

CYBER INTEGRATION CONUNDRUM: AN ANALYSIS OF COMPOSITE UNITS
TO INFORM THE OPTIMIZATION OF CYBER FORCE ORGANIZATION

BY
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A THESIS PRESENTED TO THE FACULTY OF
THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES
FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES
AIR UNIVERSITY
MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2016

APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.



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ACKNOWLEDGEMENTS

This thesis would not have been possible without the encouragement, support, guidance, and advice of many remarkable people. First, I would like to thank the faculty and staff at the School of Advanced Air and Space Studies for their unwavering dedication and commitment. A special thanks to my thesis advisor, Colonel Rick Bailey, for his encouragement and flexibility that were critical to this work. From the initial outline to the final draft his confidence in my abilities and steadfast support encouraged me to get it done. I would also like to thank the professional and intelligent men and women of Class XXV. Numerous discussions in and out of seminar opened new research avenues and improved this document immeasurably.

I also wish to thank the outstanding professionals at the Air Force Historical Research Agency and Air University Library at Maxwell AFB, Alabama. These two organizations facilitated my research and provided outstanding support in my hunt to document Air Force history accurately. In addition, the support of historians throughout the Air Force was key in vectoring this work. From my initial meetings with the historians in 24th Air Force to my later discussions with former historians from the 366th Wing, each discussion led me to a greater understanding and directed my research in ways I never would have considered. A special thanks to historian at 24th Air Force, for your assistance in building the foundations of this thesis and for your critical review.

Throughout the writing of this thesis, I was blessed with ideas and support from my mentors, fellow cyberspace professionals, and friends. Thank you all for the “white board” discussions, critical feedback when I needed direction, and support of the ideas presented. I appreciate the honest and blunt feedback and your sincere dedication to helping me make this thesis better.

Finally, I am eternally grateful for my loving husband and our two incredible children who put up with me being away from them for the last year. Your incredible strength and dedication made it possible for me to complete this course and this thesis. I truly appreciate the time you took to proof, edit, and question this work; it turned out much better for it. I am blessed to have you in my life and thank God for that blessing.

ABSTRACT

This thesis examines the history of communications in the Air Force from its beginning with flags and torches to today's integrated cyberspace operations. It focuses on the organizational structure of communications/cyberspace operations and the decisions to promote centralized command globally under a single Communications Command or unity of command locally under wing commanders. This thesis then examines the history of composite units from 1911 through the early 2000s, ending with a detailed evaluation of the 366th Wing, an Air Intervention Composite Wing, at Mountain Home Air Force Base, Idaho. Throughout this history, the Air Force has organized into composite units to perform regional presence missions or highly specialized missions. While many of these units played key roles and had great success, many were short-lived and disbanded whether the issue was command and control, fiscal realities, provisional application, or operational necessity.

The purpose of this thesis is to survey the composite units' history to distil and extract lessons learned that may be employed to enhance combat performance for defensive cyberspace operators. The Air Force can also apply these lessons to avoid pitfalls of previous composite units. The analysis concludes that a composite unit at the group level would effectively integrate cyber defense into air and space operations allowing for a shared Intelligence picture, integrated planning, and comprehensive understanding of the operational environment. This composite unit will be necessary to maintain technological superiority and to thwart adversary's activities on the Air Force's technology-based mission systems.

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Chapter 1

Introduction

It has been said that the real crux of generalship is organization and not tactics... A disorderly mob is no more an army than a heap of building material is a house. Men, Units, Groups, and Commands—all must be arranged and organized before efficiency and expediency can be achieved.

—Maj Gen Henry H. “Hap” Arnold
Chief of the Air Corps, 23 January 1940

“Our military’s technological superiority is being challenged in ways that we’ve never experienced before, and we can’t take these developments for granted. If we do, that could put American lives at risk in the not-too-distance future.”¹ This statement by Secretary of the Air Force Deborah Lee James led her assessment of the United States military’s declining superiority and stressed the need for innovation, specifically in the cyberspace domain, is critical to success today and in the future. For the United States Air Force to evolve cyberspace operations to support the anticipated environment, it must create a defensive cyber organization at the tactical level to encompass full interoperability across the domains of air, space, and cyberspace. This thesis offers a means to integrate cyber operations into air and space operations by focusing network defense operators on mission systems rather than traditional Information Technology (IT) service roles. Using lessons learned from Air Force composite units, this thesis outlines a new composite structure that integrates cyber defense of mission systems at the tactical level for both home station and deployed operations. Ultimately, success hinges on the proper organization, training, and equipping of the Air Forces’ cyber force today to meet these demands in the future.

Over the past decade, cyberspace operations have been gaining importance as an Air Force mission. On 7 December 2005, Secretary of the Air Force Michael Wynne and Chief of Staff, General T. Michael Moseley unveiled a new Air Force mission statement:

¹ Deborah L. James, Secretary of the Air Force, Keynote Address for the Armed Forces Communications & Electronics Association (AFCEA) TechNet Air Symposium, San Antonio, TX, 22 March 2016.

“to deliver sovereign operations for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and *Cyberspace*” (emphasis added).² On 6 September 2006, Secretary Wynne and General Moseley charged Air Education and Training Command (AETC), Air Combat Command (ACC), and Air Force Space Command (AFSPC) to present “options for the operational command for cyberspace.”³ The answer to this charge was 24th Air Force (24 AF), established as a Component Numbered Air Force (C-NAF) under AFSPC, on 18 August 2009.

Establishing 24 AF was the first of two significant changes to the organization of cyber forces. The other change required 24 AF to provide manpower and support to United States Cyber Command’s (USCYBERCOM) Cyber Mission Force (CMF) starting late in 2012. Each of these efforts created and then changed the organizational structure and command relationships for cyber forces within the Air Force. With the continued advancement of the cyber mission, the Air Force is examining ways to reorganize forces at the base level to better support the defense of mission critical systems. According to Gen John Hyten, AFSPC Commander, “Our entire air superiority structure, the F-22, the F-35 is dependent on cyber.”⁴

Throughout its history, the Air Force has often reinvented itself regarding technologies (air, space, and cyberspace), processes, and organizations. The purpose of this thesis is not to promote or reject the composite unit structure; *the goal is to perform a comprehensive analysis of historical organizational structure to determine at what Air Force organizational level cyber integration must occur to achieve the optimal combat performance.*

² Michael W. Wynne, Secretary of the Air Force and Gen T. Michael Moseley, USAF Chief of Staff, to Airmen of the United States Air Force, memorandum, 7 December 2005, <http://www.24af.af.mil/shared/media/document/AFD-111003-050.pdf>.

³ Michael W. Wynne, Secretary of the Air Force and Gen T. Michael Moseley, USAF Chief of Staff, to HQ ACC/CC, HQ AETC/CC, HQ AFMC/CC, HQ AFSPC/CC, memorandum, subject: Establishment of an Operational Command for Cyberspace, 6 September 2006, <http://www.24af.af.mil/shared/media/document/AFD-111003-051.pdf>.

⁴ Tom Roeder, “Air Force to develop cyber-squadrons, Gen. Hyten says at Broadmoor Symposium,” *Gazette*, 3 February 2016, <http://gazette.com/air-force-to-develop-cyber-squadrons-gen.-hyten-says-at-broadmoor-symposium/article/1569128>.

Importance of Cyberspace in Today's Environment

The United States military's dependence on cyberspace led the Secretary of Defense to declare cyberspace an operational domain in 2011 and prompted Department of Defense (DoD) investments to prepare the military for operations in a contested cyberspace environment.⁵ From 2013-2015, according to the Director of National Intelligence, the cyber threat has been the number one strategic threat to the United States, displacing terrorism for the first time since the attacks of 11 September 2001.⁶ Although other domains (land, sea, air, and space) have interdependent relationships among themselves, cyberspace is unique in that it is a fundamental part of the other domains and is an independent domain itself, which creates challenges. Also, entry into the cyberspace domain is less costly than the other domains—particularly sea, air, and space—so that anyone with a computer or smartphone can near-instantaneously distribute information worldwide or deny service to a group or area.

The May 2011 *DoD Strategy for Operating in Cyberspace* lists some potential adversaries that pose a threat to the United States. These include state actors such as Russia, China, Iran, and North Korea as well as non-state actors such as the Islamic State of Iraq and the Levant (ISIL) and criminal actors. These state and non-state threats “often also blend together; patriotic entities often act as cyber surrogates for states, and non-state entities can provide cover for state-based operators.”⁷ Figure 1 shows the capability and intent relationship for three of the state actors listed above in both computer network exploitation (espionage) and computer network attack. The adversarial threat and the United States military's dependence on cyberspace capabilities make the Air Force vulnerable to both stand-alone cyber attacks as well as cyber attacks in conjunction with kinetic operations. For example, the denial-of-service attacks on Estonian commercial and government web services (2007) and cyber attacks preceding the Russian incursion into Georgia (2008) demonstrate how cyber operations can affect national and military objectives.

⁵ Department of Defense (DoD), *DoD Strategy for Operating in Cyberspace*, May 2011, 4, http://www.defense.gov/Portals/1/features/2015/0415_cyber-strategy/Final_2015_DoD_CYBER_STRATEGY_for_web.pdf.

⁶ *DoD Strategy for Operating in Cyberspace*, 9.

⁷ *DoD Strategy for Operating in Cyberspace*, 9.

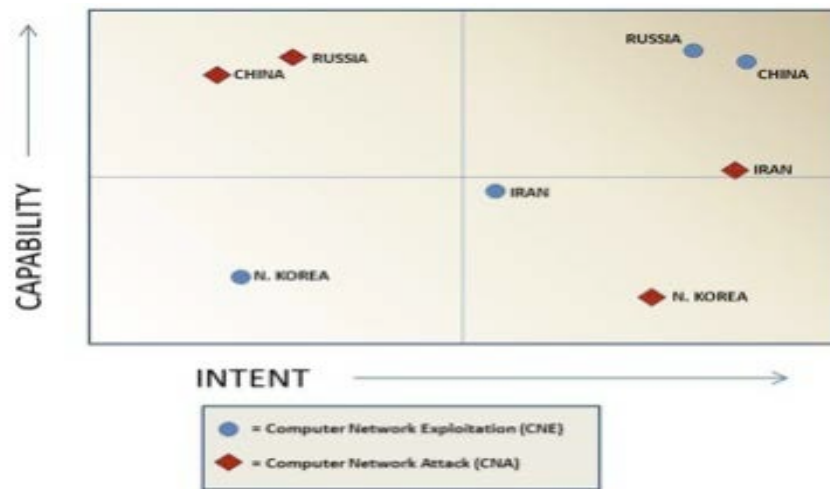


Figure 1: Cyber Threats to the United States Homeland – Steady-State Threat Matrix
Source: The Huffington Post, Recalibrate U.S. Cyber Efforts to Better Meet the High-end Threat from Nation-States, 1 April 2013

According to Admiral Michael Rogers, commander of USCYBERCOM, director of the National Security Agency, and Chief of the Central Security Service, “There should be [no] doubt in anybody’s mind that the cyber challenges we’re talking about are not theoretical. This is something real that is impacting our nation and those of our allies and friends every day.”⁸ In the past two years, cyber-related incidents affected government entities (White House, Postal Service, State Department, DoD, and Treasury, among others) and industry (J.P. Morgan Chase, Michaels, Target, AT&T, Google, and Apple). These incidents cost hundreds of billions of dollars and could result in “some truly significant, almost catastrophic failures if we don’t take action.”⁹ Figure 2 shows the number of companies, by industry, that the People’s Liberation Army of China targeted via cyber espionage from 2006 to 2012. Note the high number of IT, aerospace, satellite and telecommunications, and scientific research that could have ties to the United States government and military.

⁸ Cheryl Pellerin, “CYBERCOM Chief Details U.S. Cyber Threats, Trends,” *DoD News, Defense Media Activity*, 21 November 2014, <http://www.defense.gov/News-Article-View/Article/603696>.

⁹ Cheryl Pellerin.

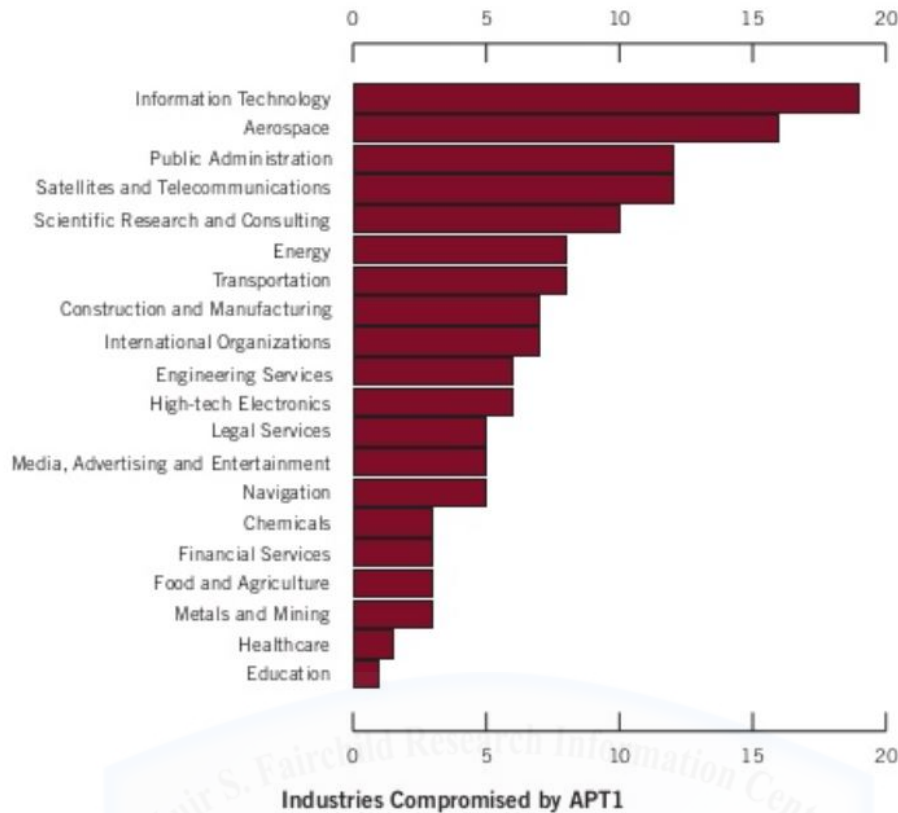


Figure 2: Advanced Persistent Threat (APT) 1 Victims by Industry
Source: Reprinted from Mandiant APT 1 Report, 18 February 2013

Reorganization Considerations

Organizational structure has been an essential factor in the execution of the mission of the United States Air Force; however, organizational change does not come without challenges. The mission, equipment, and threat environment constantly change, and the military must adapt using both tactics and organization to defend the nation. The United States military saw this challenge shortly after it reorganized the Army Air Forces into an independent Air Force.

On 6 December 1947, a group of students at the recently formed Air War College presented a document entitled “Air Organization and Characteristics.” The report consolidated student solutions to determine the organization best suited to meet the requirements of the two-month-old Air Force, stating “One of the first factors to be considered when designing an organization is the task or mission to be performed by that organization when it comes into being. Following immediately are the inseparable factors of limitations and capabilities of the personnel and material to be used in

performing that task or mission.”¹⁰ The authors also outlined six principles of organization: “That it will meet the requirements of the assigned mission. That it is simple, flexible, and economical. That span of control is proper and limited. That authority and responsibility are co-equally delegated. That assignment functions are homogeneous. That there is unity of command.” Today, more than 68 years later, these principles still apply to organizing forces and will be considered in examining the future organizational changes to the cyber force discussed in this thesis.

Challenge of Organizing Cyber Forces

Under the direction of AFSPC, 24 AF had the mission to “Operate, extend, and defend the Air Force Information Network (AFIN), defend key mission systems, and provide full spectrum cyberspace capabilities for the Joint warfighter in, through, and from cyberspace”.¹¹ To achieve its mission, 24 AF units work in coordination with base CSs around the world to defend the AFIN. The AFIN, the Air Forces portion of the Department of Defense Information Networks (DoDIN), consists of globally interconnected information capabilities and their associated processes for collecting, processing, storing, disseminating, and managing information for warfighters, policymakers, and support personnel.¹²

In addition to the direction from AFSPC, 24 AF as Air Forces Cyber (AFCYBER) also receives direction from USCYBERCOM, an armed forces sub-unified command subordinate to United States Strategic Command (USSTRATCOM). Under direction from USCYBERCOM, 24 AF supports building the CMF that will provide capabilities to Combatant Commanders worldwide. Establishment of the CMF has required significant personnel resources, new training pipelines, and significant financial investments to equip this force to operate in and through cyberspace.

¹⁰ Col M. D. Blaine, et al., “Air Organization and Characteristics,” Air War College, December 6, 1947, 1.

¹¹ The mission statement is currently to “Fly, Fight, and Win in cyberspace.”; Gregory W. Ball, “History of HQ Twenty-Fourth Air Force and 624th Operations Center,” (24 AF Historian, 17 January 2014), 5, <http://www.24af.af.mil/shared/media/document/AFD-140429-035.pdf>.

¹² Air Force Instruction 10-1701, 5 March 2014 (updated 12 May 2016), 13.

As the Air Force continues to enhance its capabilities to operate and defend the AFIN, threats to the network continue to highlight the importance to defend Air Force critical mission systems. This enhanced protection requires intricate knowledge of Air Force air and space systems. As a means to create this improved capability, the Air Force introduced the Communications Squadron-Next (CS-N) and Mission Defense Team (MDT) persistent enclave defense concepts. These concepts involve repurposing Airmen from traditional IT service roles (base CS) to active Defensive Cyberspace Operations (DCO) without “sacrificing vital cybersecurity of the architecture of those IT services that underpin our ability to produce DCO effects for priority systems.”¹³ Properly integrating enhanced cyber capability at the tactical level is the focus of this thesis.

Methodology and Evidence

This thesis will use historical analysis of primary and secondary source material. Primary source material includes speeches, student papers, memorandums, and histories of composite units written during their existence. Also, journal articles offer context to the evolution of the composite unit. Secondary source material consists of analytical pieces written to provide context to the primary source material and reinforce the overall argument. Oral histories from Air Force leaders and past student research on composite units and cyberspace also provide support.

Structure of the Argument

This thesis will take a detailed look at the historical organizational structure of the Army Air Corps and Air Force communications units and composite units to determine at what organizational level cyber integration must occur to achieve the optimal combat performance. To determine the best organization of future Air Force cyber forces, one needs to understand the history of Air Force communication forces and the evolution of the cyber force of today. Chapter 2 shows the rise and fall of centrally managed communications in the Air Force, including their effect on the CS at the base level. It then outlines the creation of 24 AF in 2008 and the impact of the Air Force Network migration completed in 2014. In addition to the cyber force changes in the Air Force, one

¹³ Lt Col Greg McCulley, “White Paper on Communications Squadron-Next Employment,” 27 Jan 2016, 1.

must also examine the headquarters direction given by USCYBERCOM and the creation of the Cyber Mission Force and its effects.

