Network Centric Warfare Case Study

U.S. V Corps and 3rd Infantry Division (Mechanized) during Operation Iraqi Freedom Combat Operations (March to April 2003)

Volume III: Network Centric Warfare Insights

Author
John B. Tisserand III

Project Director
David Cammons

CENTER for STRATEGIC LEADERSHIP CSL

Force Transformation
Office of the Secretary of Defense

A CENTER FOR STRATEGIC LEADERSHIP STUDY

Network Centric Warfare Case Study

U.S. V Corps and Third Infantry Division during Operation Iraqi Freedom Combat Operations


Prudens
Futuri

NETWORK CENTRIC WARFARE CASE STUDY

U.S. V CORPS AND 3RD INFANTRY DIVISION (MECHANIZED) DURING OPERATION IRAQI FREEDOM COMBAT OPERATIONS (MAR-APR 2003)

Volume III: Network Centric Warfare Insights

By

John B. Tisserand III

Project Director
David Cammons

Network Centric Warfare Case Study

U.S. V Corps and 3RD Infantry Division (Mechanized)
During Operation Iraqi Freedom Combat Operations (Mar-Apr 2003)

Volume III: Network Centric Warfare Insights

Case Study Sponsored by:
Office of the Secretary of Defense, Office of Force Transformation

Executive Agent for the Case Study:
United States Army War College

U.S. ARMY WAR COLLEGE
CARLISLE BARRACKS, PENNSYLVANIA 17013

Contents


Prudens
Futuri

Foreword

This volume builds upon the results of a study of Network Centric Warfare (NCW) entitled *Network Centric Warfare Case Study, Volume I: Operations; U.S. V Corps and 3rd Infantry Division (Mechanized) during Operation Iraqi Freedom (March-April 2003).*

During the past decade, United States Armed Forces have been in the process of transforming from an Industrial Age to an Information Age military. This transformation is a long way from being completed; however, the maneuver phase of Operation Iraqi Freedom demonstrated the emerging power and potential of information-networked forces.

As part of the preparations for combat, both V Corps and 3rd Infantry Division forces received new sensor systems, including the Hunter unmanned aerial vehicle (UAV) (at the corps) and the Long Range Advanced Scout Surveillance System (LRAS3) in the division. They also received extended connectivity systems in the form of increased bandwidth for the Tactical Satellite Communications (TACSAT) systems and the rapidly fielded Blue Force Tracking system, with its satellite-based text messaging capability. They used a variety of recently developed information systems like the Command and Control Personal Computer (at corps) and the Automated Deep Operations Coordination System, and they received new information systems like the Force XXI Battle Command Brigade and Below (FBCB2) coupled with the Blue Force Tracking transceiver, which was fielded down to the maneuver company level. Collectively, the use of these new systems allowed the force to fight with greater combat effectiveness.

This volume will be of interest to force designers in the United States Army and at the joint level, those concerned with the networking of the force, students of leadership, and those interested in the implications of network centric operations at the tactical, operational, and strategic levels of war.

This research was conducted by the United States Army War College in cooperation with and for the Office of Force Transformation, Department of Defense.

Douglas B. Campbell
Director, Center for Strategic Leadership


Prudens
Futuri

Preface

During the past decade, U.S. Armed Forces have been in the process of transforming from an industrial age to an information age military. This transformation is still ongoing; however, Operations Enduring Freedom and Iraqi Freedom demonstrate the emerging power and potential of transformation, at least in part, through the power of information-networked forces.

In March 2004, the U.S. Army War College (USAWC) in cooperation with the Office of the Secretary of Defense (OSD) Office of Force Transformation (OFT) initiated a study focusing on the U.S. Army V Corps' and 3rd Infantry Division's (Mechanized) major combat operations during Operation Iraqi Freedom (OIF). This study, entitled "Network Centric Warfare Case Study: U.S. V Corps and 3rd Infantry Division (Mechanized) during Operation Iraqi Freedom Combat Operations (March-April 2003)" is one of several "case studies" commissioned by OFT to determine the military's ability to conduct operations in accordance with network centric warfare (NCW) concepts. The OFT describes NCW as an "information superiority-enabled concept of operations" that will enhance combat effectiveness by networking sensors, shooters, and decision-makers.

The study hypothesis postulates that "improved sensors, connectivity systems, and networked information technologies enhanced the combat effectiveness of U.S. V Corps and its subordinate units during OIF major offensive combat operations." The results largely validated the study hypothesis. This study argues that the introduction of extended reach communications and networked information technologies significantly enhanced the ability of U.S. Army commanders to make faster decisions, more easily exploit tactical opportunities, conduct coordinated maneuver while advancing further and faster than at any previous time and more fully integrate and synchronize joint fires; all of which resulted in the rapid defeat of Iraqi military forces and the fall of the Ba'athist Regime in Baghdad.

The study is arranged in three volumes.

Volume I, entitled "Operations," uses the metrics provided in the Network Centric Operations Conceptual Framework as the guide in the conduct of the analysis concerning the applicability of NCW tenets during the conduct of major offensive combat operations. The analytical findings and observations of this volume validated that, during OIF, new sensors, extended connectivity, and new information systems enhanced the combat effectiveness of the force. This volume documents the impact of networked information on the application of combat power, battlespace synchronization, decision-makers and staffs lethality and survivability; force agility and operational tempo.

Volume II, entitled "A View of C4 Architectures at the Dawn of NCW" analyzes the command, control, communications, and computers architecture to ascertain the potential strategic and operational implications of net-centric operations from a command and control perspective.

Volume III, entitled "Network Centric Warfare Insights" is divided into two sections. The first section presents potential overarching strategic and operational impacts of network centric

operations, based on findings in the first two volumes. Section two presents a series of battle stories and vignettes illustrating the impacts of the various new technologies on actual combat actions and battles.

The U.S. Army War College served as the executive agent for this study. The research was conducted by the Center for Strategic Leadership's Information Warfare Group (IWG). The IWG study team used military personnel to manage the program and conduct the data analysis and contractors from MPRI (Military Professional Resources Incorporated) (an L-3 Communications owned company) to collect the data through personal interviews and documents, and write the report. USAWC also provided numerous other people and resources to assist in survey preparation and distribution, administrative support, and audio-visual support.

The uniqueness of this effort lies in its landpower focus. While previous case studies have quite adequately covered the "shooter-sensor" interface from a systems perspective, none have addressed the impact of NCW from the human perspective. This is the essence of land warfare, and why this study is so important.

Acknowledgements

ASSESSMENT TEAM
David Cammons, Project Director
John B. Tisserand III, Colonel, U.S. Army, Retired, Senior Analyst
PEER REVIEWER:
Dennis C. Moran, Major General, U.S. Army, Vice Director for Command, Control, Communications and Computers Systems, J-6, The Joint Staff

We wish to thank General W. Scott Wallace and the many other officers who made time available for our interviews during our initial study and the 539 officers who took the time and effort to participate and complete our survey. Without their participation this study would not have been possible.

Special thanks to Colonel John W. Charlton who made the time available during his closing student months at the United States Army War College for numerous interviews and reviews of battle stories included in this volume.

Colonel Thomas Kruegler, from the Center for Strategic Leadership of the United States Army War College, provided numerous valuable insights concerning the command and control systems used by V Corps during OIF.

Colonel (Retired) Dennis Murphy deserves thanks for his efforts to move this study along and for his valuable operational and strategic insights.

Colonel (Retired) Greg Fontenot was kind enough to allow us to use maps and tables used in *On Point.*

Lieutenant Colonel (Retired) John Wheatley, deserves thanks for his valuable insights and professional editing. Thanks to Mr. Ritchie Dion for his tremendous work in the layout of all three volumes of this study, and to Mr. Carlos Andreu for his work to prepare this study for electronic publication.

We also need to thank the many people at the United States Army War College who assisted us administratively, provided audio visual support, and the many other levels of assistance that made this study possible.

Finally, we thank our peer reviewer, Major General Moran, for his time, his careful review of the briefings and his valuable insights.

David Cammons
Project Director
Center for Strategic Leadership
U.S. Army War College
Carlisle Barracks, PA 17013
28 August 2006

John B. Tisserand III
Senior Analyst
Center for Strategic Leadership
U.S. Army War College
Carlisle Barracks, PA 17013
28 August 2006

Executive Summary

INTRODUCTION

This is a study designed to further the examination of the tenets of Network Centric Warfare (NCW), which hypothesizes that a "robustly networked force improves information sharing, collaboration, quality of information, and shared situational awareness resulting in significantly increased mission effectiveness."

PURPOSE AND SCOPE

This volume is the third of a three volume set produced by the United States Army War College in conjunction with the Office of Force Transformation, Office of the Secretary of Defense. This volume is meant to provide the military reader with two sets of insights: first, an introductory view of implications of network centric warfare for the operational and strategic levels of war, and second, a series of six short tactical-level battle stories or vignettes that can be used to further the study of network centric warfare tenets and to illustrate the impact of new technologies on organizations, leaders, and combat effectiveness.

IMPACTS AND IMPLICATIONS OF NETWORK CENTRIC WARFARE

This analytical piece reviews the tactical impacts of NCW. These impacts are based on the findings, observations, and conclusions learned from Volume I, *Operations*, of the study. They are further defined by the battle stories in this volume. These tactical impacts provide a springboard for gaining operational and strategic insights and, in turn, for deriving implications at these levels of war.

The impacts of NCW at the operational and strategic levels of war are grouped in three categories: sensors, connectivity, and information systems. Sensors, such as the Predator and Global Hawk UAVs, extended the depth of the battlespace, provided greater situational awareness for commanders and planners, and when coupled with long-range weapons, compressed the kill chain. Connectivity was the key enabler for situational awareness by providing the backbone for data from and between information systems and for voice and video communications. Information systems, enabled by the automatic transfer and assimilation of data into near-real-time useable information, provided commanders and staff with a common operational picture (COP), which enhanced shared situational awareness and collaboration. Taken together, new sensors, connectivity, and information systems enhanced the ability of commanders to visualize the battlespace, increased collaboration and the speed of command, and resulted in increased mission effectiveness.

Operational and strategic implications of the NCW environment are presented as responses to ten questions:

1. What type of leadership does the NCW environment require?

2. How would networking affect the deployment process?

3. How does the increased level of shared situational awareness across the levels of war affect the strategic employment of forces especially in the synchronization and employment of strategic firepower?

4. What kind of standardization must occur across the force to ensure information sharing?

5. How does the network affect risk tolerance?

6. How does the increased level of situational awareness impact on the traditional military decision-making process?

7. What are the implications of NCW on force design?

8. How do the Department of Defense and the Services acquire, field, and maintain a NCW concept based force considering the rapid and continuous advances in information and communications technologies and capabilities?

9. What does the transformation to a net-centric force mean for future allied and coalition operations?

10. Does the ever increasing use of NCW enablers create new vulnerabilities?

The responses to these ten questions are meant to spur further debate, discussion, and research.

BATTLE STORIES

The battle stories are tactical vignettes that illustrate effects of NCW tenets on V Corps and 3rd Infantry Division (Mechanized) forces during the maneuver phase of Operation Iraqi Freedom. The stories vary in complexity and in the systems that are highlighted. Six battles stories are provided, they are laid out in a chronological order:

1. *Tallil Air Base* illustrates the impact of the long-range scout surveillance system (LRAS3) on the battlefield and how this new system increased the quality of available information resulting in changed doctrinal tactical processes and procedures. The story also highlights the importance of innovation in exploiting the capabilities that new technologies may bring to the force.

2. *As Samawah* illustrates how increased situational awareness and communication over distances effected new processes and increased mission effectiveness. The relief of the cavalry at As Samawah by Task Force 1-15 Infantry illustrates the impact of the newly fielded Blue Force Tracking (BFT) system and how this system increased situational awareness, provided an ability to communicate that otherwise would not have existed, and resulted in increased combat effectiveness.

3. *The Five Simultaneous Attacks* illustrates the impacts of the Automated Deep Operations Coordination System (ADOCS), the Hunter Unmanned Aerial Vehicle (UAV), and process

innovations that changed the way V Corps planned and conducted corps shaping operations that resulted in greater mission effectiveness.

4. *Logistics* illustrates the impact of new technologies or, in many cases, the lack thereof on the V Corps logistics efforts. The use of the satellite tracking systems for in-transit visibility enabled convoy tracking and extended communications. The in-transit visibility and extended communications greatly increased the shared situational awareness and resulted in greater logistics agility and mission effectiveness. However, the combination of NCW enhanced units with non-enhanced units negatively affected the overall logistical effort.

5. *Objective PEACH* illustrates the impact of two new technologies on the battlefield: the BFT system and TeleEngineering system. This vignette highlights how TeleEngineering allowed the force to better prepare for the seizure of the bridge at Objective PEACH and how the BFT allowed the task force commander charged with securing the bridge to alter his mission from providing a bridgehead line to a hasty defense in time to meet and defeat a major counterattack. Both of these events were critical in maintaining the pace of the V Corps' rapid advance to Baghdad. The battle story presents a clear example of where improved quality of information, information sharing, shared situational awareness, and collaboration evolved into self synchronization and greater mission effectiveness.

6. *Thunder Runs* illustrates the impact of networks capable of delivering timely, relevant, and accurate information. The BFT system and the Tactical Satellite (TACSAT) communications systems provided for rapid information sharing, improved the quality of information, increased shared situational awareness, enhanced collaboration, and resulted in increased mission effectiveness.


Prudens
Futuri

Introduction

The battlefield is a scene of constant chaos. The winner will be the one who controls that chaos, both his own and the enemies.

—Napoleon Bonaparte

INTRODUCTION

This study is designed to further the examination of the tenets of Network Centric Warfare (NCW) that hypothesizes a "robustly networked force improves information sharing, collaboration, quality of information, and shared situational awareness resulting in significantly increased mission effectiveness."

Operation Iraqi Freedom and specifically V Corps' and the 3rd Infantry Division's attack to Baghdad (Cobra II) in 2003 was significantly different from Operation Desert Storm in 1991. Vast differences existed from the tactical through the operational and strategic levels of war. The differences included more connected, yet more widely dispersed and faster moving, tactical formations; increased service interdependence, instead of merely joint interoperability; a near-real-time shared common operational picture that spanned the levels of war, new sensor capabilities adding greater depth to the battlespace coupled with new weapons systems adding greater reach; closer integration of special operations forces with conventional forces; and a smaller number of coalition partners.

During the twelve years between Desert Storm and Operation Iraqi Freedom, the military was undergoing a "revolution in military affairs," examining such new concepts as rapid decisive operations, network centric warfare, and effects based operations while developing new capabilities. The Army fielded new precision weapons like the Army Tactical Missile System (ATACMS) and developed new sensors like the Long-Range Advanced Scout Surveillance System (LRAS3) and unmanned aerial vehicles like the Hunter. Greater reliance was placed on the Global Positioning System (GPS) for navigation and integration into the fire controls of weapons systems like the Paladin self-propelled artillery, and development and testing were carried out on a varied array of terrestrial-based, netted radios capable of automatically passing data—referred to as the Army Battle Command System (ABCS)—to assist in battlefield visualization. Throughout this period, the Army was also continuously learning from deployments and operations in such places as Somalia, Bosnia, and Kosovo, as well as its continued presence in Kuwait.

During that same twelve year period, 1991–2003, the world experienced the real arrival and acceptance of the internet, the world-wide web that allowed for the rapid acquisition and transfer of information around the world. This network transformed many of the ways in which commerce was conducted, and e-mail became an increasingly popular means of intra-office and inter-personal communications. Communications satellites, both civilian commercial and military, were placed in orbit, increasing global frequency and bandwidth capabilities. In short, the world at large, as well as the United States and its military, were experiencing vast amounts of change in a relatively short period of time, change driven by the advent of the Information Age.

By the time the United States military began preparations for possible operations into Iraq in early 2002, it had already realized that much of the information and connectivity it relied on for normal day-to-day operations may not be available for combat operations. The Army's tactical communications backbone was the Mobile Subscriber Equipment (MSE), which had been fielded in the early 1990s and was designed for the defensive battles envisioned in Europe. MSE was used by some units during Desert Storm, and its ability to support an offensive highly mobile force was found lacking. Nevertheless, the MSE system was fielded to all Army units, and during this interim period, it served its function in local training areas, at training centers, and during deployments in support of a number of relatively static missions. However, as the Army began planning for another highly mobile offensive over vast terrain, it became apparent that the MSE was for all intents and purposes obsolete.

The preparations for and the execution of Operation Iraqi Freedom in many ways reflected the application of new concepts and capabilities. They also reflected the political constraints concerning the numbers of forces that had been placed on the military strategy—what von Moltke once described as "the practical adaptation of the means placed at a general's disposal to the attainment of the object in view."

In short, Operation Iraqi Freedom, the United States' military's first major operation at the dawn of the new Information Age, was a first test of an ongoing effort to the power of a networked force.

