD	Heads-up Display
HUMRO	Humanitarian Relief Operation
HYT	High Year of Tenure
IADS	Integrated Air Defense System
IAW	In Accordance With
IBS	Integrated Broadcast Service
ICAO	International Civil Aviation Organization
ICAP	Integrated Communications Access Package
ICS	Interim Contractor Support; Intercom Control System
IDA	Institute for Defense Analyses
IF	Intermediate Frequency, Infrared
IFF	Identification Friend-or-Foe
IFGR	Information for Global Reach
IFM	Integrated Flight Management
IFR	Instrument Flight Rules
IFTU	Intelligence Formal Training Unit
IG	Inspector General
ILS	Instrument Landing System
IM	Information Management
IM/IT	Information Management/Information Technology
IMA	Individual Mobilization Augmentee
IMT	Integrated Management Tool
INU	Inertial Navigation Unit
IO	Information Operations
IOC	Initial Operating Capability
IPE	Individual Protective Equipment
IPT	Integrated Product Team
IR	Infrared
IRCM	Infrared Counter Measures
IRM	Information Resource Management
IRT	Initial Response Team
IRU	Inertial Reference Unit
ISB	Intermediate Staging Base
ISCN	Integrated Satellite Control Network
ISO	International Standards Organization
ISR	Intelligence, Surveillance, and Reconnaissance
ISU	Initial Response Team

IT	Information Technology
ITC	Intratheater Communications
ITV	Intransit Visibility
IUR	Initial Unfunded Requirement
IW	Information Warfare
IWAC	Information Warfare Applications Course
IWF	Information Warfare Flight
JAOC	Joint Air Operations Center
JA/ATT	Joint Airborne Air Transportability Training
JBI	Joint Battlespace Infosphere
JBPDS	Joint Biological Point Detection System
JBSDS	Joint Biological Standoff Detection System
JCAD	Joint Chemical Agent Detector
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
JCS	Joint Chiefs of Staff
JFACC	Joint Force Air Component Commander
JFAST	Joint Flow and Analysis System for Transportation
JFC	Joint Force Commander
JFIP	Japan Forces Improvement Program
JMPS	Joint Mission Planning System
JOPES	Joint Operation Planning and Execution System
JPACE	Joint Protective Aircrew Ensemble
JPALS	Joint Precision Approach and Landing System
JRCAB	Joint Readiness Clinical Advisory Board
JROC	Joint Requirements Oversight Council
JSAM	Joint Service Aircrew Mask
JSAWM	Joint Service Agent Water Monitor
JSB	Joint Synthetic Battlespace
JSCBDP	Joint Service Chemical and Biological Defense Program
JSCP	Joint Service Capabilities Plan
JSCRS	Joint Service Container Refill System
JSGPM	Joint Service General Purpose Mask
JSLIST	Joint Service Lightweight Integrated Suit Technology
JSLNBCRS	Joint Service Lightweight NBC Reconnaissance System
JSLSCAD	Joint Services Lightweight Standoff Chemical Agent Detector
JTAV	Joint Total Asset Visibility
JTBS	Joint Tactical Radio System
JTCPS	Joint Transportable Collective Protection System
JTRS	Joint Tactical Radio System
JV	Joint Vision
JWARN	Joint Warning and Reporting Network
K	Thousand
KBPS	Kilobytes Per Second
KC-X	KC-135 Replacement
LAIRCM	Large Aircraft Infrared Countermeasures
LAN	Local Area Network
LFDI	Liquid Fuels Distribution Infrastructure
LIDAR	Light Detecting and Ranging
LMST	Light-Weight Multi-Base Satellite Terminal
LMTD	Loadmaster Training Device
LMW	Lead Mobility Wing
LO	Low Observable
LOS	Line of Sight
LOSS	Liquid Oxygen Sub-Systems
LOX	Liquid Oxygen
LRU	Line Replaceable Unit