Chapter 3 covers the history of composite units from their inception in 1911, when the Signal Corps formed a unit with two differing types of aircraft at Fort Sam Houston, to their use during the Gulf War. There have been various types of composite units including those with multiple classes of aircraft, those with multiple types of aircraft of the same class (such as the Signal Corps example above), units with reserve and active duty Airmen, units with men and women, and units of mixed race. This chapter gives an overview of each unit including the special mission or geographical region that focused the unit, the unit's longevity, and finally the lessons learned from each composite organization.

Chapter 4 opens with a contextual review of the Air Force at the end of the Cold War focusing on the resurgence of the composite wing under Air Force Chief of Staff, General Merrill A. McPeak in the early 1990s. General McPeak wanted to create a fighting unit that possessed all the assets needed to execute a highly complex combat task independently at one base and under one commander. The chapter then focuses on one of the three composite wings created during General McPeak's tenure, the 366th Wing at Mountain Home Air Force Base (AFB) in Idaho. Built as the only Air Intervention Composite Wing, the 366th Wing offers an opportunity to validate previous lessons learned and consider new lessons.

Chapter 5 analyzes the historical examples from the previous two chapters and outlines five advantages and two disadvantages of organizing forces into composite units. The advantages include Unity of Command, Decentralized Independence, Tailoring to a Specific Mission, Integration Effectiveness, and Persistence of Mission. In addition to the advantages, the traditional composite unit has been limited in two ways, first, Insufficient Fire Power based on the size of the force and second, Limited Economy of Scale, which includes maintenance and logistics disadvantages for a composite force. The chapter concludes with considerations of advocacy and longevity of composite units.

Chapter 6 first outlines the CS-N concept and the status of the Mission Defense Team pilot. It then details a new cyber organizational construct for placing defensive cyber operators in Operations Support Squadrons (OSS) to perform enhanced defensive

network operations at the tactical level. The thesis then ties the advantages of this new organization to the lessons learned from past composite units, synthesizing the factors that apply to Air Force cyber forces. Finally, the chapter outlines considerations for the evolution of integrated air, space, and cyberspace operations over the next decade.

Finally, Chapter 7 presents conclusions and demonstrates relevance for the organization of cyber forces. Ultimately, this research shows that the best way to organize Mission Defense Teams is to place them in the OSS under the Operations Group. This will create a composite planning, briefing, execution, and debriefing environment for cyber and mission system operators. This chapter will also outline areas for future research and exploration.

Today, the United States faces unprecedented threats in cyberspace, and the military continues to improve capabilities to operate, defend, and extend in the newest warfighting domain. Because of these threats and the growing capabilities of the United States' adversaries in cyberspace, the military force structure has been and will continue to evolve to meet demands. Some lessons are unique to the cyber mission, others are specific to global command, but the ultimate goal of this analysis is to find lessons applicable to the future of Air Force cyber forces.

Chapter 2

History of Air Force Communications/Cyberspace Organization

If every airman is a defender, part of the neighborhood watch when it comes to [a] sense of ownership of the network, we can close a lot of unintentionally open windows. It's simplistic examples, but they contribute to making the network more resilient to attacks. Not just the Hunter Team, because we certainly aren't going to have enough of those, and not just the network operations and security centers.

—Lt Gen Michael Basla
Vice Commander, Air Force Space Command (2012)

To understand the complexities of cyber operations in the United States Air Force today, one must look at the foundation's operations and organizations in the past. The history and growth of communications in the Air Force has paralleled the progression of the Air Force itself. Communications had its beginnings in the Army Signal Corps using technical means (initially flags and torches) to signal balloons and then aircraft and continued to develop to high-speed data communications, standardized voice networks, long haul communications, and ultimately satellite communications. Although first posited in 1934, the concept of a single manager for communications forces was not realized until four years later.¹ This chapter begins by examining the Army Airways Communications System and the Air Force Communications Command that led communications Airmen until 1990. The chapter then describes the organizational changes that occurred because of the information age and the total reorganization of the Air Force led by General McPeak. The chapter concludes with the evolution from communications support to cyberspace operations and USCYBERCOM's CMF.

Army Airways Communications System

On 28 October 1938, Chief of the Air Corps, General Arnold, a former Signal Corp officer, activated the Army Airways Communications System (AACS).² Since

¹ Betty A. Boyce et al., *The Air Force Communications Command: 1938-1991, An Illustrated History*, ed. Thomas S. Snyder, Third Edition (Scott AFB, IL: AFCC Office of History, 1991), 260.

² Boyce et al., *AFCC: 1938-1991*, 3.

inception, the organization of communications support and operations has been flexible and continuously advancing. There has been an underlying struggle as to whom should command the communication forces. Maj Gen Harold M. McClelland, AACS Commander, stated, “Either we give base commanders command of everything on the base or we give them only operational control.”³ General McClelland did not use the terms “dual hat”⁴ or “single manager” but they were fundamental to the argument for centrally managed and integrated communications systems.⁵ Gen Carl A. Spaatz, first Chief of Staff of the Air Force, took General McClelland’s position and when the Air Force gained its independence in 1947, AACS redesignated as the Airways and Air Communication Service and subordinated the Air Transport Command. AACS consisted of three functions: air-to-ground communications, weather, and Air Traffic Control.⁶

The 1960s introduced rapid advancements in electronic communications technology, and Air Force leaders agreed on the importance of communications for command and control of operations and continued to see the need of a single manager for Air Force communications. On 1 July 1961, AACS redesignated as the Air Force Communications Service (AFCS) and became the Air Force’s 16th major air command.⁷ AFCS first offered regional communications support to nine geographic units and then added functional support to Tactical Air Command and Strategic Air Command in 1963 and 1976 respectively.⁸

³ Linda G. Miller and Cora J. Holt, *Air Force Communications Command Chronology 1938-1988* (Scott AFB: AFCC Office of History, 1988), 35.

⁴ The dual-hat concept simply meant that below the AACS, AFCS, or HQ AFCC level, the commanders filled two positions. Commanders (9 of 11) were collocated with other major command headquarters and acted as both AFCC division commanders and as the Deputy Chief of Staff for Communications-Computer Systems for their major command. “This dual-hat arrangement gave the host major command operational control over its air traffic services and communications while administrative control of these same assets resided with AFCC.” The concept offered integration and interoperability unifying communications across the major commands. Boyce et al., *AFCC: 1938-1991*, 260.

⁵ Miller and Holt, *AFCC Chronology*, 35.

⁶ Boyce et al., *AFCC: 1938-1991*, 5.

⁷ Miller and Holt, *AFCC Chronology*, 59; Boyce et al., *AFCC: 1938-1991*, 79.

⁸ Miller and Holt, *AFCC Chronology*, 63; Boyce et al., *AFCC: 1938-1991*, 145.

In November 1977, the Air Staff designated AFCS responsible for consolidating telecommunication centers across the Air Force.⁹ AFCS assumed the responsibility for the design, acquisition, operation, and maintenance of Air Force automatic data processing systems.¹⁰ The technology created new capabilities for Air Force operators including the integration of satellite communications systems.

Air Force Communications Command

On 15 November 1979, Headquarters United States Air Force redesignated AFCS as Air Force Communications Command (AFCC) and continued to expand management of communications for the Air Force.¹¹ On 5 January 1984, General Larry Welch, Air Force Vice Chief of Staff, directed the integration of “communications, data automation, and office automation disciplines across the Air Force to take advantage of the merger of these technologies” and that AFCC would “operate and maintain command-unique systems as deemed appropriate by each command.”¹² AFCC became the single manager for Air Force information systems. As communication systems in the Air Force continued to grow, major commands (MAJCOMs) and operating agencies began acquiring non-standard systems to meet their operational requirements, and as a result created interoperability issues at the base level.

To address the problem, Headquarters Air Force created the Air Force Communications Computer Systems Integration Office under AFCC on 10 October 1987, making AFCC the single overall manager of the communications environment at the base level and giving it the authority to set the standards, policies, and procedures to ensure interoperability.¹³ At its peak, AFCC was the most dispersed command in the AF with 54,000 Airmen and civilians assigned to 752 units in 430 locations including 27 foreign countries.¹⁴ AFCC managed the acquisition, installation, operation, and maintenance of communications and services throughout the Air Force and the DoD.

⁹ Miller and Holt, *AFCC Chronology*, 86.

¹⁰ Christopher H. Sterling, ed., *Military Communications: From Ancient Times to the 21st Century* (Santa Barbara, CA: ABC-CLIO, Inc., 2008), 4.

¹¹ Miller and Holt, *AFCC Chronology*, 92.

¹² Miller and Holt, *AFCC Chronology*, 106 and Sterling, *Military Communications*, 4-5.

¹³ Miller and Holt, *AFCC Chronology*, 136.

¹⁴ Boyce et al., *AFCC: 1938-1991*, 259.

Despite its massive size and mission scope, AFCC struggled for relevance as a command; Headquarters Air Force, AFCC, and other MAJCOMs debated the issue no fewer than 18 times between 1937 and 1988.¹⁵ Many of these reviews revolved around a theater commander desiring total control of all theater assets or a MAJCOM commander desiring a portion of the AFCC mission (e.g., engineering and installation or combat communications).¹⁶ As was the case with much of the organizational structure of the Air Force, the twilight of the Cold War created conditions that would lead to the end of AFCC. The first of these was Secretary of Defense Richard Cheney's direction in July 1989 for the services to review and streamline their acquisition processes.¹⁷ Secretary Cheney's direction led Headquarters Air Force to task the MAJCOMs to consolidate their practices. Both of these events took place concurrently with a functional review of communications support by Pacific Air Forces (PACAF), commanded by General McPeak. General McPeak saw the existing AFCC structure as a functional "stovepipe" with no advantage to the dual-hatted responsibilities; he offered his command as a test case for a new operational structure.¹⁸

PACAF's review of communications support in part led to a Defense Management Review panel created by Gen Larry Welch, Air Force Chief of Staff, to consider the functions and organization of AFCC. Because of this study, General Welch announced on 18 June 1990, a "complete restructure of Air Force Communications and computers" effective 1 October 1990.¹⁹ The restructure aligned AFCC as a field-operating agency of Headquarters Air Force on 1 July 1991. The reorganization's purpose was to unify command at the operational level and transfer maintenance functions from AFCC to the wing commander. The new focus placed the base CS under the host wing commander in line with General McPeak's (Air Force Chief of Staff, at this time) vision "one base, one wing, one boss."

¹⁵ Boyce et al., *AFCC: 1938-1991*, 260.

¹⁶ Boyce et al., *AFCC: 1938-1991*, 260.

¹⁷ Larry R. Morrison, *From Flares to Satellites: A Brief History of Air Force Communications* (Scott AFB: AF Communications Agency Office of History, 1997), 65.

¹⁸ Boyce et al., *AFCC: 1938-1991*, 260.

¹⁹ Boyce et al., *AFCC: 1938-1991*, 260-1.

In his Chief of Staff End of Tour Interview in 1994, General McPeak outlined his reasoning for restructuring the communication organization and dividing control of communications to the wings and units that communications supported:

Our product is operations... It is not communications... Their mission was to communicate, and communications is a vital part of what all the Air Force does, but it's not the Air Force mission, just like brain surgery is not the Air Force mission. We have got to have a hospital but we don't have a brain surgery major command. We say that surgery is functional support, and we put it under an operator. So in regard to communications, the actual communications elements—the physical equipment, the antennas and the wiring and the telephones and so forth—they belong to the people who have a product, which is operations, that requires communications support... We were left with some communications activities that have to be directed centrally and some intelligence activities that have to be directed centrally. So the question is, What do you do with those people that have to be directed centrally? You don't want them to be a major command. You don't really want them to be a functional organization that can possibly be confused with anything else in the organization. For instance, why would you take the Thirteenth Air Force in Guam (with the mission of contingency operations in Southwest Asia) and close it and hand their mission to, say, Fifth Air Force in Japan (which is completely out of the region), and say, 'Take Thirteenth Air Force and make it communications,' or 'Take what's left over from the old Communications Command and make it the Thirteenth Air Force?' We could do that, but it would mean that regular line air force organization has a mission to communicate, which is not true.²⁰

General McPeak was correct. In the early 1990s, the Air Force did not have a mission to communicate. However, removing the centralized control of communications had long-term consequences on the build out of Air Force networks and in the command and control of those networks when the Air Force later added *to fly and fight in cyberspace* as part of its mission statement.

The Information Age

The reorganization of communications forces in the 1990s had dramatic effects on the creation of both unclassified and classified networks. As the dependency for connectivity grew, each MAJCOM created networks to meet their requirements, which roughly followed the interconnectivity guidance written by the Defense Information

²⁰ Oral History Interview of General Merrill McPeak by Dr. George M. Watson, Jr. and Major Robert White, 19 December 1994. Typed transcript, K239.0512-2138 C. 1, in USAF Collection, AFHRA, 13-4.

Systems Agency (DISA).²¹ The restructuring led to the creation of more than 17 Air Force organizations, each with its own Network Operations and Security Center (NOSC), which managed and ensured functionality of networked systems.²² In 1993, the Air Force established the Air Force Computer Emergency Response Team (AFCERT), which started the development of sensors that monitor networks for anomalous behavior.²³

It was during this timeframe that Information Warfare began to emerge. In 1990, the Air Force Cryptologic Support Center outlined how to “identify and develop countermeasures to known risks to Air Force Communications-Computer systems.”²⁴ In 1993, the Air Force redesignated the Air Force Electronic Warfare Center as the Air Force Information Warfare Center (AFIWC). In 1995, Secretary of the Air Force Sheila Widnall and Chief of Staff Gen Ronald Fogelman issued a guidance document on Information Warfare and General Fogelman described Information Operations as the “fifth dimension of warfare” in a speech to the Armed Forces Communications-Electronics Association (AFCEA).²⁵ On 28 September 1995, the Air Force stood up the first Information Warfare Squadron (IWS). The 609 IWS, chartered with both offensive and defensive Information Operations missions, defended the United States Central Command Air Forces (CENTAF) Combined Air Operations Center (CAOC).²⁶ Although

²¹ Larry R. Morrison, *From Flares to Satellites*, 70.

²² Maryann Lawlor, “Command Takes Network Control,” *Signal* 61, no. 2 (October 2006): 49.

²³ Gregory W. Ball, History of HQ Twenty-Fourth Air Force and 624th Operations Center, 17 January 2014, <http://www.24af.af.mil/shared/media/document/AFD-140429-035.pdf>, 4.

²⁴ Air Force Cryptologic Support Center, “Communications-Computer Systems Security Vulnerability Reporting Program (CVRP) Concept of Operations,” 1 April 1990, 1.

²⁵ Sheila Widnall and Gen Ronald R. Fogleman, “Cornerstones of Information Warfare,” 1995; Gen Ronald R. Fogleman, “Information Operations: The Fifth Dimension of Warfare,” speech to the Armed Forces Communications-Electronics Association, Washington, D.C., 25 April 1995, <https://www.hsdl.org/?view&did=439942>.

²⁶ Jason Healey, “Lessons from Our Cyber Past: The First Military Cyber Units,” moderated discussion at Atlantic Council Cyber Statecraft Initiative Event, Washington, D.C., 5 March 2012, <http://www.atlanticcouncil.org/news/transcripts/transcript-lessons-from-our-cyber-past-the-first-military-cyber-units>.

the Air Force inactivated the squadron four years later (30 June 1999), its missions hinted at the future emphasis on defending key mission systems and terrain.

On 8 August 1996, Congress passed the Information Technology Management Reform Act (ITMRA) that created the Chief Information Officer (CIO) of the Air Force and gave the Air Force “full, independent acquisition authority for its information technology investments.”²⁷ The first appointed CIO, Mr. Arthur L. Money, stated, “Centralizing our focus on capital planning, investment concepts and evaluation of information technology through outcome-based performance measures will provide greater accountability concerning our information technology investments.”²⁸ Information Operations continued to grow throughout the Air Force, from single squadron in 1997 to an Information Operations Wing, four groups, and eleven squadrons by October 2000.

The next reorganization phase began in 2003, when Air Force Vice Chief of Staff, Gen Robert H. Foglesong recognized the fragmented nature of the Air Force’s networks and appointed ACC as the lead to develop network command and control.²⁹ In 2005, ACC created the Air Force Network Operations (AFNETOPS) concept, which dual-hatted the Eighth Air Force Commander as the AFNETOPS Commander and gave authority to direct operations on the Air Force network.³⁰ The AFNETOPS concept also created integrated NOSCs (I-NOSC) to simplify command and control of operations on the network, an effort that consolidated ten MAJCOM NOSCs down to two I-NOSCs.³¹ As will be shown, this command and control of the network would become a critical factor in the successful defense of the network.

Rise of Cyberspace Operations

On 1 November 2006, Lieutenant General Robert Elder, 8 AF Commander, received a “Go Do” letter in which Gen T. Michael Moseley, Air Force Chief of Staff,

²⁷ Larry R. Morrison, *From Flares to Satellites*, 71.

²⁸ Memorandum, SAF/AQ, “Chief Information Officer of the Air Force,” 11 September 1996.

²⁹ Headquarters United States Air Force, “Program Action Directive 07-10: The Implementation of the Chief of Staff of the Air Force Direction to Establish the Air Force Network Operations Organization Structure,” 13 November 2007, 1.

³⁰ Maryann Lawlor, “Command Takes Network Control,” 49.

³¹ Maryann Lawlor, “Command Takes Network Control,” 49.

designated General Elder as the “global effects integrator”. General Moseley also charged 8 AF to “integrate the Air Force’s global kinetic and non-kinetic strike capability... with authority to become [Commander, Air Forces] COMAFFOR for all USAF cyberspace elements.”³² On 17 September 2007, Maj Gen William T. Lord took command of Air Force Cyberspace Command (Provisional) co-located with 8 AF at Barksdale AFB, Louisiana. As Air Force Cyberspace Command (Provisional) was in the process of standardizing its operations, two major incidents occurred within the Air Force’s nuclear enterprise that would have far-reaching effects on the Air Force. The first was an inadvertent transfer of nuclear warheads on board a B-52 flown from Minot AFB, North Dakota to Barksdale AFB.³³ The second incident was the discovery of an accidental shipment of Intercontinental Ballistic Missile parts to Taiwan.³⁴ These two events shook the Air Force, caused a change in leadership at multiple levels, and shifted the Air Force’s focus toward protecting the nuclear enterprise. In June 2008, newly appointed Secretary of the Air Force Michael B. Donley and Chief of Staff, Gen Norton A. Schwartz implemented a “strategic pause” in the formal establishment of Air Force Cyberspace Command. The pause lasted until October 2008 when Secretary Donley and General Schwartz directed the consolidation of cyberspace operations in a new Component-Numbered Air Force (C-NAF) under AFSPC.