STUDY BACKGROUND

The Office of the Secretary of Defense (OSD), Office of Force Transformation (OFT) is the lead in moving the United States military to a jointly integrated Information Age organization. The Director of OFT has five top goals:

- Make force transformation a pivotal element of national defense strategy and DoD corporate strategy effectively supporting the four strategic pillars of national military strategy.
- Change the force and its culture from the bottom up through the use of experimentation, transformational articles (operational prototyping) and the creation and sharing of new knowledge and experiences.
- Implement Network Centric Warfare (NCW) as the theory of war for the information age and the organizing principle for national military planning and joint concepts, capabilities, and systems.
- Get the decision rules and metrics right and cause them to be applied enterprise wide.
- Discover, create or cause to be created new military capabilities to broaden the capabilities base and mitigate risk.

PURPOSE

This Volume, Network Centric Warfare Insights, is meant to provide the military reader an introductory view of the implications of network centric warfare at the operational and strategic levels of war. This study also provides six short, tactical-level battle stories that can be used to further the study of network centric warfare tenets and of the impacts of new technologies on organizations, leaders, and processes—tactics, techniques, and procedures.

U.S. ARMY WAR COLLEGE CASE STUDY MISSION STATEMENT

Conduct relevant research through documents and personal interviews to further the examination conducted in previous case study, titled "Network Centric Warfare Case Study Volume 1, *Operations: U.S. V Corps and 3rd Infantry Division (Mechanized) during Operation Iraqi Freedom (March-April 2003)."* Produce required briefings and a written study focusing on the potential/plausible strategic and operational implications of network centric warfare during combat operations and a series of tactical battle stories/vignettes that illustrate tenets of network centric warfare.

TASKS

1. Analyze potential and/or plausible strategic and operational implications of network centric warfare based on the findings and conclusions of Volume I, *Operations*, that examined the major combat operations of V Corps and 3rd Infantry Division (Mechanized) during Operation Iraqi Freedom (March-April 2003).
2. Produce six tactical level battle stories/vignettes that illustrate the effects of a network centric warfare enabled force.

GOAL

The aim of this volume is to further the study of network centric warfare concepts. This volume, the third of a three volume set, responds to the tasks listed above. It presents potential and/or plausible operational and strategic impacts and implications of network centric warfare (NCW) derived from the findings, observations, and conclusions of Volume I, *Operations*, and insights gained from Volume II, *A View of C4 Architectures at the Dawn of Network Centric Warfare*. Secondly, it provides six battle stories that illustrate aspects of the network centric warfare tenets.

STUDY METHODOLOGY

The USAWC approach to this volume involved historical research through original documents, after action reports, first hand interviews, books, and articles.

INTERVIEWS

This volume relied on many of the interviews that were conducted as part of the original Volume I, Operations, case study. Additional interviews were conducted to gain insights on selected actions and technologies.

PEER REVIEW PROCESS

The peer review process involved two reviews by an independent peer reviewer. The peer reviewer used for this portion of the study was Major General Dennis C. Moran, who was the CENTCOM Director of Command and Control, Communications and Computer Systems during OIF. He is currently the Vice Director for Command, Control, Communications and Computers Systems, VJ-6, the Joint Staff.


Prudens
Futuri

Strategic and Operational Implications

INTRODUCTION

Network Centric Warfare (NCW) is the military's expression of information age warfare and its impacts across all the levels of war. "Beyond battlefield applications, a networked force can increase efficiency and effectiveness across defense operations, intelligence functions, and business processes by giving all users access to the latest, most relevant, most accurate information. It also enables 'reach-back' by effectively employing people and capabilities without deploying them forward."[1]

NCW may be viewed as a warfighting concept based on the premise that networking enables warfighters to leverage available relevant information to maximize the mission effectiveness of diverse and geographically separated military capabilities. Volume I of this study concluded that V Corps' and 3rd Infantry Division's (Mechanized) conduct of offensive operations during March-April 2003 against Iraqi forces was enhanced by new sensors, extended connectivity, and new information systems. At the tactical level of war, these three factors enabled increased information sharing and situational awareness, which, among their many impacts, improved situational awareness of the battlespace and increased the speed of maneuver and the responsiveness and precision of fires.

This portion of the study reviews the tactical impacts (the findings, observations, and conclusions) learned from the Volume I study and groups them by the three categories of new sensors, extended connectivity, and new information systems. Though tactical in nature, these findings, observations, and conclusions provide a springboard to gain operational and strategic insights and implications for a networked force. After a review of the levels of war, the study uses the Universal Joint Task List (UJTL)[2] as a framework from which to consider and derive NCW implications at the strategic and operational levels of war. The hope is that the insights presented in this volume will spur further thought on the implications of network-centricity at these levels of war.

CAVEAT

The findings and observations from the Volume I study were based on an immature network. In other words, the network was not fully fielded; there were dissimilar non-interoperative systems, and much of the force did not have access to the new enablers. Those who had access received the immediate benefits of the network.

TACTICAL IMPACTS

Volume I concluded that networked information systems, sensors, and extended connectivity enhanced combat effectiveness. These factors allowed V Corps and its 3rd Infantry Division (Mechanized) to fight with a higher degree of shared situational awareness, collaboration, audacity, and synchronization than was previously possible. The impact of these factors is illustrated in the battle stories presented later in this volume.

---

[1] "The National Defense Strategy of the United States of America," (Washington, D.C.: Department of Defense, 2005), 14.

[2] *Chairman of the Joint Chiefs of Staff Manual 3500.04c: Universal Joint Task List*, (Washington, D.C.: Joint Chiefs of Staff, 2002), Appendix A to Enclosure B.

Volume I Findings

New Sensors. New sensor systems such as the Hunter Unmanned Aerial Vehicle (UAV), the Predator UAV, the long range advanced scout surveillance system (LRAS3), and others provided increased capabilities in conducting surveillance and reconnaissance. These sensors and others provided day or night, all weather acquisition of enemy forces and the real-time transmission of that data to the operators. As part of a network of sensors, they contributed to the collection of data and helped crosscheck and verify data collected by other sensors. These sensors provided highly accurate locations of enemy targets. Some also provided real-time video images. All improved the quality of intelligence collection on the enemy; when that data was placed into information systems like the automated deep operations coordination system (ADOCS), it improved shared awareness, leading to rapid decision-making that resulted in a changed target-servicing process. In fact, the most mentioned effect of the new sensor systems was the dramatically increased responsiveness and precision of joint fires. The "kill chain"—find, fix, target, track, engage, and assess—was compressed. Once enemy locations were identified, that information became targeting data that resulted in rapid engagement by all forms of joint delivered fires.

Some of the impacts of new sensors on tactical level tasks included an increased ability to develop intelligence; vastly improved responsiveness, precision, and effects of firepower, including artillery, close air support, and interdiction operations; enhanced ability of commanders to coordinate battlespace maneuver integrated with firepower; greater command and control and synchronization of forces by commanders; and streamlining of logistics and combat service support functions by reducing the volume of supplies (specifically, artillery ammunition) that needed to be transported and distributed.

Overall, the new and improved sensors enabled greater anticipation and increased responsiveness and effects of joint fires, which resulted in increased freedom of maneuver and greater overall force agility.

Extended Connectivity

Extended connectivity provided the backbone for the new information environment. The extended connectivity and bandwidth provided by the various satellite communications systems (DoD owned and operated satellites as well as commercial satellites) broke the bonds of line-of-sight tactical communications, enabling the flow of information across a dispersed network of connected information systems. Having access to the communications backbone with sufficient bandwidth available was essential to accommodating the constant flow of data at all levels of war. The extended connectivity was provided by systems such as the wide-band (25 kHz) single channel tactical satellite communications systems (TACSAT); the L-band Blue Force Tracker (BFT) transceiver; the L-band Movement Tracking System (MTS); the Ku-band Defense Tracking, Reporting and Control System (DTRACS); the Global Broadcasting System (GBS) (providing UAV feeds); a limited number of satellite-based Range Extension Assets (to connect mobile subscriber equipment [MSE] into the Defense Information Systems Network [DISN]); and commercial satellite telephones.

Extended connectivity had multiple impacts. It improved the quality of the command and control network and improved information shareability; the BFT was most responsible for these improvements. The extended connectivity provided by the TACSAT and BFT enabled wide

dispersion between forces and also enabled greater interactions and collaboration between those forces, leading to increased situational awareness and understanding. The level of the interactions shortened commanders' decision cycles while increasing confidence in their decisions and increasing their risk tolerance. Ultimately, extended connectivity improved the degree of command and control and force agility by enabling greater battlespace synchronization, more responsive forces, a higher operational tempo, and increased simultaneity and depth of operations.

New Information Systems

New information systems, including the Force XXI Battle Command Brigade and Below (FBCB2) using the BFT; MTS; the DTRACS, in conjunction with the Joint Deployment and Logistic Model (JDLM); the Command and Control Personal Computer (C2PC); and the Automated Deep Operations Coordination System (ADOCS) provided a new information environment. These systems and others using the extended connectivity backbone allowed for an automatic exchange of information and provided commanders and staffs a common operational picture (COP)—a fused picture of the battlespace—that provided unprecedented levels of situational awareness and understanding. For example, the FBCB2-BFT enabled automatic force tracking of those forces equipped with BFT, MTS, DTRACS, or other tracking systems and depicted those forces in near-real time. Not only could individual users see where they were on the battlefield in relation to other so-equipped users, but this data was automatically transmitted, fused and displayed as the COP, observed at all echelons of command representing all levels of war.

The COP provided a common basis for interaction and collaboration among commanders, between commanders and their staffs, and from staff to staff. This resulted in shortened decision cycles, greater unity of effort, and increased battlespace synchronization. The increased battlespace synchronization was demonstrated by integrated and responsive fires, maneuver force flexibility, and the retention of the initiative.

LEVELS OF WAR

The higher a man is placed, the broader his point of view.

—Carl Von Clausewitz, *On War*

The levels of war are doctrinal perspectives that clarify the links between strategic objectives and tactical actions. There are no finite limits or boundaries between the levels of war (strategic, operational, and tactical) and the levels of war are not necessarily associated with specific levels of command, size of units, types of equipment, or types of forces or components. However, certain commands tend to operate at particular levels of war, e.g. Combatant Commands typically operate at the strategic and operational levels of war while a U.S. Army corps will typically operate at the tactical and operational levels of war. Actions are strategic, operational, or tactical based on their effect or contribution to achieving strategic, operational, or tactical objectives.[3] These levels of war help commanders visualize a logical flow of operations, allocate resources, and assign tasks

---

[3] *Field Manual 3-90: Tactics*, (Washington, D.C.: Headquarters, Department of the Army, 2001), 1-2, *Joint Publication 3-0: Doctrine for Joint Operations*, (Washington, D.C.: Joint Chiefs of Staff, 2001), II-2.

to the appropriate command. The battle stories and vignettes presented as part of this volume are representative of tactical actions from battalion through corps level.[4]

The rise of information-age media reporting has compressed the time-space relationships of event occurrence and awareness; events occurring in one place can be reported with almost instantaneous visibility and implications globally. Seemingly minor military tactical actions can have operational or even strategic impacts, such as the capture of an American soldier. The shooting down of the Blackhawk helicopters in Mogadishu, Somalia in 1993 and the resulting deaths of several aircrew and the U.S. Army rangers attempting the save them, is a good example of a tactical event cutting across the levels of war and ultimately affecting U.S. national policy.

In a manner similar to the impact of information-age media reporting, the theorists of NCW believe that networked communications and info-structure will dramatically increase shared battlespace awareness across all levels of warfare. They surmise that this shared battlespace awareness will contribute to a coalescence of the levels of war.[5]

OPERATIONAL AND STRATEGIC IMPACTS

> ***…it is difficult to decide exactly where a strategical movement ends and a tactical movement begins, yet in conception the two are distinct.***
>
> —B. H. Liddell Hart, *Strategy*

The Universal Joint Task List[6] (UJTL) was used as a framework for extrapolating operational and strategic impacts from the tactical impacts of NCW as described in Volume 1. The impacts thus derived provide a logical model to address operational and strategic implications of NCW.

The UJTL provides a grouping of tasks for each level of war and each task grouping has multiple subordinate tasks. The tasks at each level can be linked horizontally across the same level of war based on type task and can be vertically linked across the three levels of war, connecting related tasks and actions necessary for the achievement of the higher task. Figure 1, provides a graphic view of the major task groupings by level of war.

Sensors

In OIF, the Combined Forces Land Component Command (CFLCC) was operating at the operational level of war during major combat operations. Activities at this level of war "imply a broader dimension of time or space than do tactics; they ensure the logistic and administrative support of tactical forces and provide the means by which tactical successes are exploited to achieve strategic

---

[4] Additional material on the levels of war is provided in Appendix F.

[5] David S. Alberts, John Garstka, and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2nd Edition (Revised) ed., *CCRP Publication Series* (Washington, DC: National Defense University Press, 1999), 88.

[6] *UJTL*, A-1. "The Universal Joint Task List (UJTL), when augmented with the Service task lists, is a comprehensive integrated menu of functional tasks, conditions, measures, and criteria supporting all levels of the Department of Defense in executing the National Military Strategy."

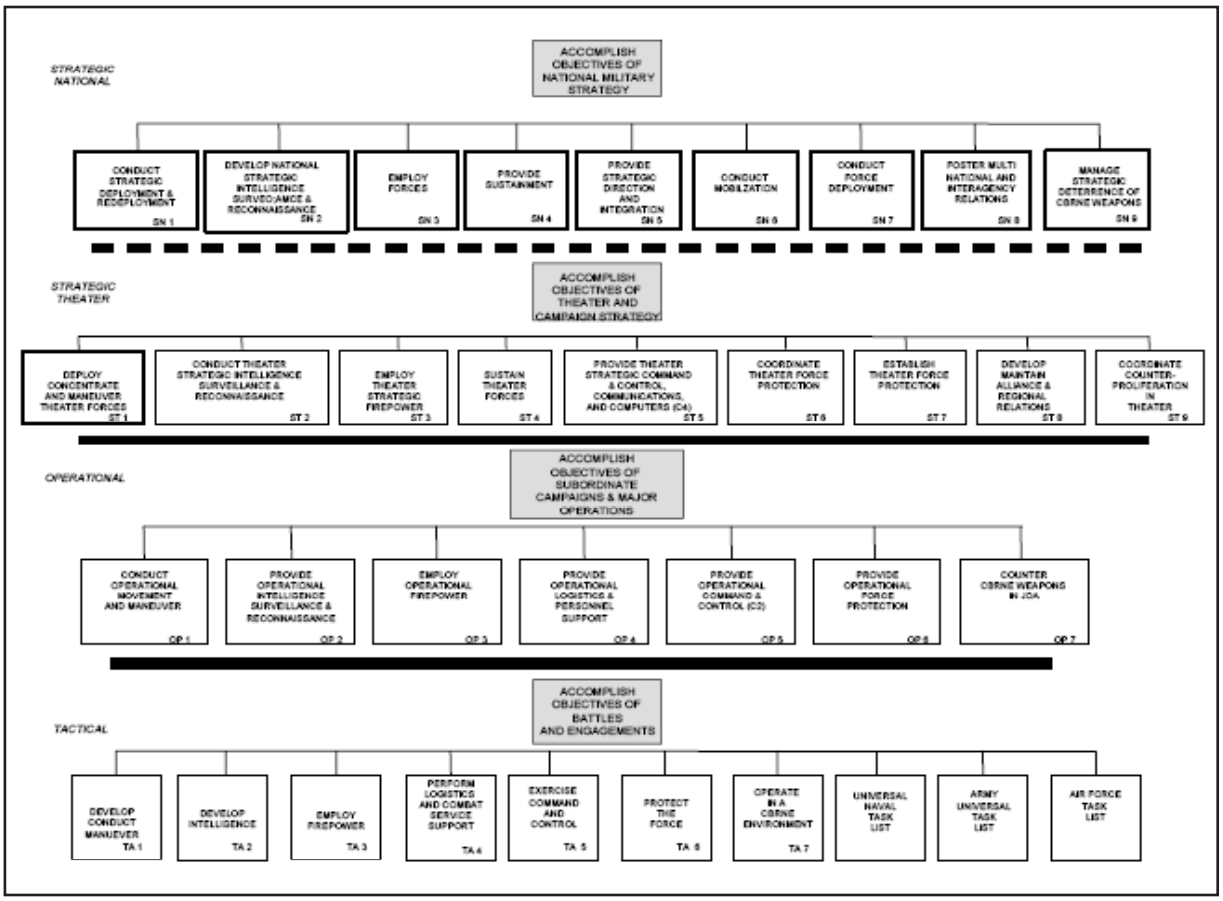


Figure 1: Relationship of Levels of War to Objectives[7]

objectives."[8] The impact of real-time feeds from networked UAVs had similar effects as they did at the tactical level. The enemy information provided by the UAVs enabled operational commands (like the CFLCC and the Combined Forces Air Component Command [CFACC]) to better fulfill the task of conducting operations in depth by taking the battle to the enemy across the breadth and depth of the battlespace and wresting freedom of maneuver away from the enemy forces. In the task of providing operational intelligence, surveillance, and reconnaissance, the UAVs enabled operations in depth by detecting, and locating enemy targets in sufficient detail to permit the effective employment of operational firepower. The operational firepower enabled the tasks of attacking operational targets, interdicting operational forces/targets, and providing firepower in support of operational maneuver. The increased precision and effects enabled by the UAVs had a corresponding effect logistically by decreasing the volume of munitions required for resupply.