LSE	Life Support Equipment
LTRS	Launch and Test Range System
LVAD	Low Velocity Airdrop
LZ	Landing Zone
M	Million
M21	Mobility in the 21st Century
M2M	Machine-to-Machine
MADARS	Malfunction Detection, Analysis and Recording System
MAF	Mobility Air Forces
MAJCOM	Major Command
MANPADS	Man-Portable Air Defense Systems
MARC	Mobility Air Reporting and Communications
MASS	Multi-Function Aircraft Support System
MC	Mission Capable
MC2A	Multisensor Command and Control Aircraft
MC2R	Mobile Computing and Communications Review
MCD	Mission Computer Displays
MCM	Multicommand Manual
MDS	Mission Design Series
MEF	Mobility Enhancement Fund
METLs	Mission Essential Task List
MHE	Materials Handling Equipment
MICAP	Mission Impaired Capability, Awaiting Parts
MIDB	Modernized Integrated Data Base
MILCON	Military Construction
MLS	Microwave Landing System, Multi-Level Security
MLV	Medium Launch Vehicle
MOBSIM	Mobility Simulator
MOG	Maximum on Ground
MOOTW	Military Operations Other Than War
MOPP	Mission-Oriented Protective Posture
MOS	Minimum Operating Strip
MOUT	Military Operations in Urban Terrain
MPRS	Multi-Point Refueling System
MRS BURU	Mobility Requirements Study Bottom Up Review Update
MRS-05	Mobility Requirements Study-2005
MS&A	Modeling, Simulation, and Analysis
MSC	Military Sealift Command
MSgt	Master Sergeant
MST	Mission Support Team
MSTS	Multi-Source Tactical System
MTBF	Mean-Time-Between-Failures
MTD	Maintenance Training Device
MTF	Medical Treatment Facility
MTM/D	Million Ton-Miles per Day
MTMC	Military Traffic Management Command
MTW	Major Theatre War
MV	Mobility Value
MWS	Missile Warning System
NAF	Numbered Air Force
NATO	North Atlantic Treaty Organization
Nav Safety	Navigation Safety
NAVAIDs	Navigation Aids
NCA	National Command Authorities
NEO	Noncombatant Evacuation Operation
NGO	Non Government Organizations

NGSL	Next Generation Small Loader
NIMA	National Imagery and Mapping Agency
NIPRNET	Non-Classified Internet Protocol Router Network
NM	Nautical Miles
NMC	Not Mission Capable
NOTAM	Notice to Airmen
NSA	National Security Agency
NVD	Night Vision Devices
NVG	Night Vision Goggles
NVIS	Night Vision Imaging System
O&M	Operations and Maintenance
OB	Order-of-Battle
OBIGGS	On Board Inert Gas Generating System
OCC	Operations Control Centers
OCONUS	Outside of the Continental United States
OCR	Office of Collateral Responsibility
ODBC	Open Database Compliant
OHRI	Overhaul Removal Interval
OICW	Objective Individual Combat Weapon
OPLAN 8044	Operations Plan 8044
OPSEC	Operations Security
OPTEMPO	Operating/Operations Tempo
OQAR	Optical Quick Access Recorder
ORD	Operational Requirements Document
ORM	Operational Risk Management
OS	Operational Support
OSA	Operational Support Airlift
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Hazard Administration
OSI	Office of Special Investigation
OSS	Operational Support Squadron
OSS&E	Operation Safety, Suitability, and Effectiveness
OWCP	Objective Wing Command Post
OWS	Operational Weather Support
P2	Pollution Prevention
PA&E	Program Analysis and Evaluation
PACAF	Pacific Air Forces
Pacer CRAG	Pacer Compass, Radar, and Global Positioning System
PACOM	US Pacific Command
PAM	Preventive Air and Space Medicine
PAX	Passenger
PBA	Predictive Battlespace Awareness
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Assoc.
PDA	Personal Digital Assistant
PDM	Programmed Depot Maintenance
PERSTEMPO	Personnel Tempo
PFPS	Portable Flight Planning Software
PICR	Product Improvement Change Request
PIK	Payment-in-Kind
PIPP	Patient Intransit Protective Posture
PKI	Public Key Infrastructure
PLSR	Precision Landing System Receiver
PMI	Patient Movement Items
POC	Point of Contact
POD	Port of Debarkation, Process Oriented Description

POE	Port of Embarkation
POL	Petroleum, Oils, and Lubricants
POM	Program Objective Memorandum
PPBS	Planning, Programming, and Budgeting System
PPS	Precision Position Services
PRAM	Productivity, Reliability, Availability, and Maintainability
PSYOPS	Psychological Operations
PTLOX	Portable Therapeutic Liquid Oxygen
QAR	Quick Access Recorder
QDR	Quadrennial Defense Review
QDUC	Quick Dial-Up Capability
QOLE	Quality of Life Enhancement
R&D	Research and Development
R&M	Reliability and Maintainability
R&PC	Requirements and Planning Council
RASP	Remote Access Server Program
RAT	Ram Air Turbine
RBL	Reliability Based Logistics
RCR	Runway Condition Reading
RCS	Radar Cross-Section
RERP	Reliability Enhancement and Re-engining Program
RESTOPS	Restoration of Operations
RF	Radio Frequency
RFCM	RF Countermeasures
RHI	Risk Hazard Index
RIMS	Records Information Management System
RM&A	Reliability, Maintainability, and Availability
RM&S	Reliability, Maintainability, and Supportability
RMA	Records Management Application
RNA	Required Navigational Support
RNP	Required Navigation Performance
RO	Recovery Operations
ROBE	Roll-On Beyond-line-of-sight Enhancement
ROM	Rough Order of Magnitude
RPM	Real Property Maintenance
RSP	Readiness Spares Package
RSVP	Readiness Skills Verification Program
RTCA	Requirements and Technical Concepts for Aviation
RTIC	Real-Time Information in the Cockpit
RVSM	Reduced Vertical Separation Minimums
SA	System Administrator
SAM	Surface-to-Air Missile, Special Air Mission, Specialized Aerospace Mobility
SATCOM	Satellite Communications
SBA	Strategic Brigade Airdrop
SCA	Software Communications Architecture
SCITS	Spinal Cord Injury Transport System
SCNSM	Satellite Control Network Sustainment and Modernization Program
SECDEF	Secretary of Defense
SECOMP-I	Secure En route Communications Package-Improved
SELCAL	Selective Calling
SGNSC	Self-Generating Nitrogen Servicing Cart
SHF	Super High Frequency
SIDS	Secondary Imagery Dissemination System
SIPRNET	Secret Internet Protocol Router Network
SKE	Station-Keeping Equipment
SKEFO	Station-Keeping Follow-On