On 18 August 2009, 24 AF was activated at Lackland AFB, Texas under the command of Maj Gen Richard E. Webber.³⁵ In addition to supporting the Air Force mission under AFSPC, 24 AF also became the Air Force’s warfighting element under

³² Gen T. Michael Mosely, USAF Chief of Staff, to Lt Gen Robert Elder, 8 AF/CC, memorandum, subject: Operational Cyberspace Command “Go Do” Letter, 1 November 2006, <http://www.24af.af.mil/shared/media/document/AFD-111003-055.pdf>.

³³ Josh White, “In Error, B-52 Flew Over U.S. With Nuclear-Armed Missiles”, 6 September 2007, <http://www.washingtonpost.com/wp-dyn/content/article/2007/09/05/AR2007090500762.html>.

³⁴ Josh White, “Nuclear Parts Sent To Taiwan in Error, Washington Post, 26 March 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/25/AR2008032501309.html>.

³⁵ Gregory W. Ball, History of HQ Twenty-Fourth Air Force and 624th Operations Center, 4.

USCYBERCOM on 23 June 2009.³⁶ In a Memorandum to Airmen in August 2009, Secretary Donley and General Schwartz outlined the cyberspace mission alignment. This alignment granted the 24 AF Commander authority over the Air Force Network and it also assigned the 67th Network Warfare Wing (now Cyberspace Wing), the 688th Information Operations Wing (now Cyberspace Wing), and the 689th Combat Communications Wing (now 5th Combat Communications Group) to 24 AF. The memorandum also activated the 624th Operations Center (OC) under 24 AF, and resubordinated both the Air Force Network Integration Center (formerly Air Force Communications Agency) and the Air Force Frequency Management Agency under AFSPC.³⁷ The 624 OC provides command and control for AFCYBERs full spectrum cyber operations in support of Air Force and joint requirements. The current organization of 24 AF is shown in Figure 3.



³⁶ United States Strategic Command, United States Cyber Command Fact Sheet, https://www.stratcom.mil/factsheets/2/Cyber_Command/.

³⁷The 869th Combat Communications Wing and the 3rd Combat Communication Group inactivated on 30 September 2013, leaving the 5th Combat Communications Group to directly report to 24 AF; Michael B. Donley, Secretary of the Air Force and Gen Norton A Schwartz, USAF Chief of Staff, to Airmen of the United States Air Force, memorandum, subject: Air Force Cyberspace Mission Alignment, August 2009, <http://www.24af.af.mil/shared/media/document/AFD-111003-054.pdf>.



Figure 3: 24th Air Force, AFCYBER, Joint Force Headquarters - Cyber Organization

Source: Adapted from the following link:

<http://www.24af.af.mil/News/Article-Display/Article/731777/24th-af-hosts-ang-go-cyber-summit> (with slight modifications to reflect current 24 AF organization)

The mission of 24 AF is to “Fly, Fight, and Win in cyberspace,” 24 AF executes this mission through three types of operations: offensive cyberspace operations (OCO), defensive cyberspace operations (DCO) and DODIN operations.³⁸ Figure 4 highlights these categories in red.

³⁸ US Joint Chief of Staff, *Cyberspace Operations*, Joint Publication 3-12(R) (Washington, DC: US Joint Chiefs of Staff, 5 February 2013), vii. JP 3-12 further defines **OCO** as cyber operations “intended to project power by the application of force in and through cyberspace”; **DCO** are cyber operations “intended to defend DOD or other friendly cyberspace”; and finally **DODIN operations** are “actions taken to design, build, configure, secure, operate, maintain, and sustain DOD communications systems

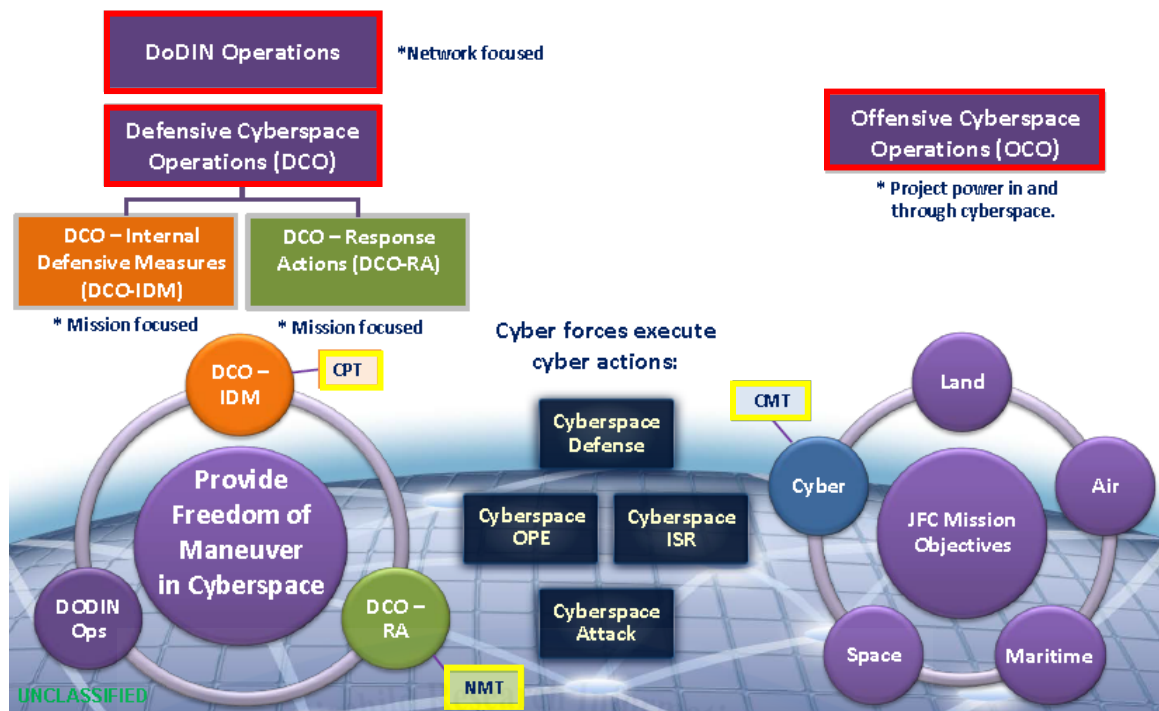


Figure 4: Cyberspace Operating Environment

Source: Reprinted Headquarters U.S. Air Force, United States Cyber Command Cyber Mission Force Brief

To provide a secure cyber enterprise 24 AF designed a “simple, agile, integrated, and interoperable [network] with documented processes for connection configuration management, reporting, and operational capability assessment.”³⁹ This interoperable network, called the Air Force Network (AFNet), is a subcomponent of the AFIN. Once established, the goal became AFNet migration, consolidating and restructuring the disparate Air Force networks to the new secure cyber enterprise. On 1 April 2014, 24 AF completed AFNet migration, consolidating 646,000 email accounts and 12,318 servers at 275 sites into a centrally managed, standardized network.⁴⁰

and networks in a way that creates and preserves data availability, integrity, confidentiality, as well as user/entity authentication and non-repudiation.”

³⁹ Jill Baker et al., “Winning in Cyberspace: Air Force Space Command’s Approach to Defending the Air Force Network,” *High Frontier* 7, no. 3 (May 2011): 14, <http://www.afspc.af.mil/shared/media/document/AFD-110519-023.pdf>.

⁴⁰ Gregory W. Ball, *24 AF Heritage, 5th Anniversary* (JB SA Lackland, TX: 24 AF Historian, 2014), 39.

As shown in Figure 4 (highlighted in orange), a subcomponent of DCO is Internal Defensive Measures (DCO-IDM), which includes actively hunting advanced threats internal to the network.⁴¹ These hunting operations include using a layered, adaptive, defense-in-depth approach with mutually supporting elements. The Air Force currently employs two weapons systems to perform these operations.⁴² The first system is Air Force Cyberspace Defense (ACD); it “prevents, detects, responds to, and provides forensics of intrusions into unclassified and classified networks.”⁴³ This weapon system provides active defense focused on AFNet enterprise defense. The second system, Cyberspace Vulnerability Assessment/Hunter (CVA/H), “executes vulnerability, compliance, defense, and non-technical assessments, best-practice reviews, penetration testing, and hunter missions on AF and DOD networks and systems.”⁴⁴ Operators use this weapon system for enclave defense. Cyber operators for both weapon systems coordinate and deconflict operations through the 624 OC. Although these weapon systems are effective and continually upgrading, the squadrons that operate them have limited manpower and resources. As such, these low density, high demand assets are focused on the AFNet and key mission systems.

USCYBERCOM’s Cyber Mission Force

To facilitate coordination of cyber activities across DoD networks and ensure the ability for the government to carry out cyber strategy, the DoD created the CMF in 2012. The DoD chartered CMF to synchronize activities in conjunction with the installation owners, military service’s CERTs, the Department of Homeland Security, and USCYBERCOM to respond to emerging threats. The CMF operates in a team concept with a build-out phase over several years. When complete, the CMF will consist of 133 teams supporting national, Service, and Combatant Command priorities, and include nearly 6,200 military, civilian, and contracted support personnel across all services.

⁴¹ JP 3-12, p. II-2.

⁴² The Air Force Chief of Staff approved six weapons systems on 24 March 2013.

⁴³ Brig Gen Robert J. Skinner, “The Importance of Designating Cyberspace Weapon Systems,” *Air and Space Power Journal*, September-October 2013, <http://www.airpower.maxwell.af.mil/digital/pdf/articles/2013-Sep-Oct/SLP-Skinner.pdf>, 33.

⁴⁴ Brig Gen Robert J. Skinner, “The Importance of Designating Cyberspace Weapon Systems,” 36.

Their missions will focus on three broad areas: Cyber Protection Forces will augment traditional defenses and add defenses to priority networks; National Mission Forces and their support “will defend the US and its interests against cyberattacks of significant consequence”; and Combat Mission Forces and their support will provide support to combatant commands.⁴⁵ Figure 4 highlights (in yellow) these mission areas. This thesis focuses on the Cyber Protection Forces and the Cyber Protection Teams (CPT) in particular, as CPTs will plan and conduct defensive operations internal to DoD networks.

The DoD charged each service to organize, train, and equip their operators for the CMF; each service took a different approach to building out their CMF teams. In 2012, the Air Force already had cyber operations formal training consisting of two squadrons: initial training at Keesler AFB, Mississippi and intermediate training focused on operational culture and weapon system construct at Hurlburt Field, Florida. Keeping this structure intact, the Air Force enhanced their intermediate training to meet a majority of the CMF requirements, followed by mission qualification training once operators reach their unit.⁴⁶ For example, many of the Airmen on a CPT operate the CVA/H weapon system.⁴⁷ They are qualified by attending undergraduate cyber training at Keesler, followed by CVA/H initial qualification training at Hurlburt, and then CVA/H mission qualification at the operational unit. By following this structure, the Air Force has added training capacity to the joint training model at the current rate of 250 operators.⁴⁸

Base Communications Squadron

General McPeak’s major Air Force reorganization focused unity of command at the wing level by placing the base CS under the wing commander. While a few of the groups have changed, e.g., the logistics group is now the maintenance group; the general

⁴⁵ Department of Defense, *Department of Defense Strategy for Operating in Cyberspace*, May 2011, 4, http://www.defense.gov/Portals/1/features/2015/0415_cyber-strategy/Final_2015_DoD_CYBER_STRATEGY_for_web.pdf.

⁴⁶ Amber Corrin, “The Air Force’s Approach to Cyber Protection Teams,” *C4ISR & Networks*, 21 September 2015, <http://www.c4isrnet.com/story/military-tech/cyber/2015/09/21/air-force-cyber-protection-teams/72415752/>.

⁴⁷ “Factsheets: Cyberspace Vulnerability Assessment/Hunter Weapon System,” Air Force Space Command, accessed 30 January 2016, <http://www.afspc.af.mil/library/factsheets/factsheet.asp?id=20874>.

⁴⁸ Amber Corrin.

organizational framework of the mission support group still exists today. The CS is a support organization assigned to the mission support group along with security forces, contracting, force support, civil engineering, logistics readiness squadrons, and others as depicted in Figure 5.⁴⁹

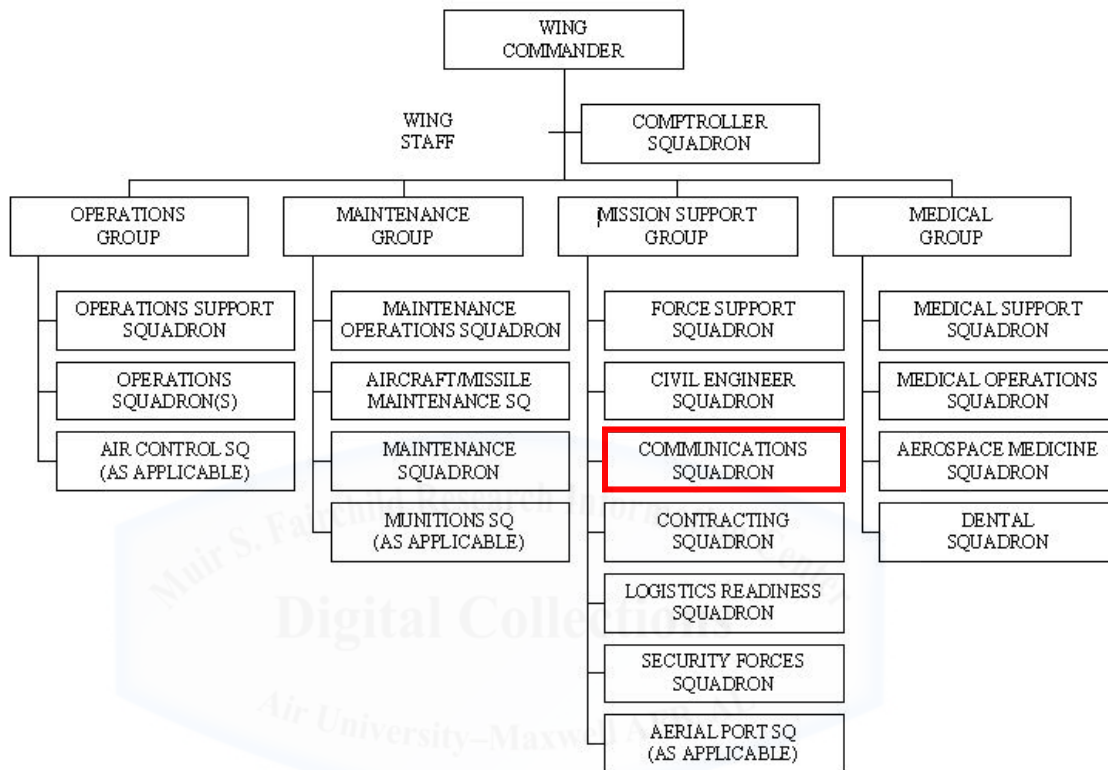


Figure 5: Wing Structure Organization

Source: Reprinted from *Air Force Instruction 38-101, Air Force Organization*, 16 March 2011

Communications squadrons originally consisted of four flights; however, in 2007, the Air Force reduced the squadron from four flights to two with provisions for a third flight. The first, Operations Flight (SCO), provide a network control center capability, knowledge operations such as records management, information management, publications and forms, and Freedom of Information Act requests. This flight also manages ground radio, telephone maintenance, and airfield systems. The second, Plans and Resource Flight (SCX) manage the base-level Command, Control, Communications,

⁴⁹ Air Force Instruction (AFI) 38-101, *Air Force Organization*, 16 March 2011, 41.

and Computers systems planning and plans support. Some CSs have a third Special Mission Flight (SCP) for units with unique responsibilities or equipment.⁵⁰

When the Air Force consolidated operations under 24 AF, many of the defensive cyber operations conducted in the CS were elevated to the AFCERT and the I-NOSCs, leaving technicians at the squadron level to do touch maintenance and patching. Orders from USCYBERCOM are sent to 24 AF and distributed by 624 OC in the form of cyber tasking orders, cyber control orders, time compliance network orders, maintenance tasking orders, or special instructions. These orders are sent to the MAJCOMs, field operating agencies, direct reporting units, MAJCOM Communications Coordination Centers (MCCC), Air Force Component Commands and Air Operations Centers, and Air Force Forces Communications Control Centers (ACCC) to distribute and track compliance for their respective CSs⁵¹.

While many of these orders are maintenance and compliance focused, there may be a time when 24 AF requires the direct support of the CS. For instance, if the AFIN is under attack and it is necessary to take actions at an Air Force installation, the 624 OC (via the 24 AF/CC) will notify the affected MAJCOM and installation commanders to direct actions with the Airmen in the CS.

Communications/Cyber Operators

This chapter focused on the organizational structure of communications in the Army Air Force and the United States Air Force. To understand the current situation, one must also examine the evolution of the operator during these times. In his 2010 SAASS thesis, Major Joseph Golembiewski outlined four epochs of Army Air Forces and Air Force communications officers: the signal officer (1860-1910), the communications-electronics officer (1910-1980), the computer officer (1980-2010), and the cyberspace officer (2010-present).⁵² In examining these epochs, Major Golembiewski found that signal officers required technical skills to set up communications networks and to fix

⁵⁰ Air Force Instruction (AFI) 38-101, Air Force Organization, 16 March 2011, 50.

⁵¹ Air Force Instruction (AFI) 10-1701, Command and Control for Cyberspace Operations, 5 March 2014, 4.

⁵² Joseph R. Golembiewski, "From Signals to Cyber: The Rise, Fall, and Resurrection of the Air Force Communications Officer" (School of Advanced Air and Space Studies, 2010), 9, 27-8, 52-3, 78.

radios and other equipment. This technical requirement lessened with the dawn of the computer officer as the focus became management over a number of different systems. The advent of cyber operations has led to the resurgence of technical officers. Currently, the cyber operations career field is a mix of operators with a technical background, typically working in 24 AF units operating cyber weapons systems and those with a less technical background working in CSs. The Air Force must evaluate this technical mix when considering solutions for future cyber organizational structures.

Chapter Summary

The Air Force continues to integrate communication into operations, from the use of flags and torches to radios to computers. Communications have become key to command and control of operations as the Air Force has become dependent on integrated technologies. This chapter has shown the historical background from the Army Signal Corps until today. It summarized the centralized command structure and dual-hatted nature of communications through 1991. In 1991, General McPeak gave control and administration of communications to the wing commander, operated and maintained largely by decentralized units focused on their individual requirements. The Air Force consolidated management of the AFIN in 2003 under ACC, which delegated management to 8th Air Force and the Air Force Air Force Cyber Command (Provisional). Finally, in 2009, the Air Force designated 24 AF the lead agency to command and control the AFIN. The chapter concluded with an overview of USCYBERCOM's CMF and the current status of the base CS. As the requirement for defensive cyber operations of mission systems grow, these are the forces that will be called upon to make the network more resilient.

Chapter 3

Development and Experience with Composite Units

Whenever a new weapon is evolved and is first tried in battle a long transition period follows before the solution to a sound operating organization become apparent. It is interesting to note that machine gun organizations are not single homogeneous units but are simply one of the mixed units that go to make up a composite fighting force. The essence of success is teamwork. We cannot secure coordination by simply issuing orders. We must train as a unit... We should build right into the organization itself, by providing a balanced composite unit, those attributes which are the very essence of the principles of mass, of unity effort, of coordination, of cooperation, of economy of force, of movement, and of security. A properly organized force complies with these principles in its very inception.