UAVs as sensors also had significant impacts at the theater strategic level of war, at U.S. Central Command (CENTCOM). In conducting the task of theater strategic intelligence, surveillance, and reconnaissance, UAVs like the Predator and the Global Hawk enhanced the theater command's ability to collect theater strategic information, especially relating to strategically important high-payoff targets. These same systems improved the collection of information on the theater strategic

[7] Ibid., B-A-3.

situation regarding battlefield damage assessments and munitions effects. The most notable effects of the new sensors are found in the enhanced ability to employ theater strategic firepower for both planned and immediate targets (immediate targets are usually time-sensitive, highly lucrative targets that present a fleeting opportunity for attack) and then following up those attacks with an assessment of the effects. This enabled the theater commander to engage strategic targets with a compressed kill chain; instead of days, strategic targets were now engaged within hours and, in some cases, within minutes after the sensors found the targets.

At the national strategic level of war, the acquisition/procurement and allocation of sensors to support the CCDR's surveillance and reconnaissance requirements are critical to this task. At this level, the provisioning of national assets for tactical exploitation remains fundamental, and it now includes a new array of sensors (UAVs) that are more flexible in their employment. Tasks that these new sensors fulfill and enhance at the national strategic level include providing current intelligence to national strategic planners and decision makers and providing general military intelligence to the same.

Connectivity

Large fixed facilities, commercial land-line communications, constant and reliable power, and available bandwidth for assured satellite connectivity are all characteristics of the operational levels of command during OIF. The ability to share information laterally with other operational level commands and vertically up to the strategic level command and down to the tactical level command posts was expected and was the norm. This extended connectivity had significant positive effects on the accomplishment of required tasks at the operational level of war. Command and control is a key operational task enhanced by extended connectivity. Essential to this task is the maintenance of operational information and force status, which was enabled by the multiple, near-real-time common operational pictures (e.g., a maneuver COP and logistics COP) that were based on the automatic flow of data from the tactical level (from systems like BFT, MTS, and DTRACS) via extended connectivity. When the COP was coupled with extended voice communications, it allowed for rapid and accurate assessment of the operational situation. This situational awareness enabled and enhanced the operational level commanders' ability to synchronize and integrate operations to optimize combat power and achieve maximum effects.

The extended connectivity provided to the tactical levels also resulted in enhanced mission accomplishment at the theater strategic level. At that level, the commander determines and manages the command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system requirements and provides the C4ISR policy, plans, and systems to shape the environment and ensure information superiority and interoperability. The theater commander also must procure and allocate the necessary bandwidth to ensure the force is information enabled. This top-down process allows for rapid communication of the commander's intent and enables the bottom-up flow of data and information necessary for situational awareness and understanding. The extended connectivity from the tactical level provided those COP products that enabled the theater commander to monitor the near-real-time tactical situation in relation to the theater strategic situation. Therefore, the extended connectivity enhanced the ability to collect information on the theater strategic situation, which allowed the theater commander to better make timely decisions on the allocation of logistic resources, intelligence requirements, and the employment of theater strategic firepower.

The information received at national strategic level from the communications and information systems enhanced the ability to monitor the execution of campaign plans (e.g., the national leadership, both political and military, knew when V Corps forces were closing in on the strategically important objective of Baghdad and could observe as the forces entered into Baghdad proper, all in near-real time). This level of situational awareness at the national level, where war policy is formulated, increases the ability to adapt to conditions as the war progresses and, if required, to make timely revisions to the national military strategy. This level of situational awareness can allow for a smoother and timelier transition from the military element of power to the other elements of national power.

Information Systems

The impact of new information systems on operational tasks included an increased situational awareness that enhanced the CFLCC's ability to conduct operational movement and maneuver. In fulfilling this task, which includes deploying forces for operational advantage and conducting maneuver to operational depths, the CFLCC was enabled by the ability to observe the operational maneuver, via the COP, as it was being executed by the V Corps and I MEF tactical formations. When the tactical formations achieved objectives earlier than expected, the CFLCC was better able to anticipate, adjust, and coordinate its requirements for operational deep fires. The information environment also improved the CFLCC's ability to coordinate horizontally with the CFACC, enhancing the ability to plan, apportion, and synchronize operational firepower. The information systems also allowed the rapid dissemination of operational information from the CFLCC to the V Corps and I MEF headquarters.

At the theater strategic level of war, the new information systems increased the level of situational awareness and were especially key in the rapid coordination and execution of strategically important time-sensitive targets. Using ADOCS, CENTCOM was able to rapidly coordinate air strikes with the CFACC or task down to V Corps for the use of the Army Tactical Missile System. The information systems also enabled CENTCOM to better estimate theater closure times of forces; this was not only important to CENTCOM, but to all of the subordinate commands where those forces were to be employed. This enhanced situational awareness allowed for a more efficient reception, staging, onward movement, and integration of the force, a near-seamless transition of forces into theater. At the tactical level, Lieutenant General William Scott Wallace stated that the situational awareness of arriving forces into the theater allowed him and his headquarters to anticipate how and where these forces should be employed into the tactical operations.[9] This level of situational awareness and the agility it provides commanders cuts vertically across all the levels of war from the strategic national to the tactical. The effects of the COP at all levels of war was to give commanders and staffs an improved ability to provide orders, respond to events and opportunities, and coordinate both horizontally and vertically.

OPERATIONAL AND STRATEGIC IMPLICATIONS

The implications of the information age environment are many for the United States military, and they affect all the levels of war. The following discussion of operational and strategic implications

[8] Ibid., B-A-2.

[9] Interview with Lieutenant General William Scott Wallace, Commander, V Corps. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired, video taped interview, 28 April 2004.

is based on the analysis provided by Volumes I and II, and on the operatonal and strategic impacts drawn from that analysis and illustrated by the six battle stories contained in this volume. Each implication is introduced by a question. It is hoped that these questions and the discussion that follows will spur further debate, discussion, and research.

1. What type of leadership does the NCW environment require? Success of netcentric operations will depend on leadership. The Army defines leadership as "influencing people—by providing purpose, direction, and motivation—while operating to accomplish the mission and improving the organization."[10] The Army also distinguishes between direct leadership—face-to-face first line leadership, organizational leadership—where leadership is more indirect and leaders are supported by a staff to assist them in their leadership and management responsibilities, and strategic leadership, where leaders work in more complex, less certain environments and are responsible for large organizations, e.g., a Service Chief or a combatant commander. The NCW environment will require leaders at all levels who are comfortable in the information environment, are adaptive and innovative, and who foster these same traits in subordinate leaders. Leaders, especially those operating at the tactical level of war, must have a boldness or audacity[11] and be capable of operating with broad mission-type orders and working within the commander's intent. These leaders must also be comfortable in the knowledge that their unit's situation and intra-unit communications may be monitored by higher levels of commands as part of the increased level of shared situational awareness. This requires a high level of trust between leaders at all levels. Leaders at all levels must clearly communicate their intent and provide mission-type orders allowing subordinates the freedom to execute the missions and enabling them with the necessary resources for execution. A danger of the netcentric environment is to empower micromanagers. This type of leadership will prove counter-productive to the ascribed NCW tenets.

2. How does networking affect the deployment process? While a COP of most in-theater maneuver theater forces was available during OIF, responding to changes in the deployment process was impaired by the lack of a common visibility of deploying forces. Joint Forces Command[12] (JFCOM)—the force provider–noted that the joint deployment planning and execution process was not sufficiently flexible, transparent, user-friendly, or disciplined to accommodate the conditions experienced in OIF. The ability to manage changes and alterations in the flow of forces proved difficult. Simply put, what was achieved, was achieved by brute force and inefficient workarounds.[13] A system that provides deploying

---

[10] *Field Manual 22-100: Army Leadership*, (Washington, D.C.: Headquarters, Department of the Army, 1999), 1-4.

[11] The terms "boldness" and "audacity" in this text are meant to convey the spirit to win in spite of numerical inferiority and the ability to calculate the risk, act boldly upon the calculation, and surprise the enemy by action. General Wallace referred to this as a "cavalry mentality."

[12] U.S. Joint Forces Command, headquartered in Norfolk, Virginia, is one of DoD's combatant commands with the responsibility for providing mission ready joint capable forces, joint concept development and experimentation, and supports the development and integration of joint, interagency, and multinational capabilities to meet the present and future operational needs of the joint force.

[13] U.S. Joint Forces Command, *Joint Lessons Learned: Operation Iraqi Freedom Major Combat Operations* (Coordinating Draft), (Norfolk, VA: Headquarters, United States Joint Forces Command (JFCOM), 2004), 25.

force COP would significantly help alleviate problems. As the joint force becomes more networked, the impacts will even be greater than those experienced during the initial phase of OIF. The development of collaborative planning and visualization tools applicable to the deployment process, as recommended by JFCOM, would have significant impact on the strategic deployment process. A deployment COP or "D-COP" would allow for timely warning of changes in the deployment flow at the national strategic level, enable the theater strategic onward movement and integration of deploying forces, and more accurately estimate closure times of the deploying forces. The D-COP would also provide flexibility to the supporting commands, such as U.S. Transportation Command[14] (USTRANSCOM), in reallocating scarce transportation resources or in shifting the flow of forces as requirements in theater change.

3. How does the increased level of shared situational awareness across the levels of war affect the strategic employment of forces, especially in the synchronization and employment of strategic firepower?[15] For example, access to the near-real-time COP would allow the U.S. Strategic Command (STRATCOM),[16] as a supporting command, to anticipate and plan for missions and changes to missions in support of the geographic CCDR's campaign plan. This process would enable increased collaboration and synchronization and would increase the effects of strategic firepower. This level of networking exploits friendly capabilities and has the potential for generating increased reach and synergy to the battlespace.

4. What kind of standardization must occur across the force to ensure information sharing? Sharing information across the joint force will require an adherence to standards. The force cannot afford non-compatible communications and information systems. The rapid acquisition of new information systems and the fielding of these systems to the forces in theater during OIF resulted in seven different, non-compatible systems (like BFT, MTS, and DTRACS) that were used to populate the different COPs. Therefore, many of the units at the division level and below could not benefit from the greater situational awareness afforded by these systems. For example, the 3rd Infantry Division (Mechanized) had only a very limited view of the logistics picture because it could not view DTRACS information. Command posts using the Maneuver Control System (MCS) lacked the joint picture and also lacked the connectivity and mobility for acquiring the continuous, automatic flow of data. As NCW brings an ever-increasing need for joint interoperability, and even joint interdependence, the information systems at all levels must be able to depict the joint COP, not just a service or functional component COP. The Department of Defense (DOD) faces constant challenges in developing systems that are truly interoperable among the services, as different commercial vendors

---

[14] U.S. Transportation Command, headquartered at Scott Air Force Base, Illinois, is one of DoD's combatant commands. USTRANSCOM is responsible for providing air, land and sea transportation for the Department of Defense, both in time of peace and time of war

[15] *UJTL,* B-C-A-42.The term strategic firepower is a far-reaching concept and is used here to refer to any type of attack (i.e., nuclear, conventional, unconventional), both lethal and non-lethal, on targets of strategic value.

[16] U.S. Strategic Command, headquartered at Offutt Air Force Base, Omaha, Nebraska, is on of DoD's combatant commands. Some if its responsibilities include for providing global strike capabilities and global intelligence, surveillance, and reconnaissance.

providing the Services' systems use different, proprietary technologies. The development of the Global Information Grid (GIG) will hopefully provide the overarching architecture, the standard which all systems must adhere to in order to plug-in and play in the network.

5. How does the networking affect risk tolerance? Volume I of the study found that increased situational awareness and the fact that the Iraqis were having little effect against armored formations had a significant positive impact on risk taking and risk mitigation. With the BFT, the tactical level commanders felt more connected to the force and felt that they understood where they were in relation to the force. This connectedness resulted in increased risk tolerance and was reflected in the boldness and audacity of the tactical maneuver commanders as they maneuvered their forces. This increased risk tolerance at the tactical level may be reflected in a greater risk tolerance at the higher levels of war, where the totality of the force and tactical actions are viewed in relation to strategic objectives.

6. How does the increased level of situational awareness impact on the traditional military decision making process? At the tactical level it was noted that the increased situational awareness and the capability to talk with other commanders changed many commanders' military decision-making process from a staff-centric course of action development process to a commander-centric, directed course of action process. This shift to a more directed course of action process did not imply a shift to micromanagement; rather, it was a shift to greater collaboration and information sharing between commanders that resulted in rapid situational understanding and knowledge of what was needed next. Enabled by the information environment, commanders were able to communicate their intent and to rapidly issue mission-type orders that allowed their subordinate commanders maximum flexibility. Commanders at the tactical through strategic levels were now able to observe and listen in on the development and the execution of the orders as the campaign was executed. Success in the NCW-enabled environment requires commanders to have a new level of trust, as information-enabled supporting and subordinate commanders execute missions within the commander's intent during the ebb and flow of engagements and battles.

7. What are the impacts of NCW on force design? Today, NCW plays a central role in the transformation of the military. At the tactical, operational, and even theater strategic levels of war, the evolving tactics, techniques, and procedures (TTP) appear to be rapidly adapting to the new capabilities provided by the networking of sensors, decision-makers, and shooters. At the national strategic level, there are developments in the transformation strategy that reflect the adoption of the new and evolving concepts. The new paradigm appears to be moving towards forces that are more interconnected and jointly interdependent, with ground forces that are smaller, faster, and lighter. This would provide a strategically agile force and one that should provide a considerable capability for the rapid achievement of national military objectives. This type of force appears most appropriate for "strategic raids," where winning battles and engagements and rapid achievement of the military campaign objectives is the goal. It does not appear to be a force designed not only to win the campaign but capable of winning the war through its actions in the post-maneuver phases of a conflict. It appears that, for over the last half century and particularly more so today, B. H. Liddell Hart was correct when he wrote "If you want peace, understand war—particularly the guerrilla

and subversive forms of war."[17] Today's ground forces must have the agility provided by netcentric enablers, but they also require the capacity to operate within the full spectrum of conflict where maneuver may be the action of winning the campaign but stability and security operations are required to win the war. This dichotomy presents a conundrum for the transformation force structure planners and weapons designers.

8. How do DOD and the Services acquire, field, and maintain a NCW-concept-based force, considering the rapid and continuous advances in information and communications technologies capabilities? There appears to be a stumbling block in the road to the transition to a fully NCW-capable force, and that road block is the current acquisition process for high technology communications and information systems. Volume II addresses the applicability of Moore's Law[18] and its impact on the capacity of computer chips and therefore systems necessary to gain and maintain a fully capable NCW force. The DOD cannot afford a ten-year development, testing, procurement, and fielding process for communications and information systems. We must realize that military C4 systems are no longer merely radios and computers using unique technologies; they are systems that rely on commercial computer technologies with a half-life of eighteen months to two years. However, the program of record development and acquisition cycle—by design—is a ten-year program. In that ten-year period, our potential adversaries, whether state or non-state, will have access to several new generations of commercial technologies. As a result, our future opponents may possess networked C4 capabilities equal to or more capable than our own. The current program of record acquisition process for C4 systems is certain to ensure technology obsolescence by the time the systems are fielded. Only a reform of the acquisition process, especially for network-related technologies (communications and computers), can ensure the timely arrival of NCW enabling systems.

9. What does the transformation to a net-centric force mean for future allied and coalition operations? For the last century, the United States chose to employ its military in allied and coalition environments. This pattern will continue for the foreseeable future. The basic requirement for conducting operations across the spectrum of war necessitates and presupposes an ability to communicate, share information, and coordinate actions. There is a probability that, as the transformation of the U.S. military continues, they may become too "high-tech" to interoperate with allied or coalition partners. Developing transformational NCW capabilities requires enormous investments in technology, and standardization to ensure compatibility. Many of our potential allies will not be able to afford such an investment. The resultant technology gap has the potential of isolating the U.S. military from its potential partners; therefore, the development of new NCW enablers must include some level of backward compatibility. Future forces must preserve the ability to operate with non-network-enabled forces without limiting their own network-enabled capabilities.