SLEP	Service Life Extension Program
SMS	Systems Management Server
SOAR	Special Operations Air Refueling
SOF	Special Operations Forces
SOLL II	Special Operations Low Level II
SORAP	Source of Repair Assignment Process
SORTS	Status of Resources and Training System
SP	Special Purpose
SPO	System Program Office
SQL	Structured Query Language
SRB	Selective Reenlistment Bonus
SRC	Survival Recovery Center
SSC	Small-Scale Contingency
STACS	Suspense Tracking Application for Command Staff
STC	Supplemental Type Certificate
STOL	Short Takeoff and Landing
TAA/D	Threat Avoidance Arrival and Departure
TACAN	Tactical Air Navigation
TACC	Tanker Airlift Control Center
TACS	Tactical Air Control System
TADIL-A	Tactical Digital Information Link-A
TADIXS-B	Tactical Data Information Exchange System-B
TAES	Theater Aeromedical Evacuation System
TALCE	Tanker Airlift Control Element
TALO	Tanker Airlift Liaison Officer
TASDAC	Tactical Secure Data Communications
TAV	Total Asset Visibility
TAWS	Terrain Awareness and Warning System
TBM	Tactical Ballistic Missile
TBMCS	Theater Battle Management Core Systems
TCAS	Traffic Alert and Collision Avoidance System
TCPS	Transportable Collective Protection System
TCS	Transformational Communications System
TCTO	Technical Change Technical Order
TDC	Theater Deployable Communications
TENCAP	Tactical Exploitation of National Capabilities
TFA	Toxic-Free Area
TIBS	Tactical Information Broadcasting System
TIC	Toxic Industrial Chemicals
TIMs	Toxic Industrial Materials
TOIC	Top Off Intelligence Courses
TOW	Time-on-Wing
TPC	Tanker Planner Course
TPFDD	Time-Phased Force and Deployment Data/Document
TPR	Training Program Requirement
TRAC2ES	Transportation, Regulating, Command, and Control Evacuation System
TRIADS	TRIWALL aerial delivery system
TRAP	Tactical Relay and Processing System
TRS-05	Tanker Requirements Study-2005
TTF	Tanker Task Force
TWCF	Transportation Working Capital Fund
TWG	Threat Working Group
US	United States
UA-HMMWV	Up-Armored High Mobility Multi-Purpose Wheeled Vehicle
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Air Vehicle

UHF	Ultra High Frequency
ULN	Unit Line Number
UR	Unfunded Requirements
US	United States
USAF	US Air Force
USAFE	US Air Forces, Europe
USSOCOM	US Special Operations Command
USSOUTHAF	US Southern Air Forces
USSTRATCOM	US Strategic Command
USTRANSCOM	US Transportation Command
USTS	UHF SATCOM Terminal System
UTC	Unit Type Code
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VHF	Very High Frequency
VIP	Very Important Person
VIPSAM	Very Important Person Special Air Mission
VLR	Vertical Lift Roadmap
VMC	Visual Meteorological Conditions
VORTAC	Very High Frequency-Omni-Directional Radio-TACAN
VPLR	Vacuum-Packed Life Raft
VPN	Virtual Private Networks
VTC	Video Teleconferencing
WAN	Wide Area Network
WARP	Wing-Mounted Air Refueling Pods
WBE	Wide-Body-Equivalent
WBEL	Wide-Body Elevator Loader
WGM	Workgroup Management
WIC	Weapons Instructor Course
W-LAN	Wireless-Local Area Network
WMD	Weapon(s) of Mass Destruction
WOC	Wing Operations Center
WRE	War Readiness Equipment
WRM	War Readiness Materiel
WST	Weapon System Trainer