—1st Lieutenant Charles McK. Robinson
Air Corps Tactical School (1931)

The Air Force is inherently composite; when directed, Airmen integrate fighter, reconnaissance, tanker, and cargo aircraft to forward project airpower. At what organizational level should this composite integration occur to permit the most effective use of air power? Air Force leadership has contemplated organizational questions regularly and has done so even before the inception of the Air Service as a combat arm of the United States Army in 1920. One solution is a composite unit (wing, group, or squadron) that integrates various warfighting capabilities under a single commander. Unlike a monolithic unit of aircraft optimized to do a single mission such as air superiority or global strike, a composite unit consists of multiple capabilities, most often differing classes of aircraft.

The Air Force used the “composite” label to designate a host of different units. These include units with multiple classes of aircraft (e.g., 4th Composite Group, at Nichols Field in the Philippines in the 1920s, had bombers, pursuit, and observation squadrons); units with multiple types of aircraft of the same class (e.g. the 80th Flying Training Wing, at Sheppard AFB in Texas, has two T-6A squadrons and T-38C squadrons). These “composite” units also include units with both reserve and active duty

members; units with men and women; and units of mixed race.¹ The Air Force has also activated wings, groups, and squadrons that are by definition composite, but were not designated “composite.” For example, the 1st, 2nd, and 3rd Air Commando Groups fit into this category. Composite units typically focused either on a location such as Hawaii, Panama Canal, and Alaska, or on a special mission such as the 509th Composite Group, which was responsible for the operational deployment of nuclear weapons during World War II. Composite units have been highly experimental and tend to be short-lived. The rest of this chapter summarizes the rich history of composite units from World War I through Operation Desert Storm focusing both on the construction of the units and lessons learned from their employment. The lessons learned in this chapter and the next will inform Air Force leadership on potential organizational restructuring efforts to optimize the integration of cyber forces.

World War I and the Interwar Years

The United States Army Signal Corps’ formed an Aeronautical Division on 1 August 1907; however, they did not organize aviators into operational units until they provisioned the 1st Aero Squadron on 5 March 1913 to support Army operations along the Mexican border.² Even though the Signal Corps did not formalize units, the first composite unit existed at Fort Sam Houston, Texas integrating two Curtiss IV Model-D and two Wright Type-B aircraft.³ At the outbreak of World War I, “at least one thing [was] certain... little or nothing was on hand, either of planes, fields, instructors, curricula, or—most important of all—experience that would indicate what was needed.”⁴ The focus at the time was solving training and supply problems; organizationally the Aeronautical Division simply mimicked the structures of the British and French. Based on the French model, American aviators organized into squadrons with the same make and model of aircraft. These monolithic units were more efficient and retained more combat power based on three major factors. First, having multiple monolithic units at the same location consolidated maintenance. At the time, manufacturers handcrafted many

¹ James Moschgat, *The Composite Wing: Back to the Future!*, 12.

² Juliette A. Hennessy, *The United States Army Air Arm, April 1961 to April 1917* (Bolling AFB, Washington D.C.: Air Force Historical Studies Office, 1985), 15, 76.

³ Hennessy, *The United States Army Air Arm, April 1961 to April 1917*, 40-2.

⁴ Hennessy, *The United States Army Air Arm, April 1961 to April 1917*, 197.

of the aircraft, so in addition to high turnover and attrition rates; aircraft required an extraordinary maintenance effort to keep them flying. Second, in terms of training, monolithic units allowed for mission-oriented training by function (e.g., observation, pursuit, and bomber) and improved striking power and survival by flying in formation. Finally, there were efficiencies in safety and performance because Airmen could locate aircraft based on the requirements of the aircraft; Airmen could position pursuit aircraft closer to the fight to preserve fuel while bombers could be located further to the rear at protected airdromes.

As American aviators learned about aerial warfare “on the fly” during World War I, they honed their flying skills and witnessed the use of various types of aircraft in concert to achieve desired effects. This period also set the tone for the organization of monolithic units with composite units being the exception. During the war, the Aeronautical Division consisted of fourteen groups (seven observation, five pursuit, two bombardment). Only the 1st Observation Group could be considered a composite unit as each of the three squadrons flew different aircraft (French Spad XIs, French Dorand ARs, and British Sopwiths).⁵

After World War I many of the squadrons were inactivated and control of the combat units fell under the jurisdiction of ground forces giving divisions, corps, and armies their own observation, attack and pursuit units for tactical employment.⁶ The Army Air Corps implemented a true composite structure starting in 1920. At first, each overseas department—Hawaii, Panama, and the Philippines—had observation squadrons. Nevertheless, military policy called for additional assets to defend America’s possessions overseas, so the War Department provided bomber and pursuit aircraft to each department.⁷ The 4th Composite Group at Nichols Field in the Philippines, formed in 1920 and incorporated one observation squadron, one pursuit squadron, and one bombardment squadron. The 5th Composite Group, at Luke Field, Hawaii, formed in 1922 and included one observation squadron, two pursuit squadrons, and two

⁵ Lucien H. Thayer, *America’s First Eagles: The Official History of the U.S. Air Service, A.E.F. (1917-1918)* (San Jose, CA: R. James Bender Publishing, 1983), 76.

⁶ Snyder, Thomas S. “A Brief History of the Composite Forces in the United States Air Force, Ramstein Air Base, Germany: Office of History, 22 February 1991, 1.

⁷ Snyder, “A Brief History of the Composite Forces in the United States Air Force,” 2.

bombardment squadrons. Finally, the 6th Composite Group formed at France Field in the Panama Canal Zone and maintained the same number and type of squadrons as the 5th Composite Group.

The primary mission of these composite groups was coastline defense, which provided both tactical and strategic capabilities. They also executed special missions both independently and in conjunction with ground forces. They integrated seaplanes, performed training missions, conducted aerial photography, made goodwill flights, executed aerial reviews, and piloted search-and-rescue patrols.⁸ The Air Corps considered these composite groups as temporary; they believed the groups were not forceful enough to withstand sustained attacks. In the lean years of inter-war military spending, the Air Corps viewed composite groups as a stopgap until Congress could provide more airplanes to build up the defensive forces. These composite groups proved that independent squadrons could integrate to carry out the mission with limited resources in an austere environment. The flexibility had its limitations, however; most prominent was the maintenance required to keep these dissimilar aircraft flying. These forces turned out to be temporary; as the United States prepared for World War II the groups became monolithic and supported larger operations. The 4th Composite Group disbanded in November 1941 as the 24th Pursuit Group and 19th Bombardment Group arrived in the Philippines. The 5th and 6th Composite Groups became Bombardment Groups in 1939 and 1937 respectively.

The establishment of the General Headquarters Air Force (GHQAF) on 31 March 1935 placed all of the pursuit, bombardment, and attack units under a single air commander, Brig Gen Frank Andrews. Observation squadrons, viewed as support aviation, would remain allocated to ground forces. GHQAF established three wings in the contiguous United States (CONUS) and three overseas wings. GHQAF did not label the CONUS wings as composite wings (1st, 2nd, and 3rd Wing) but each of these wings was indeed a composite force consisting of pursuit, bombardment, and attack units. GHQAF designated the overseas wings as composite wings: the 19th Composite Wing (1 April 1931, New York) moved to defend the Panama Canal Zone in 1933; the

⁸ Moschgat, *The Composite Wing: Back to the Future!*, 24.

18th Composite Wing (Hawaii, 1 May 1931) served as part of the Hawaiian defense force; and the 13th Composite Wing (Puerto Rico, 10 October 1940) defended the Caribbean.⁹ Like the composite groups before them, these composite wings were short-lived. The 19th Composite Wing became the 19th Bombardment Wing, the 18th Composite Wing inactivated after suffering disastrous losses in the Japanese attack on Pearl Harbor, and the 13th Composite Wing inactivated after only one year of service in 1941.

In addition to the overseas composite wings and groups, the Air Force activated the 23rd Composite Group at Maxwell Field, Alabama in August 1939 consisting of a pursuit squadron and two bombardment squadrons (light and heavy). The group's focus was to accomplish tactical service tests on aircraft and equipment, demonstrate aircraft capabilities, and integrate tactics and aerial technique.¹⁰ Its operators were some of the most highly experienced pilots in the Air Force causing an ideological battle between the Air Corps Tactical School (ACTS) Commandant and HQ Army Air Corps. This battle dissolved as World War II erupted in Europe and ACTS suspended classes as the Army Air Corps galvanized pilots to join the war effort. The group transferred to Eglin Field, Florida in September 1940 and was redesignated the Air Corps Proving Ground Detachment in July 1941. The 23rd Composite Group although short-lived showed how a highly trained integrated unit could be used to both test aircraft and train tactics. These humble beginnings would eventually evolve into two composite wings that are still active today. The 53d Wing, a direct descendant of the 23rd Composite Group at Eglin AFB, is responsible for the Operational Testing and Evaluation of new equipment and systems. The 57th Wing at Nellis AFB leads advanced air combat training and tactical employment and includes the United State Air Force Weapons School and the Adversary Tactics Group, which are both composite in nature.

World War II

During World War II, composite units continued to be the exception with only a handful composite out of over 300 groups and wings. The doctrine of the time focused

⁹ Maurer, *Air Force Combat Units of WWII*, 382, 386, 435.

¹⁰ Study, "Establishment of An Air Corps Tactical Center" Air Corps Tactical School Study. Maxwell Field, Alabama, 15 September 1939, 29.

on the monolithic unit for two main reasons. The first, as stated by General Arnold, Chief of the Air Corps in 1941, “There are two types of wings, composite and heterogeneous... The present trend is toward the later since it is believed to be more efficient tactically to have only one type of combat aviation in one command of that size.”¹¹ The second as expressed by Gen Benjamin Foulois, Chief of the Air Corps in 1943, “[airpower’s] principal defense against destruction while it is on the ground is in its ability to disperse over many airfields.”¹² Aircraft classes continued to specialize in creating more requirements for aircraft maintainers. The 1930s were the age of strategic bombing as the number of bombardment squadrons grew to match the number of pursuit squadrons. Due to doctrine, bomber growth, and aircraft specialization, some the composite units previously discussed inactivated or became bombardment units. Nevertheless, it was not the end of the composite unit. As World War II drew near, rapid defensibility of key terrain and power projection requirements brought about additional composite groups and squadrons.

With the growing Japanese presence in the Pacific, defense of Alaska became more prominent. The 28th Composite Group activated in California in February 1940 and relocated to Alaska in March the following year. The group built up assets for the preparation of war, and at its peak consisted of three bombardment squadrons, two fighter squadrons, and a pursuit squadron. Unfortunately, the Air Corps gave limited consideration to operating in the realities of the Alaskan environment. The group received aircraft that were not prepared for the low temperatures and lacked instruments for flying in poor weather conditions, and many of the fighters did not have the range required to maneuver around the weather. Even with these limitations, the group defended the Alaskan coast against the Japanese until the Air Corps inactivated the group on 20 October 1945.

To counter the growing German U-boat threat in the South Atlantic, the Air Corps activated the 1st Composite Squadron at Wideawake Field on Ascension Island on

¹¹ H. H. Arnold and Ira C. Eaker, *Winged Warfare*, (New York, NY: Harper & Brothers Publishers, 1941), 92-3.

¹² Benjamin O. Foulois, “The Present Status of Military Aviation and Its Trend of Development,” lecture, Army War College, Washington, D.C., 12 September 1933, 7-8.

5 December 1942. The squadron, a mix of available fighters (P-39s) and bombers (B-25s), teamed to sight and fire on the U-boats. The P-39 offered speed and a depth charge to pursue submarine reports while the B-25s flew long-range patrol and attack missions with two depth charges. A litany of maintenance issues plagued this complementary force as the P-39s lacked tires and the B-25s encountered engine problems. The Air Corps inactivated the squadron in September 1944 after the U-Boat threat lessened and the assets dispersed to fight other battles.¹³

Following in the footsteps of the 23d Composite Group at Maxwell Field, the Army Air Corps stood up two composite squadrons to conduct training. The 2nd Composite Squadron stood up to support the Army Cavalry School at Fort Riley, Kansas and the 3rd Composite Squadron stood up at Lawson Field near Fort Benning, Georgia to support the Army's Infantry School. The squadrons flew fighter, attack, bomber, and liaison aircraft to perform air-ground operations.¹⁴ These squadrons met high standards for their operations and maintenance proficiency and solved many of the issues raised with air-land interaction.¹⁵ The Air Corps inactivated the squadrons following World War II, but the Army-Air Force integration would resurge in the early 1990s.

Much like the 1st Composite Squadron on Ascension Island, the Army Air Corps activated the 342d Composite Group on 11 September 1942 to support island defense missions in Iceland. Consisting of a mixture of P-38s, P-39s, P-40s, and a B-18, the group flew antisubmarine patrols and intercepted German aircraft that attempted attack or appeared in the area of reconnaissance missions.¹⁶ The group downed only two German reconnaissance aircraft during their patrols. The 342d Composite Group fell under the 24th Composite Wing in Iceland, which activated in December of 1942. Both the wing and the group disbanded in mid-1944 with the lessened threat of German aircraft in the

¹³ History of the 1st Composite Squadron, December 1942, 1.

¹⁴ History of Marshall Field, Fort Riley, 17 April 2009, <http://www.riley.army.mil/News/Article-Display/Article/467978/history-of-marshall-field/>.

¹⁵ "3rd Composite Honored," *Tail Skid*, Lawson Field, Ga., Vol. 4, No. 1, 1 January 1944, 6.

¹⁶ Maurer, *Air Force Combat Units of WWII*, 220.

area. The 24th Composite Wing was re-activated twice more: first in Puerto Rico from August 1946 until July 1948, and then in Panama first as a composite group in 1973 and then as a composite wing in 1976 until the Air Force inactivated the wing in January 1987.

The 342d Composite Group was the only official composite group in the European Theater of Operations. Due to logistical considerations, the major commands in Europe, the 8th Army Air Force (AAF) and 9th AAF continued to organize units by aircraft type to lessen the burden on logistics. This organization forced the integration of disparate aircraft to occur at the air division-level. For example, 8th AAF had three air divisions: the 1st Air Division possessed 12 B-17 groups, the 2nd Air Division had 14 B-17 groups, and the 3rd Air Division had a composite of 9 B-17 groups and 5 B-24 groups with each division also having approximately five fighter groups.¹⁷ 8th Army Air Force chose this organization to simplify the chain of command as each fighter planned to support bomber operations for its division. However, according to Roger Freeman, two other traits surfaced because of the organization: first, fighter groups often supported other divisions because 8th Fighter Command maintained centralized control of all fighters and second, the command structure linked bomber and fighter units together but the two groups “remained very much a clan unto themselves.”¹⁸ The European Theater contained another composite unit, the 8th Air Force Composite Command at Royal Air Force Cheddington; this unit “controlled several units designed to deceive, confuse, and thwart the enemy.”¹⁹

Although the Army Air Corps used composite units sparingly in Eastern Europe, the China-Burma-India Theater tested a number of experimental composite units. The first, 1st Air Commando Group supported the airborne invasion of Burma in 1944 based on British Brig Gen Orde Wingate’s Long-Range Penetration concept. This model called for highly trained infantry troops to conduct hit and run operations behind Japanese lines;

¹⁷ Plan, “Proposed Plans for the Organization of the Eighth Air Force,” Headquarters Eighth Air Force, High Wycombe, United Kingdom, 13 March 1944.

¹⁸ Roger A. Freeman, *The Mighty Eighth* (New York: Orion Books, 1989), 190.

¹⁹ Martin W. Bowman, *The Bedford Triangle: US Undercover Operations from England in World War 2* (1988), 41.

pilots solely resupplied Wingate's Raiders (or Chindits) from the air. The 1st Air Commando Group (also known as Project 9, Project CA 281, 5318th Provisional Unit (Air), and Number Air Commando Force) eventually consisted of 346 aircraft. The aircraft included B-25 bombers for heavy attack, P-51 Mustangs for fighter and attack cover, L-1 and L-5 scout aircraft for scouting and light medevac, YR-4 helicopters, UC-64s for light cargo, C-47 transports, and CG-4A and TG-5 gliders for assaults and resupply.

The 1st Air Commando Group had many advantages that were not typical of most composite units. First, General Arnold gave the operation his full support and personally chose Lt Col Philip G. Cochran and to build and command the composite force. Second, Colonel Cochran reported directly to General Arnold ensuring flexible operations. Unlike the 28th Composite Group in Alaska, Colonel Cochran's independent air force received the all the air assets he requested and his unit was tailored to include the best pilots. Nearly 300 members of the group were pilots; each had to possess at least three valuable skills to be considered as a member of the group, garnering flexibility.²⁰ Third, the Air Commandos trained as a team, even before leaving the United States for India to conduct three months of joint exercises with Wingate's Raiders.²¹ Working with Col John Alison, the team trained 523 men to operate as a highly effective special operations force (a force roughly a fourth of the size of a normal Air Corps Wing).²²

While the Air Commandos proved the ability to train as a team and execute flexible, cohesive operations under difficult conditions, they also demonstrated two major challenges. The first was the group's ability to operate independently from the theater air commander and the air campaign plan--violating doctrine. Without oversight from General Arnold, this would not have been possible. The Supreme Allied Commander of South East Asia Command, British Admiral Louis Mountbatten attempted to siphon much-needed assets from the Air Commandos to support other operations in the region. The second challenge was maintenance related; with so many types of aircraft, it was

²⁰ Dennis R. Okerstrom, *Project 9 – The Birth of the Birth of the Air Commandos in World War II*, 2014, xi.

²¹ Okerstrom, *Project 9*, xi.

²² CBI History, "1st Air Commando Group," http://www.cbi-history.com/part_vi_1st_air_commando_gp.html.

hard to keep all associated parts on hand. The Army Air Force tailored the supply system for units with monolithic planes and set numbers of troops. Again, General Arnold's personal intervention fixed the supply problems and allowed the Air Commandos to execute their mission successfully.

Two other composite units followed in the footsteps of the Air Commandos, the 2nd Air Commando Group operating out of Burma activated on 22 April 1944 and the 3rd Air Commando Group operating out of the Philippines activated on 1 May 1944. However, unlike the 1st Air Commando Group, these groups did not have direct oversight from General Arnold and did not fly bombers or light cargo aircraft. The 2nd Air Commando Group employed like any other air unit (not autonomously like the 1st Group) and dropped supplies, moved troops, food, ammunition, and construction equipment in addition to providing fighter support and flying reconnaissance missions.²³ They suffered a breakdown of unit cohesion as their liaison and cargo aircraft often supported other units, their fighters augmented other large forces, and the gliders never flew a mission, but did support the group administratively.²⁴ Taking the lessons learned from the 2nd group, the 3rd Air Commando Group did not deploy with a glider detachment. The group trained for a specialized mission, but found when they arrived in the Philippines that they had to adapt to a more regular type of war. Although not integrated, the unit improvised "to try anything, to fit in any place, to tackle any assignment that could possibly be carried out with the means at hand."²⁵ Both the second and 3rd Air Commando Group adapted from their tailored mission to support the general war effort.