---

[17] B.H. Liddell Hart, *Strategy*. Second revised ed. New York Frederick A. Praeger, Inc., Publications, 1968, 373.

[18] The observation made in 1965 by Gordon Moore, co-founder of Intel, that the number of transistors per square inch on integrated circuits had doubled every year since the integrated circuit was invented. Moore predicted that this trend would continue for the foreseeable future. In subsequent years, the pace slowed down a bit, but data density has doubled approximately every 18 months, and this is the current definition of Moore's Law, which Moore himself has blessed. Most experts, including Moore himself, expect Moore's Law to hold for at least another two decades. Found at: http://www.webopedia.com/TERM/M/Moores_Law.html

10. Does the ever increasing use of NCW enablers create new vulnerabilities? NCW significantly enhances our ability to conduct warfare at all levels; however, there are some potential vulnerabilities that should be considered.

    a. The (albeit thin) networking of the land forces during the initial maneuver phase of OIF had a positive impact in reducing the number of fratricide incidents. This was anecdotally attributed to network-enabled commanders maneuvering "smarter" because of their increased situational awareness. In the future as more and more platforms are included in the network, one would expect an even greater affect on fratricide prevention. However, the converse may be true for platforms with broken or otherwise inoperable transponders/transceivers. Would a platform not "squawking" blue force be more likely to be identified as an enemy platform? In fact, during Joint Expeditionary Force Experiment (JEFX) 2004, there was a marked increase in the number and rate of air-to-ground fratricides (during simulations) when blue force tracking was installed on Army combat vehicles down to the platoon leader level. The Air Force pilots were able to "see" the blue force "squawks"—blue icons in the heads-up displays—and assumed that the most dangerous threat to the friendly forces were those nearby vehicles that were not "squawking" blue. As a result, they attacked friendly vehicles not enabled with the blue transponders.[19] An identify friend or foe system dependency may also lead to a degradation of vehicle identification skills by individual soldiers and other shooters. While NCW enablers may help reduce fratricides, service and joint training, as well as procedural controls, will remain an important factor in fratricide prevention.

    b. Does the availability of sensors, connectivity, and information systems create a dependency on these systems that results in forces unable to operate effectively in a degraded environment? The degradation may come from technology failures, enemy actions to attack the network, or an elusive and skillful enemy adapting asymmetrically to the environment. A level of non-netcentric redundancy needs to be maintained and trained for. The burden will be upon the training base to determine when, where, and to what degree soldier and leader development is necessary for training both new, netcentric skills and maintaining non-netcentric skills. Unit commanders will need to address the issues involved at the collective and unit levels of training.

    c. Does reliance on commercial satellite communications create new vulnerabilities? During the initial phase of OIF, CENTCOM forces benefited from improved connectivity and bandwidth provided by numerous space-based communications satellites. The military provided forty-four satellite communications (SATCOM) terminals while obtaining an additional thirty-five SATCOM terminals from commercial vendors.[20] Are commercial communications satellites more vulnerable to disruptions caused by potential enemy

---

[19] Information provided by Colonel Scott T. Forster, currently a member of the staff and faculty at the Center for Strategic Leadership, United States Army War College. Colonel Forster was an exercise participant in Joint Expeditionary Force Experiment (JEFX) 2004, which was the fifth in a series of large-scale Chief of Staff of the Air Force (CSAF)-sponsored experiments designed to assist the U.S. Air Force in preparing for the challenges of 21st Century Expeditionary Air and Space Force operations.

[20] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics, and Military Lessons* (Westport, Conn.: Praeger, 2003), 184.

anti-space operations than military communications satellites? Are commercial satellite vendors and their systems more susceptible to sabotage, "bugging," jamming, meaconing, or signals intercepts than United States military communications satellites?

CONCLUSIONS

> ***The foundation of our operations proceeds from a simple proposition: the whole of an integrated and networked force is far more capable than the sum of its parts.***
>
> —The U.S. National Defense Strategy

Volume I, *Operations*, of this study validated that, during the maneuver phase of OIF, new information systems, new sensors, and extended communications connectivity enhanced the combat effectiveness of V Corps and 3rd Infantry Division (Mechanized) operations. Analyzing the results from the tactical level effects yields similar impacts for the operational and strategic levels of war: information sharing across the levels of war results in a higher situational awareness, greater knowledge, and increased integration and synchronization of effort.

Volume II, *A View of C4 Architectures at the Dawn of Network Centric Warfare*, concludes that entry into the era of net-centric warfare, marked by OIF, signals a paradigm shift in the way information is moved to and on the battlefield. Attaining and maintaining a net-centric edge over the enemy requires the real-time introduction of technologies and the rapid adoption of these technologies by the users. The slow and deliberate procurement of new military C4 systems is no longer acceptable. The commercial sector technologies that make up these systems are advancing at a speed that vastly outpaces the decision cycle inherent in the current, cumbersome acquisition process. Realizing the exponential growth of global bandwidth and information technologies will require a reinvented acquisition process for the DOD in the twenty-first century. This new process must provide for timely infusion of new technologies into the force and provide the flexibility to update the technologies as advances are realized. In order for NCW to enable the necessary integration and synchronization of the multiple levels of war, it must rely on the effective and reliable networking of commanders, information systems, and effectors or shooters. The backbone of this network is the communications architecture that enables the flow of data and the exchange of information. The true enabler of NCW will be the arrival of the Global Information Grid (GIG), currently scheduled for initial operational capability in 2008. The GIG will provide global omnipresent connectivity, giving its users at all levels a seamless, secure, and interconnected information environment. The GIG will allow interfacing with our allies, coalition partners, and non-GIG systems. Only when this level of interconnectedness is achieved, provided that the acquisition challenge can be overcome, will the true potential of NCW be fully realized.

Finally, a goal of NCW is to provide decision-makers at all levels with near-real-time information, enabling them to rapidly understand the situation and then make timely decisions for their level of responsibility. This may not equate to a coalescence of the levels of war, as envisioned by some of the NCW theorists, which is often expressed as "flattening the hierarchy." The perspectives and functions of commanders and staffs at each level of war are different, each is relevant and important, and they are not diminished by an increase in situational awareness. Indeed, they may be increased.


Prudens
Futuri

Battle Stories

Introduction

This section of the volume contains six maneuver-oriented tactical level battle stories—vignettes—that use the tenets of network centric warfare (NCW) to illustrate the impact of new systems on organizations and leaders. The Iraqi ground forces at the commencement of OIF were estimated to consist of 280,000 – 350,000 regular army troops serving in 17 divisions, an estimated 50,000 – 80,000 troops in 6 Republican Guards Divisions, and a Special Republican Guard Division of approximately 15,000 troops for the defense of Baghdad. The forces consisted of over 2,200 tanks, 2,400 Armored Personnel Carriers, and 4,000 artillery systems.

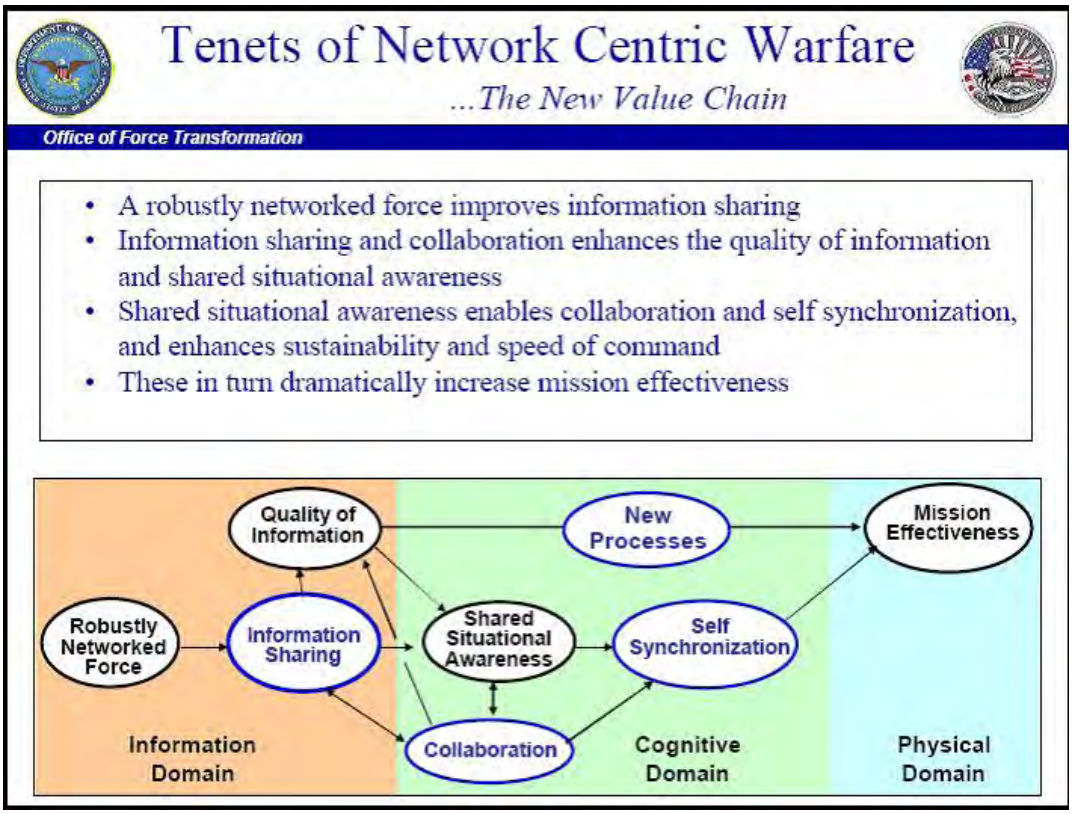


Figure 1: Tenents of Network Centeric Warfare[1]

Each battle story is written as a stand-alone narrative that highlights the effects of specific enabling technologies on combat effectiveness and mission capabilities. Each story recounts an action of the V Corps and 3 Infantry Division during the attack that culminated in the fall of Baghdad. The stories vary in their complexity, as do the system enablers. They are arranged in chronological order. Figure 2 depicts the battle stories, the technology enablers, and some of the key NCW tenets illustrated in each story.

---

1 This "Tenets of Network Centric Warfare" slide was obtained from a 16 June 2004 presentation to the Command and Control Research and Technology Symposium (CCRTS). The brief was presented by Colonels Gary Agron and Charles Pattilo, Office of the Secretary of Defense, Office of Force Transformation. The tenets are also depicted in a graphic representation across and within the information domain—where information is created, manipulated and shared; the cognitive domain—where perceptions, awareness, beliefs and values reside, and where decisions are made; and the physical domain—where effects take place.

Battle Stories

Vignette	Enablers	NWC Tenets
Tallil (OBJ Firebird)	**LRAS3**	Quality of Information New Processes and Mission Effectiveness
As Samawah	**FBCB2-BFT**	Quality of Information Shared Situational Awareness New Processes and Mission Effectiveness
5 Simultaneous Attacks	**UAV** **ADOCS**	Quality of Information Collaboration New Processes and Mission Effectiveness
Logistics	**MTS** **DTRACS**	Quality of Information Shared Situational Awareness Collaboration
OBJ PEACH	**BFT/FBCB2** **TeleEngineer**	Shared Situational Awareness Self- Coordination / Synchronization Mission Effectiveness
Thunder Runs	**FBCB2-BFT** **TACSAT**	Shared Situational Awareness Collaboration Mission Effectiveness

Figure 2: Battle Stories

Purpose and Scope

These battle stories provide opportunities for individual study or seminar learning. They are designed to spur discussion and dialogue concerning the impacts of NCW enablers on organizations and their leaders, as well as on tactics, techniques and procedures. They also provide a gateway for further discussion of the future implications of NCW concepts at the tactical level, or the implications of these concepts for operational and strategic level commanders as they apply the facets of the operational art in campaign design and execution.

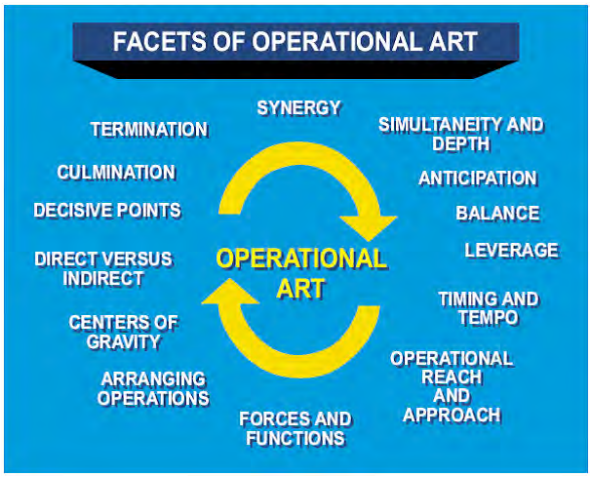


Figure 3: Facets of Operational Art[2]

[2] Obtained from Joint Publication 3-0: Doctrine for Joint Operations, (Washington, D.C.: Joint Chiefs of Staff, 2001), III-10. "Joint force commanders employ operational art, in concert with strategic guidance and direction received from superior leaders, in developing campaigns and operations."

Battle Stories

Tallil Air Base

The attack to seize Objectives CLAY and FIREBIRD during the maneuver phase of Operation Iraqi Freedom (OIF) presents a clear example of improved quality of information affecting standard operating procedures and increasing mission effectiveness. The attack on Objective FIREBIRD (Tallil Air Base) illustrates the impact of a new technology, the Long Range Advanced Scout Surveillance System (LRAS3), on the battlefield and how this new system increased the quality of available information—thereby increasing the level of situational awareness and understanding—resulting in changed doctrinal tactical processes and procedures. It also highlights the importance innovation plays in exploiting the capabilities that new technologies may bring.

CONTEXT OF THE BATTLE STORY

The attacks to seize objectives in the vicinity of Tallil Air Base and An Nasiriyah, the initial 3rd Infantry Division (Mechanized) (3 ID) objectives after crossing the berm into Iraq, occurred on 21–22 March 2003.

ENEMY FORCES

In the south of Iraq, the Iraqi army forces were focused on defending the most obvious and direct approach to Baghdad, that being the approaches between the Tigris and Euphrates rivers along Highways 1, 6, and 7. The Iraqi disposition reflected a clear expectation that the U.S.-led coalition

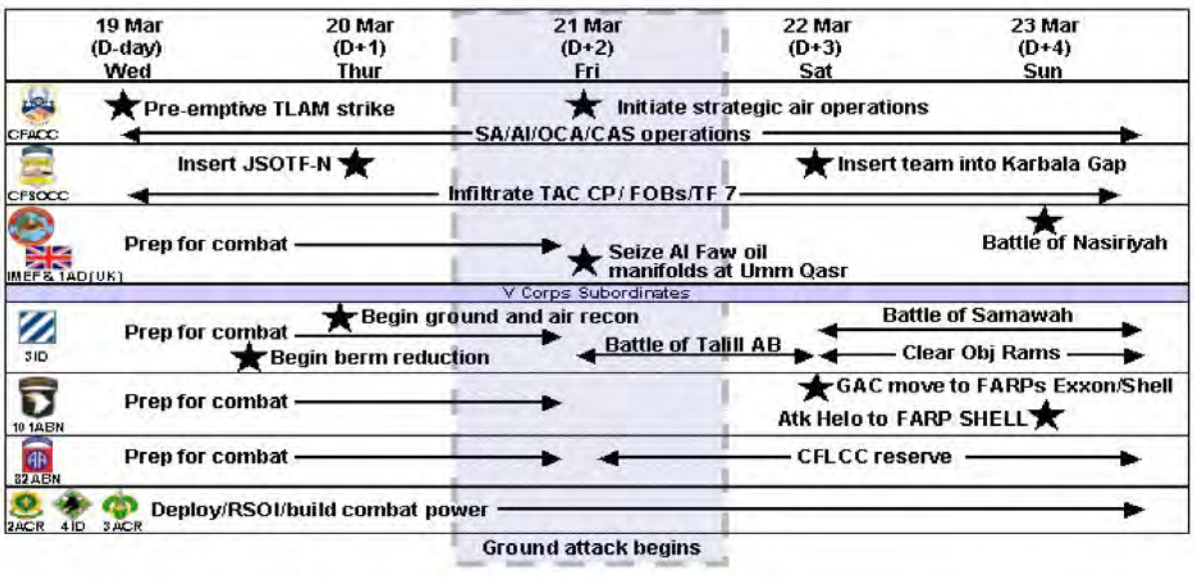


Figure 1: Timeline[1]

[1] Figure 1, Timeline, courtesy of *On Point*.

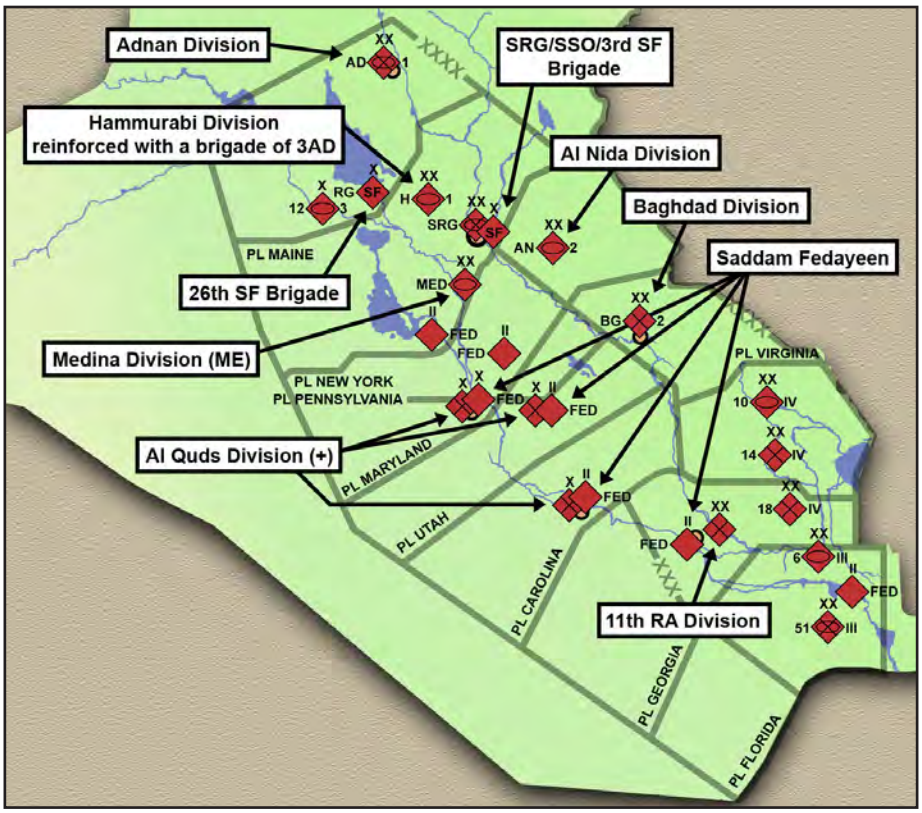


Figure 2: Enemy Forces Initial Set[2]

would attack north from Kuwait utilizing this Tigris–Euphrates valley approach for its main effort; therefore, their defenses were arrayed in depth and used oil fields as sanctuaries.[3] West of the Euphrates River, the Iraqis expected the use of airborne and air assault forces, here the Iraqis had mostly light forces, anti-aircraft units, and irregular and/or paramilitary forces mainly consisting of the Saddam Fedayeen and Ba'ath Party militia.

The 11th Infantry Division (Iraqi Regular Army) constituted the bulk of Iraqi forces positioned in the vicinity of Tallil Air Base and An Nasiriyah. Reports from special operations forces and other human intelligence (HUMINT) sources just prior to the 3 ID's approach towards Tallil Air Base and An Nasiriyah had identified two brigades of the 11th ID, the 45th and 47th, deployed east of An Nasiriyah, and the 23rd Brigade deployed in northeast An Nasiriyah. These reports indicated that the 45th and 47th would likely capitulate; however, there were conflicting reports indicating that the 45th had moved to join forces in the Al Basra area. The Division's assessment at LD was that these units would likely stay put or capitulate, while forces newly recruited in the city, coupled with the 21st Tank Regiment, the Commando Battalion, and recent Ba'ath and Saddam Fedayeen reinforcements, would offer a moderate defense.[4]

---

[2] Figure 2, Enemy Forces Initial Set, courtesy of *On Point*.

[3] Gregory Fontenot, COL, U.S. Army, Retired, E.J. Degen, LTC, U.S. Army, and David Tohn, LTC, U.S. Army, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 99.

[4] 3rd Infantry Division, *Operation Freedom: Third Infantry Division (Mechanized) "Rock of the Marne" after Action Report,* Final Draft, (U.S. Army, 3rd Infantry Division (Mechanized), Ft. Stewart, GA, 2003), Operational Overview. Battle for Tallil: 21 March.

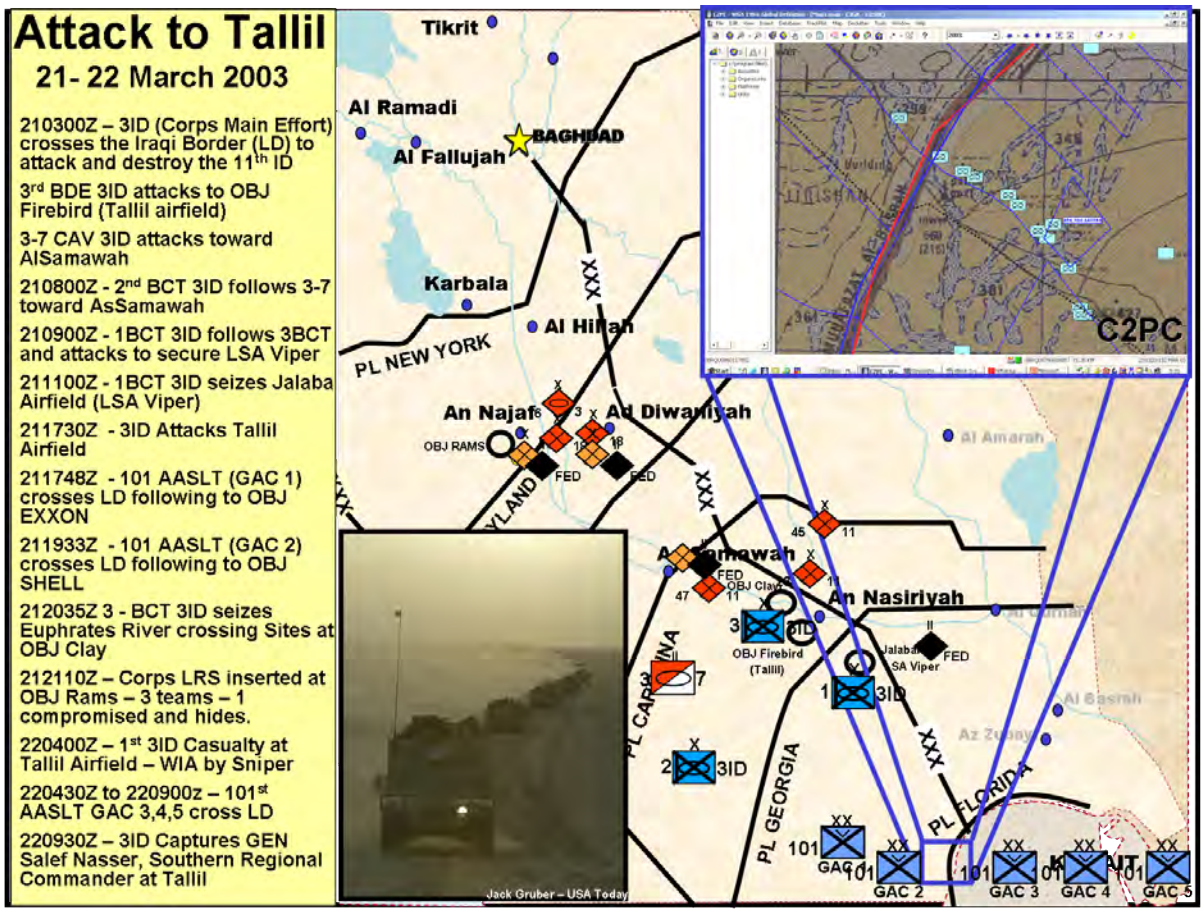


Figure 3: Attack to Tallil Significant Events[5]

FRIENDLY FORCES

Based on intelligence as to the whereabouts of Saddam Hussein, President Bush made the decision to execute the "decapitation strike" on 19 March 2003 using air and missile attacks. USCENTCOM[6] ground forces began crossing the berm and into Iraq in the early morning hours of 20 March, twenty-four hours earlier than originally planned.[7]

At the commencement of the attack into Iraq, V Corps maneuver forces consisted primarily of the 3 ID, the 101st Airborne (Air Assault) Division, and the 11th Aviation Regiment. The 3 ID was the corps' main effort and was organized for combat with three ground maneuver brigade combat teams (BCTs), an aviation brigade (4th BCT), a cavalry squadron (3rd Squadron, 7th Cavalry Regiment), divisional artillery, an engineer brigade, a signal battalion to support command and control requirements, and divisional logistic support units.

---

[5] Figure 3, Attack to Tallil Significant Events, from V Corps briefing materials courtesy of Dr. Charles E. Kirkpatrick, V Corps Historian.

[6] U.S. Central Command, headquartered in Tampa, Florida, has responsibility for most of the Middle East and Central Asia. USCENTCOM was in command of all joint military operations during Operation Iraqi Freedom from its forward headquarters in Qatar.

[7] Fontenot, Degen, and Tohn, *On Point*, 86.

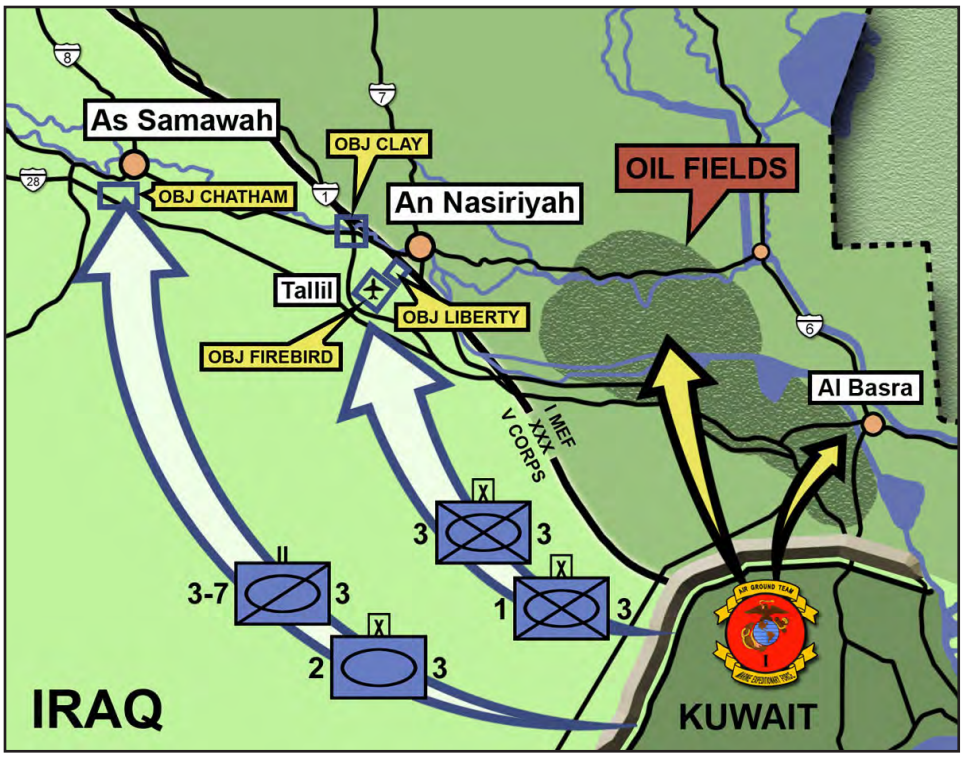


Figure 4: Ground Forces Scheme of Maneuver [9]

In the initial four days of ground operations, 20–23 March 2003, the 3rd ID spearheaded the V Corps' drive into Iraq. The initial stages of ground operations included these critical events: 1) breaching the berm at the border from Kuwait into Iraq; 2) seizing Tallil Air Base (Objective Firebird) and areas around An Nasiriyah; and 3) isolating As Samawah (Objective Chatham).[8]

Tallil Air Base was an important objective for CENTCOM's Combined Forces Land Component Command (CFLCC), which commanded all of the land forces for General Tommy Franks, the CENTCOM Commander. Tallil Air Base, about 140 kilometers north of the Kuwait–Iraq border, was to provide the initial logistics support base and necessary aviation facilities in Iraq to support the V Corps attack north to Baghdad. Tallil Air Base was also just outside the town of An Nasiriyah on the Euphrates River and was the first town of any significance where the 3 ID troops would encounter large numbers of civilians. An Nasiriyah and the Tallil Air Base were critical for the lines of communications (LOC) over which the supplies would flow that would enable the combat formations to continue the attack north to Baghdad. The bridge outside of An Nasiriyah (Objective Clay) was equally critical for the passage of the 1st Marine Expeditionary Force's Task Force Tarawa across the Euphrates River and was the first objective to be seized by the 3rd Brigade Combat Team (BCT). The attack would facilitate the forward passage of the 3 ID's 1st BCT on to the west towards An Najaf (Objective RAMS) and Karbala (Objective RAIDERS).[10]

---

[8] Ibid, 87-88.

[9] Figure 4, Ground Forces Scheme of Maneuver, courtesy of *On Point*.

[10] Fontenot, Degen, and Tohn, *On Point*, 88.

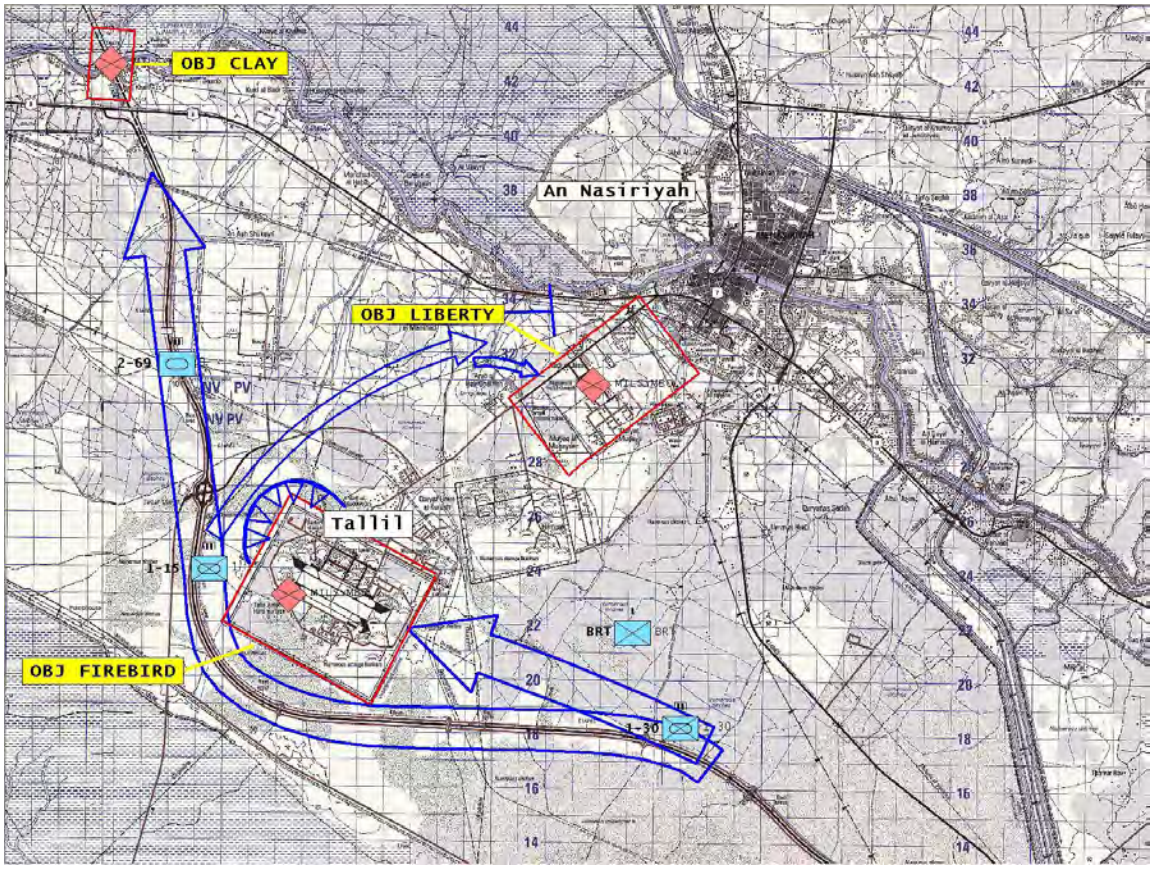


Figure 5: 3rd BCT Scheme of Maneuver [11]

THE BATTLE

After breaching the berm, 3 ID attacked north along two separate attack routes to destroy the 11th Iraqi Infantry Division in zone and seize and secure their initial objectives. The 3rd and 1st BCTs attacked north on the eastern route using Highway 1 towards Objective Firebird, and the 3-7 Cavalry and 2nd BCT swung out to the west and attacked north towards Objective Chatham.