In addition to the three Air Commando Groups, the China-Burma-India Theater also possessed two types of composite wings during the war. The first two, 68th and 69th Composite Wings were redesignated as composite units in December 1943 and served in combat, operating fighter and bomber aircraft flown by American and Chinese

²³ Maurer, *Air Force Combat Units of WWII*, 25.

²⁴ Moschat, *The Composite Wing: Back to the Future?*, 39; History of 2nd Air Commando Group, March 1944-September 1945, 6.

²⁵ History of the 3rd Air Commando Group,
<http://www.specialoperations.net/3rdACGHistory.htm>.

Airmen until August 1945.²⁶ The Air Corps inactivated the wings on 10 October 1945 and 26 December 1945, respectively. In addition to these composite wings, 14th Air Force also activated the Chinese-American Composite Wing (Provisional) (CACW) on 1 August 1943 in response to requests by the Chinese government to rebuild the Chinese Air Force.²⁷ The CACW established an operational training unit in India to train Chinese fighter and bomber crews and their maintenance support.²⁸ The commanders of the CACW and its groups and squadrons were United States Army Air Force officers and the vice-commanders were Chinese officers. The Chinese American Operational Training Unit (Provisional) trained one bombardment group (four squadrons) and two fighter groups (eight squadrons) between August 1943 and May 1944. The CACW operated successfully even though it “faced gasoline and equipment shortages, inclement weather, personnel and morale problems, and primitive living conditions.”²⁹ Unlike many composite units of the time, the CACW had personnel with differing languages and cultures. To promote close and cordial relations, many of the American staff officers learned to speak Chinese. United States Army Air Force supervisors complained that Chinese ground crews performed their jobs carelessly, left the work for American crews to complete, and were at times impatient with the Chinese rituals and customs that they perceived hindered their ability to operate.³⁰ Despite these issues, the United States and Chinese personnel effectively integrated into the same combat units. They showed the usefulness of a composite unit’s versatility employing three types of aircraft in a variety of combat missions and did so in a socially stressed environment with numerous logistical shortfalls. The CACW also trained as a composite force to improve combat performance and demonstrated the ability to move squadrons quickly to adapt to a rapidly changing combat environment.³¹ Fourteenth Air Force disbanded the CACW and its units on 18 September 1945. The United States Air Force would later train Korean and

²⁶ Maurer, *Air Force Combat Units of WWII*, 382, 386, 404.

²⁷ History of the Fourteenth Air Force (1941-1944), 114016, No. 862.01 in USAF Collection.

²⁸ A. Timothy Warnock, “The Chinese American Composite Wing: A Case Study of the Versatility of the Composite Concept,” *Air Power History* Fall 1992, 22.

²⁹ Warnock, “The Chinese American Composite Wing,” 25.

³⁰ Warnock, “The Chinese American Composite Wing,” 27.

³¹ Warnock, “The Chinese American Composite Wing,” 30.

Vietnamese nationals to fly combat aircraft, but these efforts were neither composite nor successful.³²

Activated in Utah in December 1944, the 509th Composite Group was the first Army Air Force unit organized and equipped for atomic warfare.³³ This group, like the Air Commandos, had a highly classified mission and the commander Col Paul Tibbets chose the aircraft and men that he wanted for the mission. The group consisted of the 393d Bombardment Squadron flying B-29s and the 320th Troop Carrier Squadron flying C-54s. The C-54s transported scientists, senior officers, nuclear components, and practice bombs to Roswell Field, New Mexico. While the 320th performed transport missions, the 393d trained on the modified “Silverplate” B-29s, which included continuous modifications to adjust for the heavy loads.³⁴ Once the 393d deployed to Tinian, the 320th flew supply missions about every three days. The 509th Composite Group dropped the first atomic bomb on Hiroshima on 6 August 1945 (Special Mission 13) and the second atomic bomb on Nagasaki on 9 August 1945 (Special Mission 16). After bomb dropping had concluded, the 320th continued flying, transporting scientists and equipment to study the bomb’s after-effects.³⁵ The group proved that composite units could be mobile and execute highly classified, independent operations. The 509th Composite Group continued supporting nuclear missions and testing; however, the Air Force redesignated the 509th as a Bombardment Group, reassigned the 320th, and added two additional bomb squadrons on 22 August 1947. Interestingly, the 509th became a bombardment wing in November 1947, adding three squadrons of P-51s, technically making it a defacto composite unit again.

World War II ended the golden age of the composite organization. The Army Air Forces learned a number of lessons from the war that would lay the foundation for the way the Air Force would employ airpower. Unfortunately, even though the composite

³² Robert F. Futrell, *The United State Air Force in Korea 1950-1953*, rev. ed. (Washington: GPO, 1983), 89; Carl Berger, ed., *The United States Air Force in Southeast Asia, 1961-1973: An Illustrated Account*, rev. ed (Washington: GPO, 1984), 309.

³³ Thomas S. Snyder, *A Brief History of Composite Forces in the United States Air Force*, 4.

³⁴ History of the 509th Composite Group, 46.

³⁵ History 3 Transport Unit, 21 January 1946 – 11 May 1946, 1.

organizations were successful operationally, most of the units only lasted as long as the mission they supported.

Cold War

After World War II, the Army Air Forces redesignated three bomber units to composite wings. The 314th and 315 Bombardment Wings (Very Heavy) at Guam were redesignated the 314th and 315th Composite Wings in January 1946 and moved to Japan in the summer of 1946. As part of the Far East Air Forces, these units maintained intensive training schedules, participated in exercises, supported the post-hostilities in Japan, and proved air defense over Japan during the occupation era.³⁶ The Army Air Force inactivated both units on 20 August 1948. The third unit, 316th Bombardment Wing (Very Heavy) was briefly the 316th Composite Wing serving in Okinawa from 8 January to 6 May 1946 and then inactivated on 21 June 1946.

Concurrent with the drawdown in the Pacific, the Army Air Force was also drawing down. With the inactivation of the 12th Tactical Air Command, the Army Air Forces redesignated the 86th Fighter Group as the 86th Composite Group when it added a reconnaissance squadron to the group and moved to Fürstenfeldbruck Air Base, Germany on 15 May 1947.³⁷ The group then moved to Neubiberg Air Base, near Munich Germany on 12 June 1947 and added two additional fighter squadrons to face growing Soviet aggression in Eastern Europe. The group was then redesignated the 86th Fighter Group on 25 January 1948 when the reconnaissance squadron left the group.

In November 1950, the Air National Guard (ANG) redesignated six composite groups: 106th Composite Group (New York ANG), 111th Composite Group (Pennsylvania ANG), 118th Composite Group (Tennessee ANG), 126th Composite Group (Illinois ANG), 131st Composite Group (Missouri ANG) and 146th Composite Group (California ANG). Each of these composite groups only held the moniker for four months. The Air National Guard again redesignated the groups in February 1951. National Guard Bureau extended federal recognition, activated the groups between 1

³⁶ 314th Air Division Fact Sheet, <http://web.archive.org/web/20120929013829/http://www.afhra.af.mil/factsheets/factsheet.asp?id=10130>.

³⁷ Maurer, *Air Force Combat Units of WWII*, 152-3; Charles A. Ravenstein, *Air Force Combat Wings, 1947-1977* (Office of AF History, 1984), 120-1.

March and 1 May 1951, and assigned them to either Strategic Air Command (106th, 111th, 131st, and 146th) or Tactical Air Command (118th and 126th).³⁸

In July 1955 after the Korean War, TAC established the Composite Air Strike Force (CASF) concept to have a mobile rapid-reaction force to work in concert with SAC's deterrence force. SAC would provide the overall deterrence posture, while the CASF would respond to limited "brushfire" conflicts. CASF was not a composite unit in the traditional sense; 19th Air Force commanded the Strike Force, but the NAF owned no aircraft to support the effort.³⁹ 19 AF, supplied with aircraft from 9 AF and 12 AF, trained aircrews for composite operations, based on lessons learned in Korea. Aircraft from monolithic wings would be brought together to train before their deployment. The CASF tested new fighters and transport aircraft and integrated air refueling into their operations to extend mobility.⁴⁰ The CASF was deployed over a dozen times supporting United States Air Forces in Europe (USAFE), PACAF, and the Alaskan Air Command.

In July 1958, the CASF deployed to Incirlik Air Base, Turkey to supplement naval airpower in response to an imminent coup d'état in Lebanon. The Strike Force arrived within 50 hours of the request, was fully operational in less than four days, and deterred the outbreak of hostilities in the region.⁴¹ The CASF was also able to deter a limited crisis in the Formosa Straits. On 29 August 1958, the United States Chiefs of Staff reacted to communist intentions to liberate Taiwan by sending two F-100 squadrons, one B-57 squadron, two RF-101 Squadrons, and two C-130 squadrons to Taiwan. The forces deployed within 48 hours, were fully operational by 12 September and contained the conflict.⁴² The Strike Force again deployed in 1961 in support of the Berlin Crisis. The CASF demonstrated the ability to centrally command an integrated composite force during peacetime. However 19 AF had difficulties finding aircraft to

³⁸ Maurer, *Air Force Combat Units of WWII*, 222, 238, 248, 260, 279, 282.

³⁹ GAO Report, *Air Force Organization: More Assessment Needed Before Implementing Force Projection Composite Wings*, May 1993 (GAO/NSIAD-93-44), 21.

⁴⁰ *World Heritage Encyclopedia*, "Composite Air Strike Force", http://www.gutenberg.us/articles/composite_air_strike_force.

⁴¹ Robert F. Futrell, *Ideas, Concepts, Doctrine Vol I: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base: Air University Press, 1989), 612.

⁴² Futrell, *Ideas, Concepts, Doctrine Vol I*, 613.

support their exercises and deployments and with looming budget cuts 19 AF discontinued the CASF in 1973 and was then itself inactivated.⁴³

Gulf War

The Air Force generated two provisional composite wings to contribute to the coalition fights during Operation Desert Storm. The wings organized to maximize operational effectiveness and support a broad range of mission needs. They were self-contained with their own aircraft, maintenance, planning, and logistics.

On 16 December 1990, United States Air Forces in Europe stood up the 7440th Composite Wing (Provisional) based at Incirlik AB, Turkey in support of Joint Task Force Proven Force. This force consisted of approximately 130 aircraft including F-111E night attack; F-16C day attack; F-15 interceptors; F-4G and F-16C defense suppression; RF-4C tactical reconnaissance; E-3 AWACS, EC-130E communications jamming; KC-135 tanker; and F-4E laser bombing aircraft.⁴⁴ The Navy and Air Force aircraft in Greece supported the wing with additional aircraft, including an EP-3E, RC-135 electronic reconnaissance aircraft, and B-52Gs. By 17 January 1991, the first day of Operation Desert Storm, the 7440th Composite Wing (Provisional) launched a coordinated 20-ship package within hours of the Turkish government granting border-crossing approval for offensive operations against Iraq.⁴⁵ The 7440th would support Phase I and Phase II of the air operations, opening a second front, destroying the fighting capability of Iraq in the North, and attacking operational targets to support the overall United States Air Forces Central Command's (CENTAF) air campaign.

The 7440th produced their own Air Tasking Order (ATO), which CENTAF rolled up into its theater ATO.⁴⁶ This allowed face-to-face coordination at the tactical level and employed tactics and lessons learned from exercises such as RED FLAG. In the past, Airmen would have planned in a distributed fashion with each package commander

⁴³ GAO Report, 22-3.

⁴⁴ Martin Streetly, "Composite Wing Proven in the Gulf," *Jane's Defense Weekly*, 31 August 1991, 370.

⁴⁵ Lee A. Downer, "The Composite Wing in Combat," *Airpower Journal*, Winter 91, Vol 5, Issue 4 p 4.

⁴⁶ James P. Coyne, *Airpower in the Gulf*, (Arlington VA: Aerospace Education Foundation, 1992), 58.

building his or her plan and then communicating it through secure communication channels, typically phone. This distributed planning was coordinated in series rather than parallel requiring re-coordination. In addition, the dispersed units would have each created their own maps and communications cards⁴⁷ that would not have been coordinated. The face-to-face planning that occurred in the composite wing allowed package commanders to utilize the same maps and communication card and to plan in parallel, all deconflicting the plan as it progressed. This also allowed the planners to work through contingencies and for all participants to understand their role and the relationships between the aircraft. This tight coordination also allowed the quick reconfiguration of forces to react to changes in the environment. This flexibility and responsiveness kept the composite wing attuned to their environment and allowed operators to adapt quickly to changes in that environment.⁴⁸

The Air Force established a post-Gulf War composite wing, 4404th Composite Wing (Provisional), at Prince Sultan Air Base, Al Khari, Saudi Arabia to replace the Provisional Air Division established during Operations Desert Storm, stabled by Tactical Fighter Wing (Provisional). The wing was structured and manned to conduct a temporary mission, Operation Southern Watch, ensuring that Iraq complied with United Nations sanctions. The wing also supported Operation Provide Comfort and Operation Northern Watch. The wing consisted of six provisional groups in nine locations in the Persian Gulf.

The provisional composite wings performed valiantly during the Gulf War and had many successes in regards to command and control, expeditious response, and integrated operations. However, due to the number of aircraft available in theater and the limited losses, the Gulf War did not stress the limits of the composite wing. The

⁴⁷ A master map shows the flow plan for the mission. A coordination card summarized all the mission-relevant information on a sheet of paper that each pilot carried. Operators use these two products in a fashion similar to the operational level ATO. J. Scott Norwood, *PROVEN FORCE – Proof of Concept for the Composite Wing*, (Newport, RI: Naval War College, 1992), 6.

⁴⁸ Ronald L. McGonigle, *Air Force Composite Wings—Future Success or Failure*, School of Advanced Military Studies, United States Army Command and General Staff College, 13 May 1993, 20.

composite wings did not receive requests for support that were larger than they could support.

Chapter Summary

The Air Force started employing composite units during World War I. These units performed either regional presence missions or a specialized mission. Many of the composite units outlined in this chapter were short-lived; once their particular mission was complete, the Air Force often disbanded the unit. The composite units made major contributions to America's war efforts from the employment of the first nuclear bomb to the ability to seize the initiative and gain air superiority over Iraq. These composite units were not necessarily the most efficient, but they were extremely effective.⁴⁹



⁴⁹ Moschgat, *The Composite Wing: Back to the Future*, 73.

Chapter 4

General McPeak's Composite Wings

As we refocus our defense efforts toward regional concerns, the ability to project power – often into areas where we have little or no permanent presence – becomes increasingly important. Global instability and the drawdown of our forces overseas translate into an even greater need for quick reaction, long reach and precisely applied fire-power. Airpower can rapidly assemble and quickly apply a decisive force to deter conflicts or terminate them swiftly and with minimum loss of life. It possesses unparalleled strategic agility.

The Air Force today is undergoing the most fundamental reshaping it has experienced since it was established as a separate Service nearly half a century ago... This reshaping and restructuring has been driven by the demands of a new era – new thinking, new security challenges and opportunities, new fiscal constraints and new technology... We are streamlining, layering and empowering.

—Donald B. Rice
Secretary of the Air Force (1992)

In the early 1990s, as the Cold War subsided, threat assessments projected the need to respond to small, short-notice, regional conflicts rather than large scale battles against the Soviet Union. As mentioned in Chapter 2, Secretary of Defense Cheney requested the services review and streamline their processes. The Air Force, like the other services, was ordered to scale back expenditures by 25 percent over five years.¹ In a speech to the Air Force Association on 18 September 1991, Air Force Chief of Staff, General McPeak outlined a Top-to-Bottom restructure with the following five themes: decentralization, strengthen commanders, streamline and flatten the organizational structure, consolidate (where practical), and clarify functional responsibilities.² This chapter will first outline General McPeak's plan including the objective wing structure

¹ "USAF Shake-up Puts Emphasis on Composite Wings." *Jane's Defense Weekly*, 11 January 1992, 48.

² Gen Merrill A. McPeak, Chief of Staff Address: "Restructuring the Air Force: Organize, Train, and Equip", Air Force Association National Convention, 18 September 1991.

and the creation of two types of composite wings. The chapter will then focus on the 366th Wing at Mountain Home AFB, Idaho including the mission, assets, planning, training, exercises, and deployments. The chapter will conclude with the wing's transition to an Air Expeditionary Wing and its involvement with Air Expeditionary Forces.

General McPeak's Plan

"Make no mistake, international events and internal pressures will reshape the military services. The Air Force must adapt or go the way of the dinosaurs."³ General McPeak outlined a plan in which the wing commander will command the entire base and all of the resources associated with it; he emphasized the concept as "One Base, One Wing, One Boss" and where possible, making that boss a general officer.⁴ This new wing would have an "objective" structure and would consist of four groups. In addition to the objective wing, General McPeak wanted to consolidate a number of wings into composite wings. He admitted that composite wings were by no means a new idea, as many SAC wings had been composite (operating both bombers and tankers) for years.⁵ Some of the quick changes would occur at bases that already had multiple aircraft such as the 4th Wing at Seymour Johnson AFB, North Carolina. Seymour Johnson had two wings, a fighter wing with F-15Es and a tanker wing with KC-10s; they reorganized into the fourth wing on 22 April 1991.

In addition to the ready-made composite wings, the Air Force would also create two composite wings from scratch. These wings became force projection composite wings. For example, the 366th Wing enabled quick air intervention anywhere in the world while the 23d Wing at Pope AFB, North Carolina integrated air/land support to the Army's rapid deployment forces.⁶ General McPeak did not envision that all wings would

³ Gen Merrill A. McPeak, Chief of Staff Address: "Restructuring the Air Force: Organize, Train, and Equip."

⁴ Gary Lockhard Capt, "One Wing, One Base, One Boss," *Citizen Airman*; vol 44 no 1; February 1992; 16-17.

⁵ Gen Merrill A. McPeak, Chief of Staff Address: "Restructuring the Air Force: Organize, Train, and Equip," 71.

⁶ In addition to these initial two composite wings, the Air Force created a third, 347th Wing, at Moody AFB, Georgia to support as a second air/land wing.

be composite; many wings would remain organized around a single aircraft and mission, prepared to integrate with other wings when required.

The Air Force relied on five models to support composite wings: (1) Navy Carrier Air Wing, (2) 7440th Composite Wing (Provisional), (3) 4404th Composite Wing Provisional, (4) Composite Air Strike Force, and (5) Training in Composite Force Procedures.⁷ The Navy Carrier Air Wing employs a mix of force projection aircraft, a single commander leads the wing, and the wing trains continuously in composite force procedures.⁸ Chapter 3 discussed the second, third, and fourth analogies. The final model, composite training, encompasses the ability to bring monolithic squadrons together for a composite force exercises, such as RED FLAG. During each RED FLAG, aircrews plan and execute ten composite force missions against an aggressor force permanently stationed at Nellis AFB, Nevada. At the time, the Air Force aimed to have aircrew stationed in the United States participate in a large-scale composite force exercise approximately every 18 months.⁹

The Air Force's aggressive restructuring effort was not without antagonists. One opponent, the Chairman of the Subcommittee on Readiness of the House Committee on Armed Services, requested that the Government Accountability Office (GAO) initiate an independent evaluation. The GAO examined the Air Force's justification to implement the force projection composite wings. Their findings, published in a May 1993 report, found that the Air Force did not exercise sufficient analysis before building the composite wings. The GAO found the five analogies did not support the utility of establishing the wings as permanent peacetime organizations. The report stated that the Air Force had "not established clear criteria for the concept" or determined the cost of the wings.¹⁰ They also found that the wings would require additional support, such as EF-111s from Cannon AFB, New Mexico or Airborne Warning and Control Systems (AWACS) from Tinker AFB, Oklahoma, and the GAO believed that this inability to commit critical assets to the composite wing "highlights an inherent limitation" of the composite concept. The

⁷ GAO Report, 18-24.

⁸ GAO Report, 18.

⁹ GAO Report, 23.

¹⁰ GAO Report, 3.

DoD nonconcurred with much of the GAO report and rejected its recommendations. The Air Force continued to build out three force projection composite wings. All three wings had an impact on the Air Force and the integration of airpower. The remainder of this chapter will focus on the 366th Wing as it was the most documented and longest lasting of the three force projection composite wings.

366th Wing Mission and Assets

After the announcement in early 1991, the 366th Tactical Fighter Wing began preparations to become the Air Force's premier air intervention composite wing. The wing would lose its EF-111A squadron and grow to a rapid deployment wing with five dynamic aircraft. On 1 October 1991, the Air Force redesignated the wing as the 366th Wing. Their mission was "to rapidly deploy a highly trained composite force and successfully plan and execute self-sustaining air operations in any theater, region, or contingency area in support of US/allied, national, and/or military objectives."¹¹ To execute this mission, the wing created the Air Intervention Composite Wing Plan 366-94 primarily designed for crisis action procedures.¹² This plan provided National Command Authorities and the Joint Chief of Staff a "highly trained, **integrated composite force** which can rapidly deploy to any theater in the world and, as the situation dictates, conduct immediate self-sustained air intervention operations" (emphasis in original).¹³

Per the ACC Concept of Operations, the 366th Wing consisted of the following aircraft: F-15C, F-15E, F-16C, KC-135R, and B-52G (geographically separated at Castle AFB, California).¹⁴ The B-1Bs (Ellsworth AFB, South Dakota) would replace the B-52s

¹¹ Headquarters Air Combat Command, "ACC Concept of Operations for the 366th Wing (Mountain Home AFB)" (U), 18 February 1993. K-WG-366-HI v2, SD I-3, ii. (Secret) Information extracted is unclassified.

¹² Headquarters 366th Wing, Air Combat Command, "366th Air Intervention Composite Wing Plan 366-94," (U), 3 January 1994, K-WG-366-HI v2, SD I-4, 1. (Secret) Information extracted is unclassified.

¹³ Headquarters 366th Wing, "366th Air Intervention Composite Wing Plan 366-94" (U), iii. (Secret) Information extracted is unclassified.

¹⁴ ACC Concept of Operations for the 366th Wing, 6. (Secret) Information extracted is unclassified.

in April 1994 after they demonstrated conventional capability in combat.¹⁵ On 1 April 1997, the 34th Bomb Squadron would relocate to Mountain Home AFB giving the wing the full complement of airpower on one base. The wing was prepared to spearhead operations and prepare for follow-on contingency forces or to augment forward bases.¹⁶

The 366th Wing supported the following mission areas:

1. Defensive Counterair – F-15Cs, supported by F-15Es and F-16Cs;
2. Offensive Counterair – F-15C is the primary air-to-air fighter, augmented by F-15E and F-16C;
3. Offensive Counterair-Surface - F-15E, F-16C, and B-52G/B-1B are the primary air-to-ground assets;
4. Strategic Attack/Air Interdiction – F-15E, F-16C, B-52G/B-1B;
5. Air Refueling – KC-135R to support long-distance power projection and in theater support;
6. Electronic Combat – Gained EF-111 assets to support with the ability to neutralize and/or screen electromagnetic devices (tasked unit from Cannon AFB);
7. Surveillance and Reconnaissance – AWACS (tasked unit from Tinker AFB);
8. Base Operability and Defense – support from PRIME BEEF and RED HORSE;
9. Logistics; and
10. Combat Support.¹⁷

In addition to these capabilities, the wing could request additional aircraft (F-117s, F-4Gs, RF-4s, and EC-130s) to offer support at the deployment site.¹⁸ To support both crisis action and deliberate planning, the wing assembled the aircraft into three force projection packages with the option to add bombers to any package:

¹⁵ Albert M. Lewis and Miriam J. Fleming, History of the 366th Wing, 1 July 1992 – December 1993 Narrative (U), K-WG-366-HI v1, 1. (Secret) Information extracted is unclassified.

¹⁶ ACC Concept of Operations for the 366th Wing (U), iii. (Secret) Information extracted is unclassified.

¹⁷ ACC Concept of Operations for the 366th Wing (U), 12-13. (Secret) Information extracted is unclassified.

¹⁸ Lewis and Fleming, History of the 366th Wing, 9.

“A” Package: 8 F-16C, 6 F-15C, 6 F-15E, and 4 KC-135R + 3 B-52/B-1

“B” Package: 14 F-16C, 10 F-15C, 10 F-15E, and 5 KC-135R + 7 B-52/B-1

“C” Package: 18 F-16C, 12 F-15C, 12 F-15E, and 6 KC-135R + 7 B-52/B-1¹⁹

This flexibility allowed the wing to tailor the force to meet precise objectives. These forces would be prepared to deploy rapidly and immediately perform air-to-air and air-to-ground operations for up to seven days with wing assets and an additional 30 days upon resupply.²⁰

The wing organized in General McPeak’s “objective wing” structure, divided into four groups: 366th Operations Group, 366th Logistics Group, 366th Support Group, and 366th Medical Group. Table 1 outlines the seven operations group squadrons highlighting the diversity of assets within the wing.

Table 1: 366th Operations Group Squadrons

Squadron Designation	Aircraft or Functions
366th Operations Support Squadron	Intelligence, Airfield Operations, Current Operations, Weapons and Training, Weather
22d Air Refueling Squadron	KC-135R “Stratotanker”
34th Bomb Squadron	B-52G “Stratofortress”, B-1B “Lancer”
389th Fighter Squadron	F-16C “Fighting Falcon”
390th Fighter Squadron	F-15C “Eagle”
391st Fighter Squadron	F-15E “Strike Eagle”
392d Electronic Combat Range Squadron	Operated the Saylor Creek Facility (Range for Mountain Home AFB)

Source: Albert M. Lewis and Miriam J. Fleming, History of the 366th Wing, 1 July 1992 – December 1993 Narrative, K-WG-366-HI v.1, 13-17.

¹⁹ Headquarters 366th Wing, “366th Air Intervention Composite Wing Plan 366-94” (U), iii. (Secret) Information extracted is unclassified.

²⁰ ACC Concept of Operations for the 366th Wing (U), 3. (Secret) Information extracted is unclassified.

366th Wing Planning, Training, and Ranges

Since its inception, the 366th Wing had an integrated philosophy: “The wing *lives, works, plans, trains, deploys, and fights*, together providing the opportunity and environment for enhanced combat effectiveness” (emphasis in original).²¹ While at home station, the 366th Operations Support Squadron (OSS) led operational planning. The OSS was the center of the composite wing as it enabled force projection capabilities, provided weather support, training mission, Intelligence, weapons and tactics, air traffic control and more. When the OSS deploys, it became the core of the deployed Air Operations Center, which in the late 1990s would become the Expeditionary Operations Center (EOC). The Airmen operating in the OSS/EOC were key to sustaining combat operations, mission planning, Intelligence estimates, target analysis, weaponeering, ATO generation, and assessment.²²

The wing routinely conducted exercises to keep their Airmen sharp. Support personnel practiced the skills needed to generate aircraft, to rapidly deploy (Initial Response Readiness Exercises), and to support flight operations while under attack (Ability to Survive and Operate Exercises).²³ The 366th Operations Group maintained an “aggressive aircrew training program” to prepare operators for the next war.²⁴ The wing modified training to integrate combat lessons learned, encouraged innovation, and sound tactics development.

The 366th Wing hosted some home station exercises, the central one being Sharpshooter, a combat readiness exercise to prepare for real world deployments. Sharpshooter exercises not only emphasized coordination in planning and execution, but they also prepared Airmen for large force employment exercises such as RED FLAG and combat operations. In addition to the regularly scheduled exercises, the wing also

²¹ ACC Concept of Operations for the 366th Wing (U), 1. (Secret) Information extracted is unclassified.

²² Richard W. von Berchefeldt, *The Composite Wing: America's First Team or White Elephant?*, Maxwell AFB, AL: Air War College, April 1995, 12.

²³ Yancy D. Mailes and Clifford M. Sibley, History of the 366th Fighter Wing, Previously 366th Wing, 1 January 2000-31 December 2004 (U), K-WG-366-HI DVD, 76. (Secret) Information extracted is unclassified.

²⁴ Mailes and Sibley, History of the 366th Fighter Wing (U), 76. (Secret) Information extracted is unclassified.

participated in Exercise Accurate Test (Oman), Exercise Initial Link (Bahrain), ROVING SANDS, COMBAT HAMMER, COMBAT ARCHER, and MAPLE FLAG. Each of these exercises offered operators a unique training environment to hone their skills.

According to Brig Gen Irving L. Halter Jr., 366th Wing Commander, in an assessment of an ACC Flight Leadership Focus Day:

First, as to senior level involvement in our daily flying program, I am satisfied that we are significantly involved and mentor our Airmen firsthand. Second, flight leadership in the 366th is as strong as I've seen it anywhere in my 25 years of aviating. Our Airmen plan, brief, fly, and debrief to exacting standards. Third, we are constantly looking at ways to improve our training... I have been impressed with how our Airmen are innovatively addressing these challenges... Fourth, our aviators believe they are hard-pressed to fly 3-4 times a week and accomplish required ancillary training/additional duties.²⁵

To facilitate training and local exercises, the 266th Range Squadron created a realistic electronic combat environment within the Mountain Home Range Complex. Saylor Creek bombing range is a large part of this complex offering 100,000 acres for bombing and training. The range is located 25 miles south of Mountain Home limiting the amount of time and fuel required to get aircraft to the range. The range hosts simulated hostile radar facilities, simulated surface to air missile batteries and other visual and electronic warfare training targets.²⁶

366th Maintenance, Logistics, and Cost

The 366th Wing employed cross-utilization training for their maintenance Airmen, training them to work on multiple aircraft, three engine types, and in multiple back shops.²⁷ Cross-utilization training afforded the Airmen a wider knowledge base and flexibility to support the mission in numerous ways. Standard practice for aircraft maintenance in the early 1990s consisted of three levels: organizational, intermediate,

²⁵ Memo, 366 FW/CC to COMACC, "Flight Leadership Focus Day Feedback," 10 December 2002, K-WG-366-HI DVD, SD 2-02.

²⁶ The Center for Land Use Interpretation, Saylor Creek Bombing Range, <http://clui.org/ludb/site/saylor-creek-bombing-range>.

²⁷ Mailes and Sibley, History of the 366th Fighter Wing (U), 435. (Secret) Information extracted is unclassified.

and depot-level maintenance. To streamline the system, General McPeak favored a move towards two-level maintenance for all wings.²⁸ He felt that removing the intermediate level would improve deployability and allow for the downsizing of maintenance at the wing level. The 366th Wing was able to take advantage of the new system to streamline the maintenance process.

Due to the differences between composite and monolithic wings, the Air Force initiated research studies in the mid-1990s. One of these studies, written by an Air Force Institute of Technology student, outlined a necessity to adjust maintenance manpower authorizations for composite wings. In addition to unit/wing mission, utilization rate, primary aircraft assigned, aircraft maintainability, and scheduled maintenance requirements, composite wings must also consider deployment concepts and wartime sustainability up to and beyond 30 days for determining manpower.²⁹ A study written at the Airpower Research Institute outlined the logistical implications of the composite wing. The study found that when the composite wing deploys it will encounter different transportation issues because one wing will incur the entire deployment burden, the wing must carry as much of the essential equipment and supplies necessary for self-sufficiency as possible.³⁰ Also, the base-level supply systems required an additional depth of supply in order to be the first-response fighting force; this added uncertainty due to the wing hosting small numbers of various aircraft and was expensive.

Many of the opponents to the composite wing cited the wing's high maintenance cost as a reason to stop the wing. A RAND Study from 1992 found that composite wings would cost about one percent more than a monolithic wing. RAND also recommended several offsets that could reduce those costs such as cross training maintenance technicians, training cost offsets, and command and control offsets.³¹ The 366th Wing executed each of the RAND recommendations.

²⁸ Merrill A. McPeak, "For the Composite Wing," *Airpower Journal*, Fall 1990, 9.

²⁹ Stella T. Smith and Cristina C. Vilella, Capt., A Maintenance Manpower Study of the Composite Wing at Mountain Home AFB, AFIT, September 1994, 67-68.

³⁰ William L. Egge, Logistics Implications of Composite Wings, Airpower Research Institute, December 1993, 50

³¹ Raymond A. Pyles, John R. Folkson, Jr., Gary F. Mills, Composite Wings Needs, Costs, and Options, RAND Project Air Force, Santa Monica, CA 1992, 43,51-53. M-U 30352-1 no. 4117.

Deployments

In the late 1990's the Air Force started to examine a new framework to manage the force structure of the Air Force while accommodating a high daily operations tempo and being ready to support two major theater wars. The new concept, the Expeditionary Air Force (EAF) provided stability and predictability for service members and their families. Under the EAF construct, the Air Force established ten Aerospace Expeditionary Forces (AEF) consisting of approximately 175 combat and support aircraft and 12,500 Airmen.³² These AEFs were on a 15-month rotation, comprised of 90 days availability for overseas deployment followed by a 12-month home-station duty period. In addition to the ten AEFs, the Air Force maintained two on-call Air Expeditionary Wings, one of which was the 366th Wing, to supplement the AEF as a rapid response force.³³

From April to June 1996, the 391st Fighter Squadron and the 726th Air Control Squadron deployed to Al Jaber, Kuwait while the 389th and 390th Fighter Squadrons deployed to Prince Sultan Air Base, Saudi Arabia. The squadrons sustained AEF III flying sorties to support Operation Southern Watch (enforcing a United Nations no-fly zone) and to fill a naval carrier gap. The wing learned some lessons from the deployment. First, the onsite build-up at the forward base was challenging due to some redundant processes and the lack of a standard AEF deployment planning process.³⁴ The wing also learned that the Air Force designed their communications assets for emergency use in wartime, not continual use in major contingencies. The continual use led to equipment not being up to standard and a poor inventory of the equipment.³⁵ Even with these setbacks, the wing achieved their mission of filling the carrier gap and used global power to keep the B-1B in the theater as a direct deterrent to influence the adversary.

³² Richard G. Davis, *Anatomy of a Reform: The Expeditionary Aerospace Force*, (Washington, D.C.: Air Force History and Museums Program, 2003), 30.

³³ Davis, *Anatomy of a Reform: The Expeditionary Aerospace Force*, 77.

³⁴ Michael D. Dugre and Regina J. Brown, *History of the 366th Wing, 1 January 1997 – 31 December 1999* (U), 13 December 2002, 59. (Secret) Information extracted is unclassified.

³⁵ Dugre and Brown, *History of the 366th Wing*(U), 59. (Secret) Information extracted is unclassified.

The 366th deployed again to Shaikh Isa, Bahrain in September 1997 as the 366th Air Expeditionary Wing supported Operation Southern Watch (AEF V). This deployment had some successes. First, the wing used this opportunity to employ the Enroute Expeditionary Operations Center (EEOC) and the Deployment Personnel Accountability and Readiness Tool (DPART), which we will discuss in more detail in the next section.³⁶ Second, the EOC director had complete command and control of all troops and assets. Third, the Air Force saved 1.8 million dollars by utilizing aircraft generation equipment at a contingency site to pre-position assets in theater.³⁷ Finally, the wing integrated a training capability that made upgrade training and Professional Military Education (PME) testing available. This capability also trained 65 Bahrainis and afforded Airmen continuation training sorties with the host nation.³⁸

In addition to their deployment, the wing participated in two Expeditionary Forces Experiments (EFX 98 & 99) that tested the innovations built by the AEF Battle Lab. EFX 98 taught the wing the importance of information and communications, representing a first step toward “developing the Air Force’s next-generation command and control network.”³⁹ To further the AEF training concept, the 366th Wing participated in local combat readiness exercises “deploying” to a simulated bare-base on the perimeter of Mountain Home. Again, communications represented a vital link for the deployment with intranet and responsiveness successes and land-mobile radio, Giant Voice system, and communications security problems.⁴⁰ Also, the wing did not have an alternate communications plans causing a breakdown in the ability to command and control forces.

Following the attacks on 11 September 2001, the 366th Wing was the on-call Air Expeditionary Wing available to meet any theater commander’s requests for forces. On

³⁶ Dugre and Brown, *History of the 366th Wing (U)*, 75. (Secret) Information extracted is unclassified.

³⁷ Dugre and Brown, *History of the 366th Wing (U)*, 100. (Secret) Information extracted is unclassified.

³⁸ Dugre and Brown, *History of the 366th Wing (U)*, 100. (Secret) Information extracted is unclassified.

³⁹ Dugre and Brown, *History of the 366th Wing (U)*, 142. (Secret) Information extracted is unclassified.

⁴⁰ Dugre and Brown, *History of the 366th Wing (U)*, 177. (Secret) Information extracted is unclassified.

12 September 2001, the 390th Fighter Squadron, prepared to respond to any emergency taskings from the Western Air Defense Sector, sat alert and flew defensive Combat Air Patrols defending United States airspace.⁴¹ That same day, the 22nd Air Refueling Squadron started airlifting members to aid recovery efforts in New York City and began flying air-refueling missions to keep fighters airborne.⁴² On 23 September 2001, the 366th Wing began the deployment to Qatar to support Operation Enduring Freedom. The 34th Bomb Squadron was the lead B-1B unit and participated in the opening moments of the operation on 7 October 2001. The 34th Bomb Squadron employed technology that they had no combat experience with, adapted their tactics to kill a range of targets, and revised their procedures for bomb runs and flight orbits. In the end, the squadron flew 369 combat sorties and dropped over 3,500 tons of ordnance, striking 35 percent of the targets while flying only five percent of the missions.⁴³

On 17 October 2001, the 391st Fighter Squadron joined the fight flying their first missions. By the time they redeployed on 12 January 2002, the squadron had flown 233 missions and dropped 431,500 pounds of munitions over Afghanistan.⁴⁴ The 389th Fighter Squadron arrived at Al Udeid AB, Qatar on 7 November 2001 and flew its first missions on 12 November 2001. The squadron flew 211 sorties and dropped 132 weapons before returning home on 6 January 2002. Although most of the squadrons in the 366th Operations Group supported Operation Enduring Freedom, they deployed in a piecemeal fashion, not as a composite wing.