3rd BCT, commanded by COL Dan Allyn, had the task of seizing the division's initial objectives. The 3rd BCT had prepared for a brigade-level coordinated attack that was to begin the evening of 22 March using attack aviation and ground maneuver supported by artillery fires. The plan called for a night attack, with the attack aviation units conducting attacks on enemy targets in and around the air base and a sequence of artillery fires for about an hour preceding the ground maneuver attacks. TF 2-69 Armor (AR) was tasked to seize the bridge over the Euphrates (Objective Clay). TF 1-15 Infantry (IN) was tasked to secure Objective Liberty, the Iraqi 11th ID's garrison, isolate Tallil, and provide a blocking force against enemy forces that may approach from An Nasiriyah or Tallil towards Objective Clay. TF 1-30 IN was to clear and secure Tallil Air Base the following morning. TF 2-70 AR was the BCT reserve. The BCT reconnaissance troop (BRT) would precede

[11] Figure 5, 3rd BCT Scheme of Maneuver, graphics derived from interview with COL John W. Charlton, who commanded TF 1-15 Infantry during this action. Interview conducted 14 March 2006 at the U.S. Army War College, Carlisle Barracks, PA.

the main body of the BCT by approximately two to three hours and take up positions where they could observe enemy activity and pass back reports to the BCT as the attack forces approached.[12]

The plan began to change shortly after the division cleared the berm and began advancing north. On the afternoon of 21 March, a day prior to when 3rd BCT was scheduled to conduct its attacks on the objectives vicinity Tallil Air Base, COL Allyn received a radio call from BG Austin, the 3 ID assistant division commander for maneuver, asking if the 3rd BCT was postured to initiate its attacks early. BG Austin informed COL Allyn that, due to a combination of the division's rapid advance and uncertainty as to the intentions of the enemy as well as a number of other factors, if it were possible he wanted the BCT to take its initial objectives a day earlier than planned. At that point, TF 2-69 AR was closing into its attack position, 1-10 Field Artillery (the BCT's direct support artillery battalion) was closed into its positions to support the attack, and TF 1-15 IN and TF 1-30 IN were rapidly closing into their attack positions. The attack would also be supported by two additional artillery battalions, 1-41 Field Artillery and 1-39 Field Artillery (Multiple Launch Rocket System–MLRS) still in movement to positions from which to support the attacks. COL Allyn quickly determined he had sufficient combat power based on what he knew about the enemy situation, but he recognized that his carefully planned, synchronized and coordinated attack would now be more of a phased attack. COL Allyn felt confident that, based on the BCT's level of training, its ability to adjust on the move, and their overwhelming firepower, they were ready to accept some risk in the interest of speed.[13]

At about 1400, the BRT began its movement forward, approximately two to three hours ahead of the attack forces moving out of their attack positions. This movement ahead of the main force enabled the scouts to move quickly and with some stealth, hopefully allowing them to take observation positions and send reports without enemy observation or contact. However, within 30 to 45 minutes after their departure, the BRT made contact with two civilian trucks and men dressed in civilian clothes emplacing a minefield along the route of advance. The scouts stopped the minefield emplacement by engaging these forces, killing a number of them and capturing several. The BRT report of this action gave COL Allyn an indication that the Iraqi forces may not have been planning on capitulating but rather on staying put and fighting. The BRT continued its movement toward their observation points without further contact. Once in their observation positions, the BRT, using their newly fielded Long Range Advance Scout Surveillance Systems (LRAS3s), was able to locate enemy forces at extended ranges. They confirmed that the enemy did not have a strong positional defense on the air base and that the basic scheme of maneuver was supportable.[14]

The BCT began its movement out of its attack positions with TF 2-69 AR initiating its movement out of its attack positions around 1540 and the two infantry task forces starting around 1645. To support the attack, the attack helicopters supported by artillery suppression of air defense artillery (SEAD) conducted attacks against enemy forces at Tallil in advance of the BCT attacks on the objectives. The BCT had a number of fire plans developed to support the seizure of Tallil, including an extensive set of preparatory fires on likely enemy positions, but there was a desire to conserve ammunition and not place extensive fires on an enemy that might capitulate. MG Blount, the 3 ID commander, related that, after reviewing the attack plan with COL Allyn, he had concerns

[12] Interview with Colonel Daniel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired., Personal interview, 10 Nov 2004.

[13] Ibid.

[14] Ibid.

over the artillery ammunition expenditures that were planned. He then explained that, with the LRAS3, they could do away with some of the pre-planned fires and move to observed precision fires, thereby increasing effects while saving precious ammunition.[15]

As the separate task forces proceeded on their routes towards their objectives, each received enemy artillery fires. These fires were largely ineffective; it appeared the enemy was firing a pre-planned sequence of fires, and his inability to adjust the fires reflected a low level of training. These fires were mainly harassing and while troublesome, did not impede the BCT's attack forces. The BCT's supporting artillery's coverage of the area by counterfire radar allowed the artillery battalions to react swiftly, placing effective counterfires on the Iraqi artillery batteries faster than the Iraqi artillery could even make adjustments on the BCT's advancing forces. The 1-41 Field Artillery did fire a short set of preparatory fires and smoke just prior to TF 1-30 IN's final attack onto Tallil Air Base.[16]

The BCT's forces successfully completed all of their tasks by late in the morning on 22 March. They suffered minimal casualties while inflicting heavy losses and capturing a substantial number of Iraqi forces.

TECHNOLOGY DESCRIPTION

Long Range Advanced Scout Surveillance System (LRAS3)

The LRAS3 is a second generation, forward-looking infrared (FLIR) system with long-range optics, an eye-safe laser rangefinder, a low-light television camera, and a global positioning system (GPS) with altitude determination. It is a digital system capable of exporting targeting information to the Force XXI Battle Command, Brigade-and-Below (FBCB2) System.[17] It is noteworthy that, at the time of this battle story, the LRAS3s in use were not digitally linked. They lacked the necessary cables to provide the digital linkage because of early delivery of systems for the war. Additionally, the LRAS3s were not otherwise capable of sending data over the blue force tracker system which sends data over L-band satellite.[18]

Figure 6: LRAS3 [19]

The LRAS3 is capable of target identification and providing ten-digit grid readouts of the targets out beyond ten kilometers with a sixty meter circular error probability. It operates line-of-sight and provides real-time acquisition, target detection, recognition, and location information, and is capable of 24-hour and adverse weather operations.

[15] Interview with Major General Buford Blount, Commander, 3rd Infantry Division (Mechanized). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, Videotaped interview, 19 August 2004.

[16] Interview with Colonel Allyn.

[17] Christina Cavoli and Fritzgerald McNair, "Sensing Beyond the Visible: Combat Enabling Technologies Increase Warfighter Safety in Iraq," *Defense AT&L*, September-October 2005.

[18] Information based on telephone conversation with LTC Edward J. Stawowczyk and Michael B. O'Hara, LRAS3 Project Leader / PM FLIR, 16 March 2006.

[19] Figure 6, LRAS3, courtesy of Michael B. O'Hara, LRAS3 Project Leader / PM FLIR, 16 March 2006.

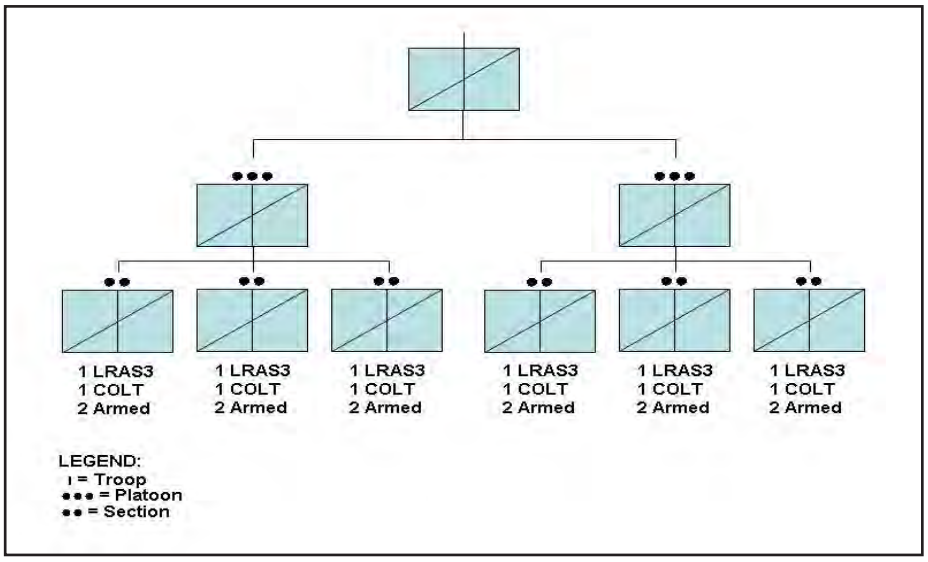


Figure 7: Organization of BRT

ORGANIZATIONAL STRUCTURE

Brigade Reconnaissance Troop Organization

The fundamental role of the brigade reconnaissance troop (BRT) is to provide ground reconnaissance, surveillance, and security within and to the front, flanks, and rear of the BCT. The BRT's primary mission is to provide battlefield information directly to the brigade commander. The brigade commander and his staff determine the role of the BRT in all brigade missions. In the digitally equipped Force XXI units (the 3 ID was not a digitally equipped Force XXI unit) the BRT, using its digitized and other communications capabilities, provides the brigade commander near-real-time information regarding the enemy's disposition.

Typically, the troop is organized with four officers (troop commander, executive officer, and two platoon leaders), fifteen non-commissioned officers (NCOs), and thirty enlisted soldiers. The headquarters element is organized and equipped to perform command and control and logistical support functions for the troop.

The scout platoons are organized and equipped to conduct reconnaissance, surveillance and security missions. The platoon typically consists of three scout sections. Each scout section is equipped with 2 armed HMMWVs, one using the M-2 .50 Cal machinegun and the other using the MK-19 40mm automatic-grenade launcher. As depicted above, each section also had a LRAS3 mounted on a HMMWV. Although not organic, the scouts usually operate with attached artillery combat observation lasing teams (COLTs) to provide responsive fires and laser designation for laser-guided artillery and aerial-delivered munitions.

A total of forty-two LRAS3 systems were fielded to 3 ID in Kuwait in February 2003, just a month prior to the attack. Of these, thirty-nine systems were placed into scout units and three were held in forward support battalions as operational floats to replace damaged systems. Each brigade received thirteen mounted systems.[20]

---

[20] Edward J. Stawowczyk, "A Combat Multiplier in Iraq: The Long Range Advanced Scout Surveillance System," *ARMOR*, March-April 2004.

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES USED

Prior to the fielding of the LRAS3, scouts would typically maneuver their vehicles using low ground to avoid detection by enemy forces.

Prior to the LRAS3, scouts and COLT had to estimate the grid coordinates of enemy forces. This process took time using a map and determining azimuth and distance to the target.

Prior to LRAS3, the scouts' night surveillance capabilities were limited to the 600–1000 meters that was provided by their night vision goggles and the 2–3 kilometers provided by the attached COLTs.

The prior process of employing artillery in support of a deliberate attack, as was planned by 2 BCT, is described in FM 71-123, Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion Task Force, and Company Team.

> In planning, the commander strives to ensure that his fire support is massed where he needs it the most. The majority of fires will be in groups or series. Fire support is planned "top down" to ensure synchronization with maneuver forces and massing of fires. Indirect fire preparation of the objective should be delivered immediately preceding the attack and in combination with the movement of attacking units, depending on the amount of surprise desired or necessity to soften the point of attack. Indirect fires should also be planned to isolate the objective from both the observation and effective fire of the enemy located on adjoining positions. Generally, this will mean delivering a mix of HE and smoke. Smoke missions must be carefully planned in terms of location, duration and logistical support, as the basic load of an artillery unit does not include enough smoke ammunition for sustained operations.[21]

This is a top-down driven process, with fires placed on known and pre-templated, likely enemy positions using echeloned suppressive fires to, on, and across objectives.

IMPACT OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

After training and operating with the LRAS3, the scouts adjusted to the increased surveillance capabilities, which gave them a greater opportunity to acquire enemy targets beyond enemy direct fire and observation capabilities and allowed the scouts to maneuver quickly along the high ground without assuming higher risk.[22]

The LRAS3 provided instant ten-digit grid readouts of all targets, eliminating the need to estimate the grids of enemy targets and having to adjust fires onto the target to gain the desired effects. The precise grid readout of targets was coupled with the Paladin field artillery system (Paladin contains its own Automatic Fire Control System—AFCS—with an on-board position navigation system and technical fire direction system) to deliver first rounds effect on the targets.

The LRAS3 provided a capability that far exceeded any previously fielded ground-based night observation and long-range systems capabilities, allowing the scouts even greater capability to operate at night and under adverse weather conditions. The night range capability and image clarity

---

[21] *Field Manual 71-123: Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team,* (Washington, D.C.: Headquarters, Department of the Army, 1992), 3-32.

[22] Stawowczyk, "A Combat Multiplier in Iraq: The Long Range Advanced Scout Surveillance System."

of the LRAS3 is credited with preventing several fratricides, because operators could distinguish between enemy and friendly vehicles beyond the range of other systems. At the battalion task force level, the LRAS3 was often employed in an overwatch or over-the-shoulder position with infantry or armor forces, providing those units and their company and task force commanders situational awareness of enemy activities.[23]

The artillery fires in support of the attack were not the lengthy preparatory fires described in the current doctrine. Instead, a short sequence of fires was used just prior to the attack on Firebird, with the majority of fires being placed on precisely known, observed targets and achieving immediate effects. This shift in artillery execution freed more artillery to the counterfire role, allowing for immediately responsive suppression of enemy artillery.

TECHNOLOGY AS AN ENABLER

The LRAS3 enabled the 3 ID scouts to conduct their reconnaissance and surveillance missions with greater speed, a higher degree of stealth, increased accuracy, and increased survivability. This system is credited with providing the commanders of companies, battalions, BCTs, and the division with increased situational awareness of the enemy and had an immediate impact on mission success.

The use of the LRAS3 coupled with the Paladin enhanced precision engagement against known enemy targets.

The freeing of the artillery from firing lengthy preparatory fires reduced the artillery ammunition requirements and therefore eased the logistic support requirements, this was especially critical as transportation assets were at a premium.

The availability and immediacy of the artillery for counterfires assisted dominant maneuver by 3rd BCT forces by reducing and eliminating the effects of enemy artillery on the force.

Overall, the LRAS3 had impacts on the division, the corps, and force as a whole. It helped reduce the logistics burden by decreasing ammunition requirements and increasing the effects of the artillery that was fired. Its impacts could also be attributed with reduced friendly casualties from enemy artillery as more artillery was immediately available to fire counter-battery missions.

NETWORK CENTRIC INSIGHTS

This battle story, as seen from a net-centric point of view, yields the following results:

1. LRAS3 with its ability to conduct day/night/all weather surveillance from extended standoff and to provide accurate coordinates of enemy locations improved the quality of information available to the scouts and as a result to the force at large.
2. The accurate scout reports, combined with today's integration of the LRAS3 information, digitally shared through the FBCB2 system, increased the situational awareness of the force.
3. The force responded to the new capabilities presented by the LRAS3 by developing new tactics and techniques for the employment of scouts; observation positions beyond enemy direct fire

[23] Interview with Colonel John W. Charlton, Former Commander of Task Force 1-15 Infantry, 3rd Infantry Division (Mechanized) During Operation Iraqi Freedom 1 (Maneuver Phase). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired. Videotaped interview, May 9 2006.

and observation capabilities and positions "over-the-shoulder" of friendly maneuver forces permitted scout assets to be emplaced more quickly and with far less risk.

4. The force responded to the new capabilities presented by the LRAS3 by developing new processes that were reflected in the manner in which artillery fires were planned and delivered and increased the effects of those fires.
5. The increased effects of artillery fires conserved ammunition and resulted in less demand on the logistic and transportation assets.
6. The LRAS3 impacts were also reflected in the increased responsiveness of artillery in the counterfire role.
7. LRAS3 can be seen as contributing to the speed of execution by the information it provided and the shared situational awareness resulting from the reports generated by this information.
8. The end result of LRAS3 was increased combat effectiveness for the scouts, the brigade combat team, the supporting artillery, and the force as a whole.


Prudens
Futuri

Battle Stories

Task Force 1-15 Infantry Relieves 3-7 Cavalry at As Samawah

This battle story illustrates how increased situational awareness and communication over distances effected new processes and increased mission effectiveness. The relief of the cavalry at As Samawah by Task Force 1-15 Infantry (IN) illustrates the impact of a newly fielded technology, the blue force tracking (BFT) system, and how this new system increased the quality of information, increased situational awareness, provided an ability to communicate that otherwise would not have existed, and resulted in increased combat effectiveness.