Innovation

Throughout its composite history, the 366th Wing had to innovate to operate. As the only air intervention composite wing, its structure was different from any other wing in the Air Force. As mentioned above, the wing created new processes for conducting cross-utilization training for maintainers and unique ways to determine the proper

⁴¹ Mailes and Sibley, *History of the 366th Fighter Wing* (U), xiii. (Secret) Information extracted is unclassified.

⁴² Mailes and Sibley, *History of the 366th Fighter Wing* (U), xiii. (Secret) Information extracted is unclassified.

⁴³ Mailes and Sibley, *History of the 366th Fighter Wing* (U), 97. (Secret) Information extracted is unclassified.

⁴⁴ Mailes and Sibley, *History of the 366th Fighter Wing* (U), xiv-xv. (Secret) Information extracted is unclassified.

manpower required to support a composite force. Some of the largest innovation efforts occurred after the creation of the AEF Battle Lab at Mountain Home in July 1997. The Battle Lab worked to enhance expeditionary operations by reducing the logistics footprint, reducing response time, and increasing combat deployment capabilities.⁴⁵

While the Battle Lab had numerous innovations, the following section focuses on three. The first, the Enroute Expeditionary Operations Center (EEOC) derived from lessons learned during the 1997 deployment to Bahrain. The wing needed a “centralized facility under a single director” to centralize wing operations.⁴⁶ The Battle Lab built a multifunction communications pallet that would fit inside a modified KC-135R and would serve as an airborne command platform. This platform allowed the wing commander and planning staff to maintain situational awareness, conduct mission planning, and direct execution while en route to the forward operating location. The second innovation, the Self-contained Hardfloor Operating Platform for Support (SHOPS), consisted of the Mobile Expandable Container Configuration (MECC), an Environmental Control Unit, and an Integrated Cargo System. Using five MECCs, the Battle Lab housed the EOC Mission Planning Cell, a tool crib, the avionics repair station, and a combined Life Support Section.⁴⁷ The SHOPS allowed Airmen to move equipment quickly and begin working once they reach the forward operating location. The third innovation, the Deployment Personnel Accountability and Readiness Tool (DPART), had the most impact on future Air Force operations. The Battle Lab created DPART system to consolidate all of the readiness data to a single standard database accessible to all personnel using a Smart Card to “sign in” during the deployment process.⁴⁸ DPART

⁴⁵ Mailes and Sibley, History of the 366th Fighter Wing (U), 45. (Secret) Information extracted is unclassified.

⁴⁶ CONOPS, 366 OSS/OST, “366th Wing Expeditionary Operations Center (EOC) Concept of Operations for Expeditionary Force Experiment 1998, Feb 1998.

⁴⁷ Report, AEF Battle Lab, “Air Force Air Expeditionary Wing Battle Lab SHOPS After Initiative Report,” October 2000 (SD 2-111, K-WG-366-HI DVD), 1.

⁴⁸ Report, AEF Battle Lab, “After Initiative Report - DPART Report,” October 2000 (SD 2-108, K-WG-366-HI DVD), 12.

provided commanders with readiness levels of the wing and laid the foundation for the Common Access Card (CAC) that would be implemented Air Force-wide in 2006.⁴⁹

Wing Transition – Air Expeditionary Wing

The 366th Wing started the millennium as the most diversely equipped composite wing in the Air Force consisting of 20 F-15Cs, 20 F-15Es, 22 F-16Cs, 7 KC-135s, and 8 B-1Bs.⁵⁰ The wing was prepared to support 60 sorties a day delivering more than 200 tons of ordnance. However, in its 11 years in existence as a composite unit, the 366th Wing never deployed as a composite air intervention force to support a contingency tasking.⁵¹

Two events in the early 2000's led to the end of the composite force. First, on 25 June 2001, the Office of the Secretary of Defense released Program Budget Decision (PBD) 824 called for the consolidating the B-1B fleet to two bases, Ellsworth AFB, South Dakota and Dyess AFB, Texas and the inactivating the 22nd Air Refueling Squadron.⁵² The second event occurred on April 2002 when Air Force Chief of Staff Gen John P. Jumper, shifted the wing's organizational structure from the "objective" wing to the Combat Wing Organization concept. The new combat organization stripped the group of a bulk of personnel and realigned maintenance assets. In response to PBD 824, the 22nd Air Refueling Squadron transferred their KC-135s to the Kansas Air National Guard and the squadron inactivated on 30 August 2002. The 34th Bomb Squadron returned to Ellsworth AFB on 19 September 2002 and on 30 September 2002, the Air Force redesignated the 366th Wing as the 366th Fighter Wing. The wing reorganized under the new structure positioning the maintenance Airmen under a new Maintenance Group to enable core discipline focus and improve combat readiness.⁵³

⁴⁹ George I. Seffers, "Air Force Consolidates Readiness Information," *FCW*, 17 July 2000, <https://fcw.com/Articles/2000/07/17/Air-Force-consolidates-readiness-information.aspx>

⁵⁰ Mailes and Sibley, History of the 366th Fighter Wing (U), 1. (Secret) Information extracted is unclassified.

⁵¹ Mailes and Sibley, History of the 366th Fighter Wing (U), 2. (Secret) Information extracted is unclassified.

⁵² Mailes and Sibley, History of the 366th Fighter Wing (U), 8. (Secret) Information extracted is unclassified.

⁵³ Mailes and Sibley, History of the 366th Fighter Wing (U), 438,443. (Secret) Information extracted is unclassified.



Figure 6: Last Composite Wing Formation Flyover, 7 June 2002
 Source: U.S. Army Corps of Engineers Digital Visual Library

Chapter Summary

The centerpiece to ACC's Concept of Operations for the 366th Wing was that "the wing will achieve the Air Force objective of establishing a 'Global Reach-Global Power' air intervention force. It's new organizational philosophy to live, work, plan, train, deploy, fight, and play together will provide the atmosphere and expertise for enhanced combat effectiveness."⁵⁴ The 366th Wing accomplished this goal by creating an organization centered on five unique aircraft to support a broad range of missions.

The Airmen planned and trained as they would fight. Taking advantage of the Idaho Training Ranges, Airmen were able to execute a variety of training profiles including large force employment exercises. The base grew to support the unique mission sets building out maintenance and logistics support. In addition to home station training and exercises, the 366th Wing participated in a myriad of exercises to hone their composite skills. They then executed these skills in support of Operation Southern Watch and Operation Enduring Freedom. However, the Air Force employed the

⁵⁴ ACC Concept of Operations for the 366th Wing (U), 18. (Secret) Information extracted is unclassified.

squadrons more in a piecemeal fashion than as a composite wing. In 2002, the 366th Wing lost its KC-135 and B-1B squadrons and redesignated as the 366th Fighter Wing. Even though the wing was no longer an Air Intervention Composite Wing, the wing was still composite in nature maintaining three types of fighter aircraft.



Chapter 5

Analyzing the Composite Unit Concept

No general can accustom an army to war. Peacetime maneuvers are a feeble substitute for the real thing; bet even they can give an army an advantage over others whose training is confined to routine, mechanical drill. To plan maneuvers so that some of the elements of friction are involved, which train officers' judgment, common sense, and resolution is far more worthwhile than inexperienced people might think. It is immensely important that no soldier, whatever his rank, should wait for war to expose him to those aspects of active service that amaze and confuse him when he first comes across them. If he has met them even once before, they will begin to be familiar to him.

—Carl Von Clausewitz
On War

While Chapters 3 and 4 gave a historical background of the composite unit, this chapter analyzes that data to determine strengths and weaknesses of the composite unit as well as considerations for future employment.

Strengths

Unity of Command

The first strength afforded by composite units is the unity of command--the ability to ensure unity of effort for every objective under a single responsible commander and orient all sub-objectives toward the primary objectives. The 366th Wing's command relationship demonstrated the unity of command. Once deployed, the 366th Wing Commander planned and executed air operations under the authority delegated by the supported commander. That commander could be the Commander in Chief (CINC), a Joint Force Commander (JFC), a Joint Force Air Component Commander (JFACC), the Commander, Air Force Forces (COMAFFOR), or if tasked the 366th Wing Commander could assume the responsibility of the JFACC, COMAFFOR, or wing commander.¹

¹ Headquarters 366th Wing, Air Combat Command, "366th Air Intervention Composite Wing Plan 366-94," (U), 3 January 1994, K-WG-366-HI v.2, SD I-4, vi. (Secret) Information extracted is unclassified.

During Operation Desert Storm, the responsibility for achieving operational objectives belonged to the 7440th Composite Wing (Provisional)'s mission commander. The mission commander was responsible for the tactical gameplan, for coordination, execution, and held accountable during the mass debrief. This mission commander's authority and relationship solidified by leading all the forces through the mass briefings ensuring that all of the 7440th's assets would understand the mission's plan. During execution, the mission commander could reconfigure assets based on fallout and adversary engagement. The mission commander was knowledgeable about the strength and configuration of his forces and could determine if they would be able to complete the objective. Once the mission was complete, the mission commander would lead the mission debrief, scrutinizing the employment of forces in detail and identifying both the good and bad from the mission.

Decentralized Independence

The second strength of composite units is their ability to operate with decentralized independence, the ability for headquarters to delegate operational control to lower levels. The tactical coordination process in composite units allows a mission commander to receive a tasking via the ATO, determine force assignments, accomplish a threat assessment, and develop a mission execution plan for the composite force. The ATO had two limitations; first, it takes an extended time to write one, and second, it requires a secure means of communication to disseminate.² The composite unit is postured to compensate for these limitations in two ways; first, the operation commander can issue the composite unit mission-type orders³ with target, objective and time data; and second, the composite unit can perform tactical coordination through their internal communications structure to update the force. If the composite unit were to lose communications with headquarters, the unit could still utilize tactical coordination and execute command and control locally to complete an objective.

² Norwood, *PROVEN FORCE – Proof of Concept for the Composite Wing*, 17.

³ Mission type orders are “(1) An order issued to a lower unit that includes the accomplishment of the total mission assigned to the higher headquarters and (2) An order to a unit to perform a mission without specifying how it is to be accomplished (JP 3-50)”. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, -Amended 15 February 2016, 156.

There are some composite unit examples where decentralized independence was key. The first example includes the composite groups defending Hawaii, Panama, the Philippines, and Alaska before World War II. These groups had limited contact with CONUS air operations and would adapt and integrate the forces they had available to meet the unique defensive needs of the environment in which they operated. A second example is the 1st Air Commando Group, commanded by Colonel Cochran. The 1st was able to plan and execute their missions independently of the theater air commander and the air campaign plan. While this violated doctrine, the group was able to prosecute flexible operations under tough circumstances to support Wingate's Raiders.

The 366th Wing executed decentralized independence through their ability to plan operations in the EEOC while en route to the deployed location. During an exercise in 1998, the EEOC was able to receive the ATO and intelligence updates from the rear Operations Support Center, plan the mission packages, and have two B-1 crews place practice bombs within 15 feet of the newly designated target.⁴

Tailorable to a Specific Mission

The third strength afforded to composite missions is the ability to tailor the force for a specific mission. The 1st Air Commando Group was handpicked to support General Wingate's Raiders; the group trained as a team conducting joint exercises with Wingate's Raiders for three months before execution so that they could employ flexible operations under difficult combat conditions. The 509th Composite Group was also very effective at tailored operations. The 393d Bombardment Squadron and 320th Troup Carrier Squadron executed highly classified missions to get nuclear scientists, components, and eventually, atomic bombs to where they needed to be.

Tailored missions could also be considered as a limitation in that the composite force may become too specialized that they lose effectiveness when the environment changes. The 2nd and 3rd Air Commando Groups saw this limitation, even though the Army Air Corps built them in the image of the successful 1st Air Commando Group. These groups trained for a specialized mission but ended up fighting a more traditional

⁴ Report, ASC2A, "EFX 98 Assessment Report," ca. November 1998, SD 4-30.

type of war. They adapted where possible--for example shedding their gliders--and improvised to support the general mission.

Integration Effectiveness

The fourth strength afforded composite units is integration effectiveness, the ability to perform mission integration through proximity. One of the principle advantages of a composite unit is the ability to plan with face-to-face coordination. An example of this is the 1st Composite Squadron operating on Ascension Island. The squadron was able to counter U-boat operations with a mix of fighters and bombers integrating speed, long-range patrol, and depth charges to mitigate the U-boat threat. The 23d Composite Group, as well as the 2nd and 3rd Composite Squadrons, focused on training integration with different types of aircraft and with cavalry and infantry troops. The Air Force exercises composite integration training today at Nellis AFB with RED FLAG, GREEN FLAG, CYBER FLAG, and the United States Air Force Weapon School integration missions.

Persistence of Mission

The fifth and final strength afforded to composite units is the persistence of the mission and the familiarity of the Airmen with their roles. "The composite wing personnel know each other's differences and idiosyncrasies and already have adapted – a process that can take days or weeks when different units are thrown together."⁵ The 366th Wing facilitates this adaptive learning mode through repeated composite application and integration of forces through command and control.

Weaknesses

During the build-out of the 366th Wing, the concerns revolved around the cost of the wing and the ability for maintenance to support a number of disparate aircraft. It was difficult to make comparisons of force posture, readiness, cost, and maintenance between the composite wing and the monolithic wing. While there were concerns, the Air Force built the 366th Wing and successfully deployed many times (as outlined in Chapter 4). The cost and maintenance requirements were not found to be weaknesses of the composite wing. Besides the significant start-up costs for the wing, the 366th Wing was

⁵ David A. Fulchum, "USAF Wing Takes Innovations Overseas," *Aviation Week & Space Technology*, 13 December 1993, 52.

comparable to like-sized monolithic wings. In addition, maintainers employing cross-utilization were able to support the needs of the wing. The wing did struggle when it was deployed piecemeal to support multiple theaters, thus dividing the resources that were built to deploy together as a composite force. There are however two weaknesses with the composite units studied: first, the lack of sufficient firepower and second, the limitations of the unit based on economy of scale.

Insufficient Firepower

The first weakness is that as a singular force, composite units have a limited number of assets, and while other assets can supplement the composite unit, these forces do not train with the composite unit on a recurring basis. For example, during the interwar period, as composite groups had to accomplish their mission with the aircraft that were available including aircraft that were not suited for the austere environments the composite groups supported. Had any of these composite units been attack by a large number of aircraft, they may have been overwhelmed.

More recently, the 366th Wing was designed to provide rapid strike capability anywhere in the world, self-sustaining for seven days and could be resupplied up to 30 days. Even at its peak, the wing only had 77 aircraft prepared to support up to 60 sorties a day delivering more than 200 tons of ordnance. As a comparison, many of the ATOs during Operation Desert Storm employed larger force packages, some with more than 70 aircraft.

Limited Economy of Scale

The second weakness stems from the economy of scale. For any Air Force unit, owned aircraft is not the same as aircraft available to fly. Depending on the day, aircraft could be designated spares, in the wash rack, one might require a function check flight to clear maintenance, one could be due for regularly scheduled home-station maintenance, and one might be at depot.⁶ A monolithic wing can absorb these losses more than a composite wing because they have more aircraft on hand. The composite wing also conducts large force exercises generating a large number of sorties of multiple aircraft.

⁶ McGonigle, *Air Force Composite Wings—Future Success or Failure*, 34.

In addition to the aircraft themselves, composite units have limited manpower for performing maintenance operations and require a larger Intelligence support team to produce a threat picture for all the air platforms. When the 366th Wing deploys, all of the support staff and equipment also come from the base, in effect gutting the home station to support the deployment.

One of the foundations for the success of the 366th Wing is mobility. To deploy on a moment's notice, the wing must have sufficient assets available and the ability to get those assets into the fight. Getting sufficient assets in theater requires airlift and tanker support.

Considerations

In researching the composite units throughout history, two additional considerations have been apparent. First, advocacy has been key in the support and sustainment of composite units. Whether it was General Arnold's support of the 1st Air Commando Group or General McPeak's support of the force projection composite wings, advocacy for the unorthodox composite unit was necessary for its survival.

The second consideration is longevity. Composite units throughout the history of the Air Force have been experimental, limited in number, and of short duration. They have been custom solutions for temporary missions, and have not caused a major reorganization of the Air Force. Strategists and planners should consider this when designing or integrating a new composite unit if longevity and sustainment are goals.

Chapter Summary

If employed properly, the advantages of composite units accumulate to create a synergistic increase in combat effectiveness. This chapter outlined the following five advantages for organizing composite units and gave examples of each: Unity of Command, Decentralized Independence, Tailorable to a Specific Mission, Integration Effectiveness, and Persistence of Mission. As an example, leveraging the evolution of composite mutual support, composite force bombers and fighters can maximize their exploitation power and minimize attrition.⁷ As we have seen, composite units are a natural fit for contingency response and regional presence.

⁷ Norwood, *PROVEN FORCE - Proof of Concept for the Composite Wing*, 24.

In addition to the strengths, there are also two weaknesses associated with composite units: Insufficient Firepower and Limited Economy of Scale. In addition to the advantages and disadvantages, strategists should also consider the importance of advocacy and longevity when determining if a composite unit is a good solution to a problem.



Chapter 6

Cyberspace Application & Recommendations

If every airman is a defender, part of the neighborhood watch when it comes to [a] sense of ownership of the network, we can close a lot of unintentionally opened windows. Historically, the development of a new warfighting domain usually generated the requirements for new organizations, new doctrine, and new training to prepare those who would serve in the new domain. This was the case in the last century, with the development of air as a new domain of warfare, and of new organizations like the Army Air Service and the Army Air Corps, and of course, the U.S. Air Force...

Therefore, as we leverage cyberspace, we must also address threats and challenges to our access to, and mission assurance in, that domain. My message to you this morning is this: While our Nation and its international partners and allies are vulnerable in cyberspace, which in turn creates risks to our critical infrastructure, disaster is far from a foregone conclusion. Instead, we can--indeed we must--leverage the abundant talent from all sectors of our country... to steel our networks and seek resiliency going forward, both simple and complex.

—Gen Norton A. Schwartz
Chief of Staff, United States Air Force (2010)

Composite units have been used to tackle some of the Air Force's toughest and unique missions. The following chapter will first explain the Air Force's current vector to create CS-N. It will then outline a hypothetical case for creating a composite OSS, based on the lessons learned from composite units throughout history. The chapter then compares this new composite OSS to previous composite units based on the strengths and weaknesses outlined in the previous chapter. The chapter concludes with considerations for this future integration of defensive forces including thoughts on organizing, training, and equipping the force, as well as personnel considerations.

Communications Squadron-Next

As we saw in Chapter 1, cyberspace is a contested domain and the United States does not have enough cyber operators to defend everything. To build resilience, the Air Force is in the process of prioritizing air, space, and cyberspace assets to defend the nation's most valued interests. CS-N is the concept of repurposing Airmen from

traditional IT roles into DCO roles focused on persistent enclave (mission system) defense.¹ A subset of CS-N is the Mission Defense Team (MDT), a team that consists of a team of six to nine cyber operators skilled in mapping the mission and determining cyber key terrain, understanding adversary intent and capabilities, performing cyber hygiene, utilizing sensors to monitor the network, and responding to anomalous behavior on the network. Unlike the CPTs, which have a limited dwell time, the MDT will be persistent and able to characterize the environment, create a baseline, and recognize disparities.

Current documentation outlines replacing the traditional CS with CS-N and maintaining the squadron's location in the Mission Support Group, so the organizational structure shown in Figure 5 would remain unchanged. The squadron would add an additional flight to house MDT personnel. A White Paper on CS-N, states "a flexible yet streamlined C2 [Command and Control] construct should be established that promotes centralized control-decentralized execution."² The Air Force is in the process of executing an MDT pilot. Headquarters Air Force started Phase 1 of the pilot in 2015, choosing 17 CSs to create a team and evaluate the feasibility of the concept. This pilot effort is scheduled to continue until 2022.

Personnel chosen for the pilot received training prepared by AFSPC and Air University. Instructors built the training based on lessons learned from enterprise defense operators utilizing ACD and CPT enclave defense forces operating CVA/H. In addition, MDT personnel are taught to accomplish mission mapping following the Functional Mission Analysis process. Depending on the team, the wing commander or tenant unit commander employs the MDT to defend a single mission system or multiple mission systems.

Hypothetical Sample Case

For the remainder of this chapter, a hypothetical sample case will be used to discuss the advantages, disadvantages, and planning considerations for employing cyber operators at the tactical level in a composite unit. This hypothetical case would move the MDT personnel from the CS-N to the OSS under the Operations Group. This would

¹ McCulley, "White Paper on Communications Squadron-Next Employment," 1.

² McCulley, "White Paper on Communications Squadron-Next Employment," 10.

allow integration of cyber operators with the operators of the mission system(s) they are defending (e.g. pilots, missileers, space system operators, etc.) The Air Force could implement this reorganization effort during the rollout of the pilot units or postpone it until the pilot effort is complete and MDTs are more prevalent in the Air Force. For discussion purposes, 24 AF will have Operational Control (OPCON) and Administrative Control (ADCON) of these forces. In addition, 24 AF would create an Establishing Directive granting authority for the wing to consult directly or coordinate actions with the MDT personnel utilizing direct liaison authorized (DIRLAUTH).

The 624 OC would provide command and control of the MDT, enabling the coordination and integration of defensive cyber operations of like mission systems across the Air Force, regardless of the MAJCOM. For example, if two MDTs defending the cyber key terrain of the F-15E found an adversary attacking or exploiting a system, they would alert the 624 OC. The 624 OC would then notify the other F-15E MDTs across the Air Force to take defensive actions to secure the network. This direction would have effects on systems across two major commands and four wings.

Comparison to Historical Composite Units

The previous chapter outlined five strengths and two weaknesses seen in past composite units. This section will outline how the Air Force can apply each of these characteristics to the hypothetical sample case to create a sound composite force by integrating cyber operations at the tactical level.

Unity of Command

The hypothetical sample case lends itself to the unity of command on two levels. First, as described in the previous section, the 24 AF would command all cyber forces (though 624 OC) with the requisite authority to employ these forces in the pursuit of a common purpose, defense of the Air Force's networks (at all levels). Second, the wing commander, utilizing DIRLAUTH through the Establishing Directive, maintains the ability to command and integrate cyber forces with air and space forces to promote the highest level of defense for their local assets. This organizational structure enhances the unity of effort as operators (not part of the same command) coordinate and cooperate toward common objectives on a daily basis integrating network defensive measures into standard procedures. This integration also affords commanders at multiple levels

awareness of the cyber environment, including threats to the mission system and capabilities available to defend said threat.

Decentralized Independence

Similar to the composite units discussed in Chapter 5, the 624 OC could issue mission-type orders to the MDT. Before planning, the MDT would be given an objective, the purpose for their operations, and the commander's intent from 24 AF. The MDT would then carry out their delegated operations at the wing level, integrating and adapting defensive cyber forces based on the defended mission systems operations. This allows the MDT flexibility to support the mission system while still keeping the 624 OC apprised to the holistic defense of the network.

Tailorable to a Specific Mission

Air Force mission systems are complex, better described as a "system-of-systems." These systems include, but are not limited to, planning networks, maintenance networks, and the interfaces between networks and they consist of many different types of networks and network components. To defend these specialized systems, cyber operators will require precise skill sets. By tailoring cyber defensive operations to a specific mission system, cyber operators can hone their skills to the system operated. This allows the cyber operator to perform functional mission analysis of a system and to place network sensors where they can best detect anomalies in the network. These familiarities with the supported mission also afford the cyber operator the ability to baseline the system and know what "normal" network traffic looks like to identify anomalous behavior more effectively. This specialization could also be a limitation making it difficult for operators to adjust to defend when transitioning to new units.

Integration Effectiveness

Co-locating cyber operators with mission system operators increases the ability for these operators to integrate due to their proximity. They can accomplish integrated mission planning where intelligence analysts brief the cyber threat analysis along with the threat picture. This shared awareness and face-to-face planning will create a common language as well as integrated tactics, techniques, and procedures. For the cyber operator, who understands the standard employment of the mission system and how mission system operators interact with the system, can lead to enhanced defensibility and

the understanding of standard network traffic. For example, if a cyber operator understands how a pilot transfers data from a mission planning system to the aircraft, the operator can put defensive measures in place that could alert decision-makers if the data is altered in an unexpected way.

These integrated operations can lead to a better understand of the system by both cyber operators and mission system operators, such that the mission system operators will be more aware of potential cyber effects to their system and then know how to react. Space operators achieved the same type of educational interaction as pilots became more aware of the Global Positioning System (GPS) and the effect of GPS jammers. This integrated understanding can lead to the creation of operating standards and the ability to adapt to new situations. In addition, this joint understanding could eventually allow cyber operators to “attack back” through Defensive Cyber Operations – Response Actions (DCO-RA) when warranted.

Persistence of Mission

Composite units have historically benefited from the persistence of the mission and the familiarity of the Airmen with their roles. As discussed in the last section, daily interaction between the cyber and mission system operators leads to an understanding of roles and the ability to adapt their support to the mission as needed. For cyber operators, focusing on defending critical mission systems allows for the proper placement of network sensors. These sensors can collect data and monitor the network 24 hours a day, 7 days a week, and 365 days a year giving cyber operators the ability to respond to incidents on the network quickly with data to support the finding. In addition to the sensors’ persistent monitoring of the network, cyber operators can perform “active” defense while the mission system is executing its mission. For example, cyber operators could be monitoring the mission planning system for anomalies during mission planning and could scan and secure the data that will be taken to the aircraft for the mission.

Insufficient Firepower

Insufficient firepower was a concern of historical composite units, which had limited numbers and types of aircraft. At the unit level, MDTs would not be constrained in the same manner, in that cyber operators should have the equipment and expertise available to defend a mission system. Once operators conduct functional mission

analysis, place network sensors, and baseline the mission system (not an easy task), they can effectively monitor and defend the system. However, at the Air Force level, MDTs much like CPTs today, would be limited based on the personnel and equipment availability. Cyber operators cannot defend the network in all places at all times. The Air Force must prioritize the locations of defensive assets based on the needs of the mission and the assets available.

Limited Economy of Scale

The economy of scale will affect the MDT. If a commander places an MDT on a highly specialized network, it may require specialized equipment and skill sets to support the mission. This implies that for some mission sets the Air Force will not be able to use a standardized off the shelf system (once created). This specialized equipment would also add additional maintenance requirements.

Considerations for Future Employment

The following section outlines considerations that the Air Force should evaluate for the optimal integration of cyber operators into composite units at the tactical level. This includes considerations for operational advantages and the resources required to create composite units. The section is broken down into four categories: organize, train, equip, and personnel.

Organize

The hypothetical sample case outlined a force in which 24 AF maintained OPCON and ADCON of the MDT forces. This organizational structure is similar to the Air Force Communications Command prior to 1990, which as discussed in Chapter 2 created conflicts between the Command and the wings where the CSs were located. As a means to lessen the conflict, 24 AF would create a Command and Control Establishing Directive with the wings to grant them DIRLAUTH of the forces. This is just one solution to the problem; the opposite could also be effective with the wing maintaining OPCON and ADCON of the MDT forces and having a Command and Control Establishing Directive with 24 AF. The Air Force would retain the cyber operators for service specific defense in both of these organizational models. A third option would be for the cyber forces to be ADCON to the wing and tactical control (TACON) to 24 AF when performing operations under the direction of the 624 OC. An example of the third

option was the 7440th Composite Wing, where the unit's home station handled ADCON responsibilities while the 7440 WG/CC maintained TACON. A fourth option would be for the forces to be apportioned as a joint force and allocated to USCYBERCOM through the Global Force Management Implementation Guidance (GFMIG) much like CPT forces are apportioned to USSTRATCOM and allocated/reallocated to combatant commanders or back to the services.

Another future consideration would be to integrate offensive cyber forces into composite units at the tactical level. This would require a detailed review of the operators' authorities, but could allow for integrated cyber and air or cyber and space operations (e.g. integrated Suppression of Enemy Air Defenses operations).

Train

In order for the Air Force to support the new composite operations and cyber units, it will require cyber operators skilled in unique networks and equipment. This will require cyber operators to specialize versus remaining generalized. As mentioned in Chapter 2, the current cyber operations career field is a mix of operators, some with a technical background and some without. To support the defense of key mission systems, the Air Force needs more technically competent operators. This will require additional training for Airmen transitioning to mission system defense. Currently the CS-N pilot units are filling this technical skills gap with contractors, but this is not a feasible long-term solution. The Air Force must develop a sustained training path to transition these forces. This foundational training should utilize current CPT and DCO training as a baseline.

In the future, cyber operators could forward deploy with the mission systems they are defending in order to support integrated planning and execution. Prior to deployment, these operators should receive training on integrating offensive cyber capabilities into operations, including the available capabilities and request procedures for the theater. This training would allow the cyber operators to be knowledgeable of the process and points of contact to integrate offensive cyber operations as well as inform the mission system operators of capabilities that may be able to support their efforts in theater.

In addition to training cyber operators, intelligence personnel would also receive cyber-specific training. This will allow intelligence personnel to study and integrate the

cyber threat to the mission system into the daily threat picture. This will inform both the mission system operator and the cyber operator who can integrate this threat into the tactical plan. The Air Force offers an introductory cyber course for intelligence personnel called the Cyber Intelligence Formal Training Unit (CIFTU). The course is two weeks and focuses on enhancing both technical and analytical training for intelligence analysts. Until analysts are trained at the wing level, the 624 OC Intelligence, Surveillance and Reconnaissance Division (ISRDR) could be bolstered to provide refined mission system cyber threat data to support operations (on a limited basis).

Equip

The Air Force should consider standardized equipment for as many MDTs as possible; this will take advantage of the economy of scale for both equipment and training of personnel. In addition, it will enhance the ability of cyber operators to smoothly transition from defense of one mission system to another. In addition, the Air Force Life Cycle Management Center (AFLCMC) should be involved to create processes and funding for the sustainment and maintenance of these systems. One size does not fit all when it comes to mission assurance and defensive cyber operations. Some mission systems will require special equipment and training. Headquarters Air Force should prioritize and identify these systems early in order for the MDT to adapt.

Personnel

As discussed in the training section, cyber operators chosen for the MDT will require additional technical training. In the short term, contractors will fill this technical gap, but the Air Force needs to plan for the long-term operational cyber force. This will include selecting accessions to the career field with a technical background and offering training to prepare them for operations. Much like the communications officers in the mid-1990s, the career field will need to adjust to account for the new organization taking into account who will rate the performance of MDT personnel. In the hypothetical situation, this rater could be a detachment commander who falls under a squadron in one of the 24 AF wings. It could be the OSS commander if the MDT is ADCON under the local wing or a tenant unit commander. The Air Force Personnel Center should create training to ensure that senior raters understand the cyber career field and know how to

position Airmen for assignments, promotions, professional military education, and career progression. In addition, the Air Force should consider a force construct that allows cyber operators the ability to retain their skill and to remain focused on the tactical fight; the Air Force has done this historically with Warrant Officers.

In addition to bringing in the right cyber operators, the Air Force should consider retention and growth opportunities for these Airmen. The private sector offers financial incentives to lure away Air Force cyber operators for which government and military positions cannot compete. Integrating cyber at the tactical edge could be a non-financial incentive to keep cyber operators in the Air Force. The composite unit has a demonstrated history of exceptional people who take pride in being at the “tip of the spear.” This could start a new foundation for cyber operators to increase their ingenuity, perseverance, and esprit de corps.

Conclusion

In addition to the considerations outlined above, the composite cyber unit should also contemplate the considerations described in the last chapter: advocacy and longevity. The DoD and each of its services are supporting the build out of the CMF, and the services have the funding necessary to push the program forward. The MDT requires similar support at the Air Force level for advocacy and backing from the supported wings that mission system defense is necessary to assure their missions. This advocacy and the expansion and support of MDTs across the Air Force will be key to the sustainment of the program and its longevity so that MDTs and the units they support avoid disbandment like many of the composite units evaluated in this thesis.

To ensure advocacy and to engender longevity, Air Force leaders must organize these new cyber forces in a way to achieve optimal combat performance. This chapter outlined five positive and two negative aspects of integrating defensive cyber forces at the tactical level. The first two positive aspects are that the composite unit allows for unity of command as well as decentralized independence when warranted. Also, commanders can tailor cyber forces to integrate into operations and to support operational requirements of mission system operators. This integration through proximity allows for enhanced planning, execution, and debriefing opportunities. Finally, the persistence of

the mission affords cyber and mission system operators the ability to learn from each other's actions and to create a baseline for enhancing operations.

The Air Force should also consider two negative aspects of integrating cyber defenses at the tactical level. First, insufficient firepower is more apparent at the Air Force level--deciding where to place MDTs rather than on the MDTs themselves and their execution. Second, the limited economy of scale is less apparent when compared to a traditional composite unit; some MDTs may require specialized equipment to defend mission systems, which could affect the creation of a single weapon system for MDT employment. Also, considerations were presented on how to organize, train, and equip the force and concerns and solutions were outlined on how to optimize career progression for cyber operators.



Chapter 7

Conclusion

Composite units have a rich history in the Air Force. These units evolved into a flexible, effective, and credible capability for the National Command Authorities and the Joint Chief of Staff to employ at a moment's notice. The United States' first composite group was created during World War I. The interwar period saw the growth of composite units to defend austere environments and ensuring that America retained its territories overseas. World War II saw the expansion of composite units throughout the world and concluded with a composite unit conducting highly classified missions to drop atomic weapons on Japan. The 1950s saw the resurgence of composite integration with the Composite Air Strike Forces bringing together aircraft and Airmen from around the service to train and prepare for deployment operations. Finally, at the end of the Cold War General McPeak brought back the vision of the composite wing operating as America's 911 Force.

Communications support and cyber operations also have a diverse history in the Air Force; from the initial flags, torches, and signal balloons to the highly integrated computer systems and networks used today. The Air Force has evaluated the organizational structure of communications many times. The focus of these changes has vacillated on one major decision: centralized versus decentralized command of the "network." From the Army Signal Corps until 1991, the Air Force centralized the command structure and dual-hatted many of the commanders who managed the network. In 1991, General McPeak decentralized the network and gave command of the personnel and assets to the wing commander. While personnel and assets at the base level remained under the wing commander, in 2003 the Air Force started consolidating the management of the AFNet and in 2009 activated 24 AF to command and control the AFIN. As the Air Force continues to become more dependent on integrated technologies, it is time to change the organizational structure of cyber forces to defend these technologies.

The goal of this thesis was to take a detailed look at the historical organization structure of the composite units and communications/cyber units as described in the

preceding paragraphs to determine at what organization level within the Air Force cyber integration must occur to achieve optimal combat performance. Based on this assessment, the best level to integrate operations is at the lowest tactical level in the form of a composite unit.

This thesis described composite units as a force multiplier that offers decisive qualitative advantages. These advantages include unity of command under a single responsible commander and the ability to use mission-type orders to obtain decentralized independence when needed. Historical composite units have been tailorable to a specific mission set and flexible to adapt to given environment and innovate when necessary to meet the commander's objectives. Composite units offer integrated effectiveness, a true force multiplier, in that operators of different systems understand each other's employment and can enhance each other's capabilities. The final advantage of composite units is the persistence of the mission and the ability to integrate continually. In addition to the advantages, there are also two disadvantages; first, composite forces are limited in the amount of firepower they can provide, and they are also limited in being able to take advantage of economies of scale. In addition to these advantages and disadvantages of the composite unit, the Air Force must also consider how it will organize, train, and equip the force to support the integrated fight and how to retain skilled personnel to perform these necessary operations. A concern that is often discussed with creating smaller specialized units is the fear of penny packeting. This idea dates back to World War II when Field Marshal Bernard L. Montgomery and other commanders mockingly use the term "penny packets" to describe the improper dividing up of airpower to support ground forces. According to Air Marshal Arthur Coningham, "The strength of airpower lies in its flexibility and capacity for rapid concentration; it follows that control must be centralized in an air commander and command exercised through Air Force channels; and air forces must be concentrated in use and not dispersed in penny packets."¹ The composite unit outlined in this thesis is not meant as a strategy to penny packet cyber operators to support air and space operations. It is a means to place defensive cyber operators into optimal defensive positions such that these defensive forces integrate at the

¹ Rebecca Grant, "Up from Kasserine Pass," *Air Force Magazine*, September 2007, 76.

tactical level with the mission systems they are defending. In addition, 24 AF can shape the cyberspace environment to concentrate force and allow the rapid concentration of enterprise defensive systems and enclave defensive systems work in concert to assure the Air Force's missions.

This study is just the beginning. Due to the size and scope many unanswered questions remain, and there is more research to be done. The first is a further study on command and control of cyber forces, evaluating the current construct and manning and considering how to reorganize and expand this function. The second is a detailed analysis of the CS-N construct, including a review of personnel, equipment, organization, and training. Third, a follow-on study focused on smaller composite units and their integration would be beneficial to evaluate the integration of MDT forces; this could include a study of the integrated teams within the Air Operations Center and the implementation of integrated Intelligence units.

The Air Force needs to be deliberate in its choice of organizational structure for these new mission system defensive forces. The pilot units are already employed and will roll out across the Air Force in the next seven years. Air Force leaders need to understand the context of our lessons learned both from the communications community and from composite units. There is a wealth of knowledge that can be gained and if properly employed can be used to invigorate the advocacy of the change, and to ensure its longevity with the end goal of achieving optimal combat performance through integrated air, space, and cyberspace operations.

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