CONTEXT OF THE BATTLE STORY

The story focuses on the actions of the 3rd Infantry Division's (3 ID) TF 1-15 IN moving from the vicinity of An Nasiriyah to relieve the 3rd Squadron, 7th Cavalry (3-7 CAV) at As Samawah (Objective CHATHAM) and then secure Objective VIKINGS. These actions took place from 23 to 26 March 2003.

ENEMY FORCES

By 23 March 2003, just three days after the initiation of the attack, a large number of Iraqi forces from the 11th Infantry Division in the vicinity of Tallil Air Base and An Nasiriyah were casualties,

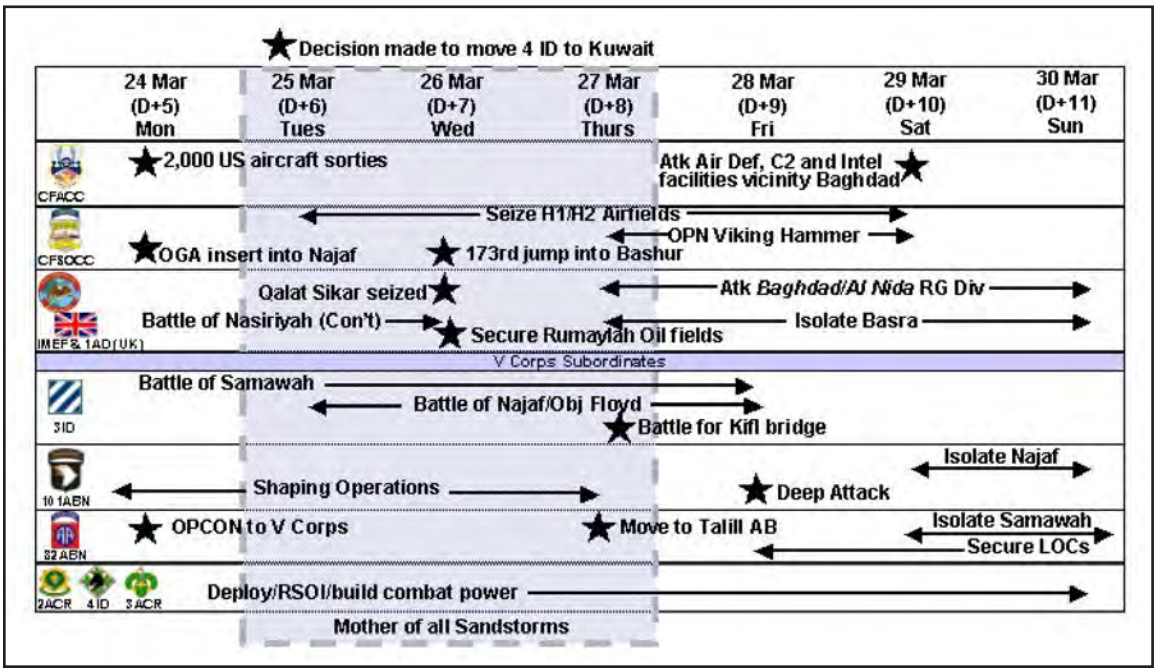


Figure 1: Timeline[1]

[1] Figure 1, Timeline, courtesy of On Point.

prisoners of war, or contained east of the Euphrates River. There was no evidence of a significant conventional Iraqi force between An Nasiriyah and Karbala.[2] About one hundred kilometers west-northwest of An Nasiriyah along Highway 8 lays As Samawah, straddling both sides of the Euphrates. Here the Iraqi military and paramilitary had utilized existing water obstacles and dug prepared fighting positions covering a large portion of the town. In addition to regular Iraqi military forces, the city was defended by Republican Guard troops that had infiltrated into the city and by an estimated brigade-size element of Al Quds, Saddam Fedayeen, and Ba'ath party militia. The Republican Guards and the paramilitaries had occupied the schools for their headquarters and ammunition storage areas. Though poorly trained, the paramilitary forces, dressed in civilian clothes and armed mostly with small arms, machineguns, rocket-propelled grenades (RPGs), and mortars, were fanatical. The paramilitary forces also forced Iraqi civilians to fight as part of the resistance, executing those not willing to fight.[3]

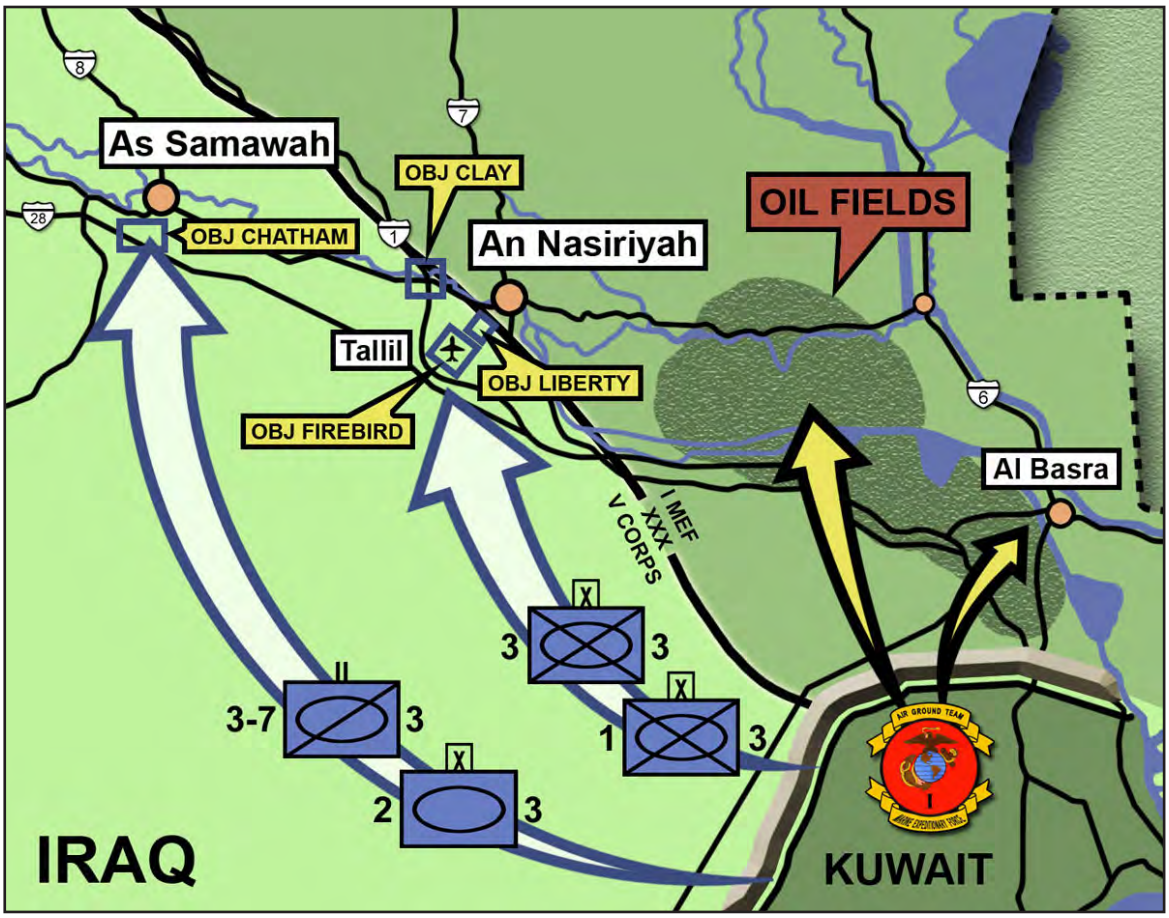


Figure 2: 3 ID Advances to Initial Objectives[4]

[2] Gregory Fontenot, Colonel, U.S. Army, Retired, E.J. Degen, Lieutenant Colonel, U.S. Army, and David Tohn, Lieutenant Colonel, U.S. Army, On Point: The United States Army in Operation Iraqi Freedom (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 152.

[3] 3rd Infantry Division, Operation Freedom: Third Infantry Division (Mechanized) "Rock of the Marne" after Action Report, Final Draft, (U.S. Army, 3rd Infantry Division (Mechanized), Ft. Stewart, GA, 2003), Operational Overview, p. xiii, Battle for As Samawah: 22-24 March.

[4] Figure 2, 3 ID Advances to Initial Objectives, courtesy of *On Point*.

FRIENDLY FORCES

After crossing the berm into Iraq on 20 March 2003, the 3 ID advanced along two routes that converged southwest of As Samawah. The 3-7 CAV and 2nd Brigade Combat Team (BCT) moved along Route HURRICANE, the western route, while the 1st and 3rd BCTs and the remainder of the division advanced on Route TORNADO. As Samawah (Objective CHATHAM) was the designated objective for 3-7 CAV, which had the mission to seize the bridges over the Euphrates and contain As Samawah as 2nd BCT continued the attack north to Objective RAMS. V Corps' original scheme of maneuver envisioned containing any enemy forces in the town of As Samawah as friendly forces moved around the western edge of the city as they advanced north.[5]

Intelligence reports on the enemy forces at As Samawah indicated that there were dug in fighting positions, but there were no indications of any paramilitary threat in the town.[6] In fact, the troopers of the 3-7 CAV expected a positive reception. As one aviator commented, "They told us the Iraqis would have a parade for us when we got to As Samawah. Instead I got a bullet in my helicopter."[7] This was the general reception in store for the U.S. forces at As Samawah. By 0900 on 22 March, 3-7 CAV had taken the bridges southeast of As Samawah and then encountered Iraqi artillery fires and "fanatical" paramilitary forces. The paramilitary forces began to employ mortars and pickup trucks with machine guns (technical vehicles) to attack the cavalry troopers mounted in their M3 Bradleys and M1A1 Abrams tanks.

As 1st BCT advanced northwest towards As Samawah from An Nasiriyah along Highway 8, its soldiers encountered Iraqi civilians who came out to greet the U.S. soldiers. As the BCT approached As Samawah, they also encountered a number of ten to twenty man ambushes and attacks using technical vehicles.[8] The BCT fought through the ambushes and passed through 3-7 CAV to the west around noon, continuing its movement to the north.[9]

The 3-7 CAV continued to hold the bridges and attempted to contain the enemy, but the fighting around As Samawah grew, and the threat to the logistics traffic and soft-skinned vehicles increased. Early on 23 March, 3-7 CAV was ordered to clear the enemy from one kilometer north of Highway 8 and to divert traffic from Highway 8 south of As Samawah to Route Rovers (Highway 28) in an effort to maintain momentum.[10]

At this point, 3rd BCT received orders from division to assume control of the fight at As Samawah and relieve 3-7 CAV. The 3rd BCT had just detached one task force, TF 2-69 AR, to 1st BCT after the bridges at Objective CLAY were turned over to TF Tarawa.[11] Of the remaining 3rd BCT forces,

---

[5] Fontenot, Degen, and Tohn, *On Point*, 126.

[6] Ibid., 123.

[7] Comment submitted on a U.S. Army War College survey conducted in the summer of 2004 to gather data as part of the Network Centric Warfare Case Study: US V Corps and 3rd Infantry Division (Mechanized) During Operation Iraqi Freedom (MAR-APR 2003).

[8] 3 ID, Operation Iraqi Freedom After Action Report, Operational Overview, p. xii, Movement Along HWY 8: 22-23 MAR.

[9] Fontenot, Degen, and Tohn, *On Point*, 131.

[10] 3 ID, Operation Iraqi Freedom After Action Report, Operational Overview, p. xiii, Battle of As Samawah: 22-24 MAR.

[11] Interview with Colonel Daniel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired., Personal interview, 10 Nov 2004.

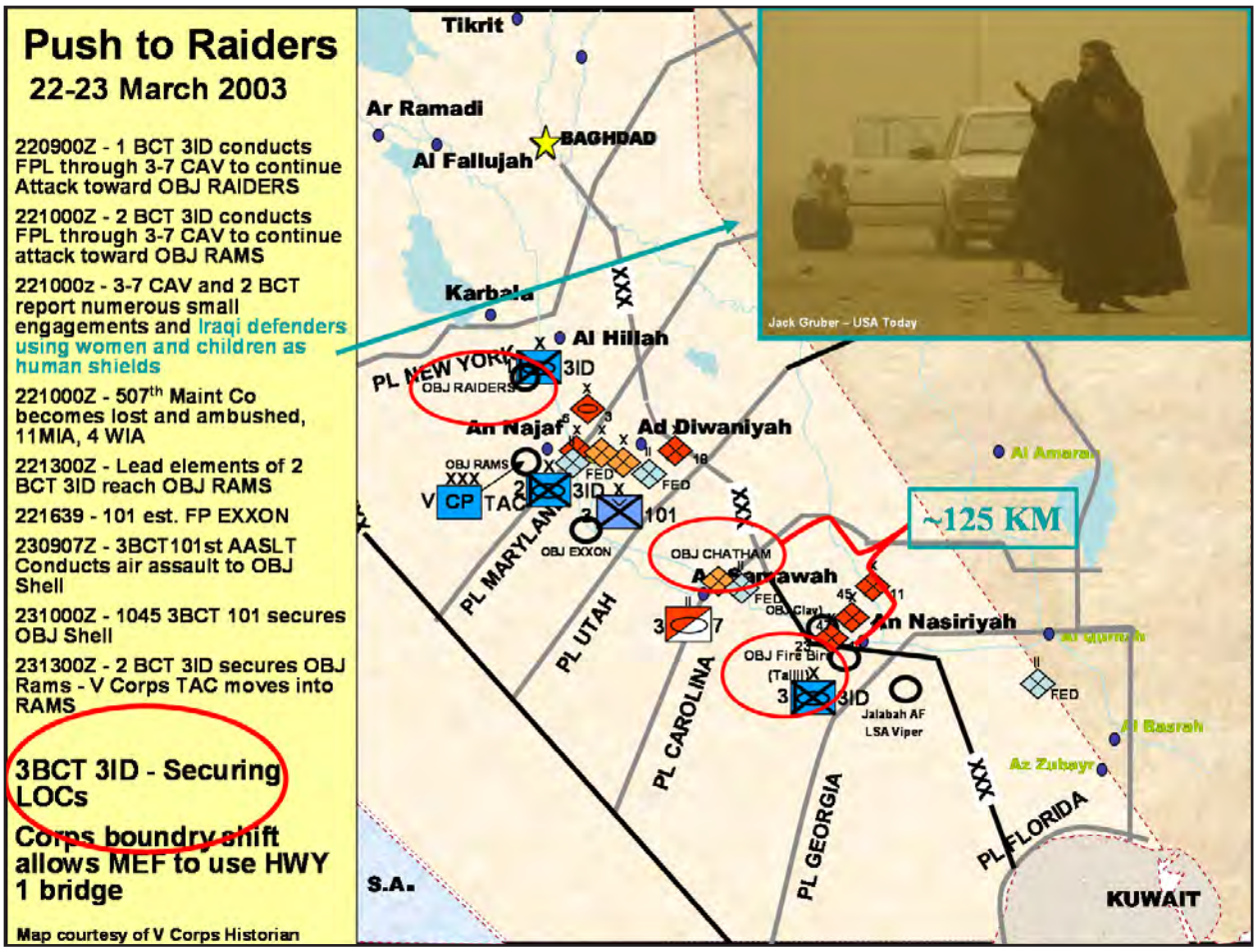


Figure 3: Push to Raiders[12]

TF 1-15 was preparing to move to link up with 2nd BCT for the attack to Objective RAMS, TF 1-30 IN was securing Tallil (waiting to be relieved of this mission by TF 1-41 IN), and TF 2-70 AR and the Brigade Reconnaissance Troop were securing the lines of communications (LOCs)[13] along Highway 8 from the Tallil and An Nasiriyah area towards As Samawah as the division and V Corps forces and trains advanced.

TF 1-15 IN relieves 3-7 CAV at As Samawah

TF 1-15 IN had just started moving from the An Nasiriyah area to link up with 2nd BCT when the 3rd BCT received orders from division to assume control of the fight at As Samawah.[14] Lieutenant Colonel John Charlton, commander, TF 1-15 IN, had not planned or prepared for action at As

---

[12] Figure 3, Push to Raiders, provided by Dr. Charles E. Kirkpatrick, Historian, Headquarters, V Corps. Slide from V Corps briefing "The Road to 'Victory!' in Operation Iraqi Freedom"

[13] Joint Publication 1-02 Department of Defense Dictionary of Military and Associated Terms, (Washington, D.C.: Joint Chiefs of Staff, 2001 (As amended through 20 Mar 2006)), C-2. Lines of communications – "All the routes, land, water, and air, which connect an operating military force with a base of operations and along which supplies and military forces move."

[14] Interview with Colonel John W. Charlton, Former Commander of Task Force 1-15 Infantry, 3rd Infantry Division (Mechanized) During Operation Iraqi Freedom 1 (Maneuver Phase). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired., Videotaped interview, May 9 2006.

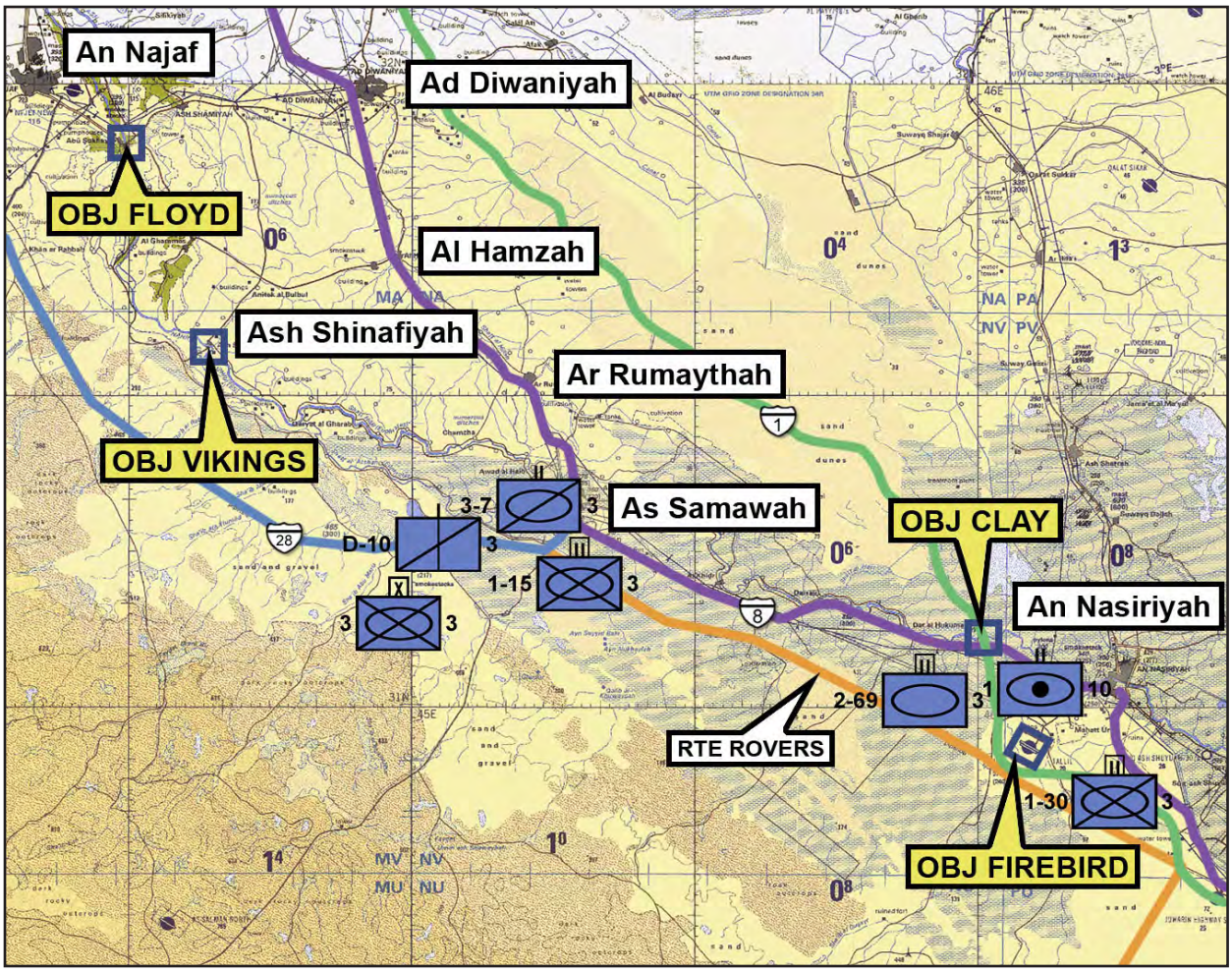


Figure 4: 3rd BCT Forces from As Samawah to Tallil Air Base[15]

Samawah when he received the fragmentary order from 3rd BCT over FM radio changing his unit's mission to now move to As Samawah and relieve 3-7 CAV. Charlton recalls that, up until this point, he had been using his map board with acetate, changing between 1:100,000 scale maps for navigation across the desert and smaller scale maps and imagery products for TF orders and operational graphics and for use in and around built-up areas. The problem was that he did not have any small-scale maps or imagery products of As Samawah.

Using his Force XXI Battle Command, Brigade and Below (FBCB2) blue force tracking screen, LTC Charlton was able to locate the commander of 3-7 CAV, and approximately two hours after receiving the change in mission, he was linked up with the cavalry and in the process of conducting a battle handover. The face-to face with the cavalry squadron commander lasted about an hour. Then LTC Charlton, his operations officer (S-3), and the fire support officer put the TF operations order together in about an hour.[16] Charlton then met with his subordinate commanders and briefed them on the mission. Thanks to the suggestion of one of his company commanders, who had become skilled at

[15] Figure 4, 3rd BCT Forces from As Samawah to Tallil Air Base, courtesy of On Point.

[16] Interview with Colonel Charlton.

using the FBCB2 graphics features, Charlton was able to digitally transfer the operations order and graphics to each of his company teams simultaneously. Now each company within the TF had the order and graphics on scalable maps and imagery available to them on their FBCB2s.[17] By early afternoon, the TF 1-15 IN company teams began to maneuver into their assigned sectors and take up the fight with the enemy. By 1430, the 3rd BCT had relocated its tactical operations center (TOC) to the As Samawah area and assumed control of the fight, employing both 3-7 CAV and TF 1-15 IN to isolate As Samawah and prevent enemy interdiction of the LOCs on Hwy 8 and 28.[18]

The fighting in As Samawah continued unabated throughout the night, but the flow of logistics supporting the combat forces proceeded up the LOCs. On the morning of 24 March, 3rd BCT was fighting in As Samawah with the cavalry and TF 1-15 IN and securing the LOCs from Tallil Air Base all the way to As Samawah with TF 2-70 AR, TF 1-30 IN, and the brigade's reconnaissance troop. The BCT attempted to use a series of FM retransmission stations to maintain command and control during this phase of the operation; despite detailed planning, the attempt was not successful. The only means the BCT had for exercising effective command and control over its battalions was via the FBCB2-BFT.[19] In the late afternoon, the 3-7 CAV was returned to division control, and it departed to seize another bridge (Objective FLOYD) and to isolate An Najaf from the east and northeast up to Objective JENKINS.[20] Around this same time, 3rd BCT was tasked to send TF 2-70 AR forward under the control of the Division REAR CP to provide security in Objective RAMS;[21] the brigade was also given the mission to secure Objective VIKINGS.[22] Through the evening and night of the twenty-fourth, the 3-7 CAV advanced up Route Appaloosa, which became known as "Ambush Alley," to the bridge designated as Objective FLOYD.[23]

Team B, TF 1-15 IN at Objective VIKINGS

Objective VIKINGS, vicinity of Ash Shinafiyah about seventy kilometers northwest of As Samawah, was a principle canal crossing over the Euphrates. The division had originally intended to use the canal crossing to resupply 3-7 CAV in their feint, but now it was needed to protect the LOCs against enemy attacks.[24] Early evening on the twenty-fourth, 3rd BCT assigned the mission to secure Objective VIKINGS to TF 1-15 IN, and LTC Charlton assigned the mission to his team, B, 1-15 IN. To maintain the fighting strength in As Samawah, 3rd BCT attached Team (TM) B, 2-69 AR, to TF 1-15 IN. TF 1-15 IN was now in command of four company teams fighting in As Samawah and one company preparing for an independent operation some seventy kilometers away.

---

[17] John W. Charlton, "Digital Battle Command: Baptism by Fire," Army Communicator 28, no. 4 (2003).

[18] Fontenot, Degen, and Tohn, *On Point*, 132-33, figures 70 and 71.

[19] Interview with Colonel Allyn.

[20] For the movements of 3-7 CAV, see Fontenot, Degen, and Tohn, *On Point*, 133, 198-199, and 3 ID, Operation Iraqi Freedom After Action Report, Operational Overview, p. xiv, Gary Owen Moves to Najaf: 24 MAR.

[21] Ibid., Operational Overview, p. xiii, Battle of As Samawah: 22-24 March.

[22] Summarized Interview of Colonel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized), Interview by Colonel Cherry, May 13 2003. This interview was provided by the Center for Army Lessons Learned in Ft. Leavenworth, KS. It was conducted in Iraq and covers the period of time from 19 to 24 March 2003.

[23] Fontenot, Degen, and Tohn, *On Point*, 168.

[24] Summarized Interview of Colonel Allyn. Colonel Allyn recalls that, after sending TM B/1-15 IN to VIKINGS for a couple of days, it was relieved by TM C/1-30 IN.

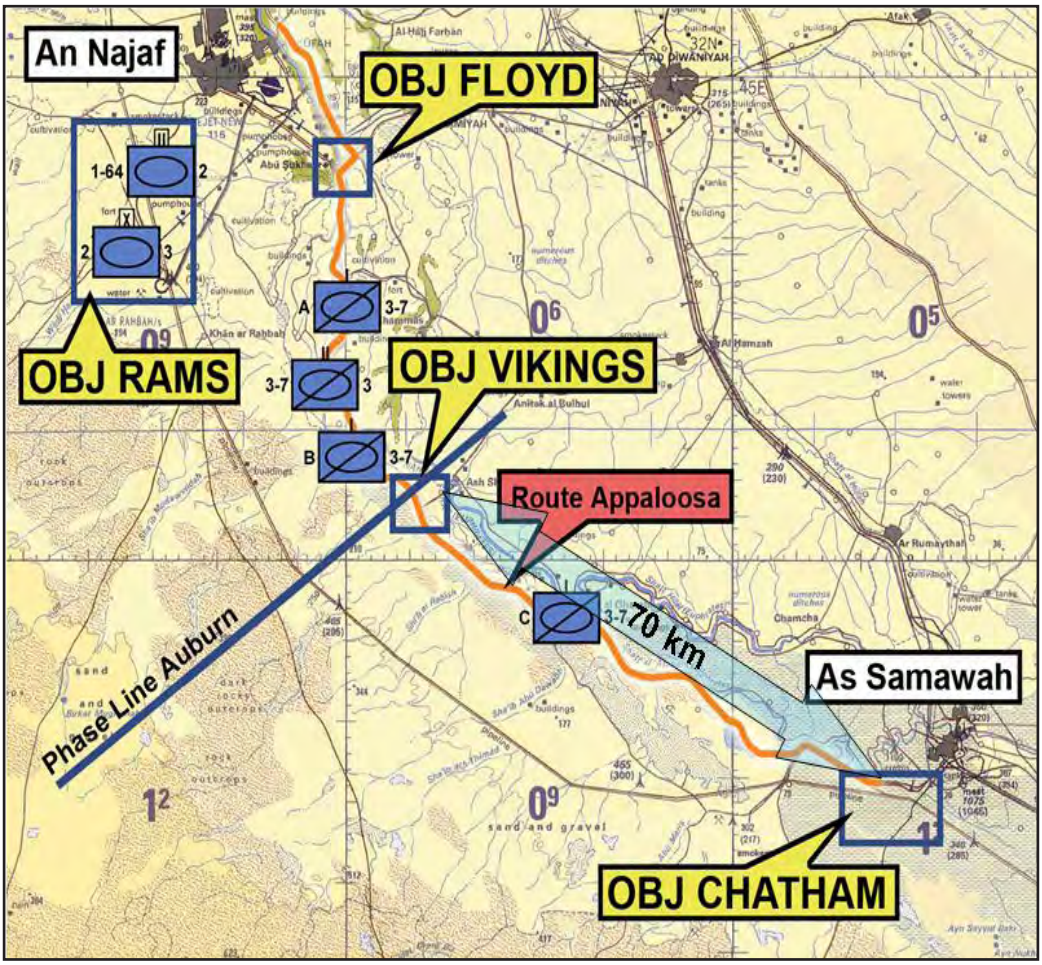


Figure 5: 3-7 CAV Approach to Objective FLOYD[25]

Due to the limited range of the organic FM radio systems, the only means available for communicating with the company at VIKINGS was via the FBCB2- BFTs located in the company commander's and executive officer's vehicles. Team B, 1-15 IN also had an Air Force TACSAT radio located with the air controller that could be used for emergency backup communications. Internal communications was still primarily FM radio. The night of the twenty-fourth, TM B prepared for the move and received additional logistics support for their operation. On the early morning of the twenty-fifth, TM B moved to VIKINGS using their FBCB2-BFT as the principle means of navigation. This maneuver was carried out in a building sandstorm that limited visibility down to fifty meters; the team moved like a flight of aircraft flying formation under instrument conditions. While enroute, the team sent both their regular situation reports and the report of their arrival at the objective via the text messaging capability provided by the FBCB2-BFT.

On morning of 25 March with the sandstorm building, TF 1-15 maneuvered into As Samawah, conducting a demonstration to keep the enemy boxed up and guessing.[26] LTC Charlton recalled that, during this action, which involved his scouts and two company teams, he noticed on his FBCB2-

[25] Figure 5, 3-7 CAV Approach to Objective FLOYD, courtesy of *On Point*.

[26] Summarized Interview of Colonel Allyn.

BFT screen that one of his scouts had become separated from the force. Using the information from the screen, he contacted the scout and brought him back to where he needed to be.[27]

By mid-morning on the twenty-fifth, the division contacted Colonel Allyn, the 3rd BCT commander, and asked how quickly he could release TF 1-15 IN so that they could link up with 2nd BCT in Objective RAMS, vicinity An Najaf.[28] Colonel Allyn used TF 1-30 IN to relieve TF 1-15 IN at As Samawah. When the relief in place was completed, TF 1-15 IN was loaded on heavy equipment transporters and moved to link up with 2nd BCT in RAMS. TM B, 1-15 IN remained at VIKINGS until later the next day when it was relieved by TM C, 1-30 IN. Team B's commander then used his FBCB2-BFT to navigate across the desert and link up with TF 1-15 IN in RAMS the next day, 27 March.[29]

TECHNOLOGY DESCRIPTION

Force XXI Battle Command Brigade and Below – Blue Force Tracker (FBCB2-BFT)

The blue force tracker (BFT) was one of the most widely praised command and control (C2) systems of the maneuver phase of Operation Iraqi Freedom (OIF). It provided unprecedented situational awareness from the lowest tactical level to the highest strategic level. It was rapidly produced but sparsely fielded, and some units received the equipment only a few days prior to the start of combat operations.

The Force XXI Battle Command Brigade and Below (FBCB2) is a digital command and control (C2) system consisting of both hardware and software integrated into platforms located primarily at brigade and below. The system provides an automated network-enabled C2 system that facilitates the flow of battle command tactical mission requirements. It interfaces with Army and joint C2 and other sensor systems on the battlefield, resulting in vertical and horizontal information integration. This shared common battlefield picture (COP) displays near-real-time information, which contributes to situational awareness, provides graphics

OEF/OIF BFT Fielding

Over 1200 BFT/FBCB2 installs completed in 6 countries and over 20 states covering OIF Joint and Coalition Ground and Aviation Platforms

UNITS	BFT PACKAGES		TOTALS
	GROUND	AVIATION	
JTF 180	176	41	217
V CORPS	29	8	37
3D ID	150	6	156
1ST MEF	200	0	200
101ST AAD	68	88	156
1ST AD	153	15	168
3D ACR	47	10	57
4TH ID	43	0	43
UK	47	0	47
75TH FA	18	0	18
173D ABN	90	0	90
TOTAL	1,021	168	1,189

Figure 6: Blue Force Tracker Fielding[30]

[27] Interview with Colonel John W. Charlton, former Commander of Task Force 1-15 Infantry, 3rd Infantry Division (Mechanized) During Operation Iraqi Freedom 1 (Maneuver Phase). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired.

[28] Summarized Interview of Colonel Allyn.

[29] Interview with Colonel Charlton.

[30] James Conatser, Captain, U.S. Army and Thane St.Clair, Captain, U.S. Army, "Blue Force Tracking - Combat Proven," ARMOR, September-October 2003 (2003).

Figure 7: FBCB2-BFT Installations

and overlays, and allows the exchange of C2 messages. The FBCB2 comes in two variants. The standard FBCB2, using the enhanced positioning location and reporting system (EPLRS), is a terrestrial-radio-based system and was developed as part of the Army Battle Command System development process. The FBCB2 fielded for Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) was the FBCB2-BFT, a satellite-based version of the FBCB2-EPLRS, which was rapidly developed and procured outside of the standard development and procurement process.

The standard FBCB2-EPLRS is a digital C2 system for brigade and below application that is part of the Army's digitized force known as the Army Battle Command System (ABCS). The FBCB2-EPLRS was developed during the mid-1990s and was fielded and concept proven with the 4th Infantry Division and 1st Cavalry Division at Ft. Hood, Texas, as the first divisions in a digitized force. The FBCB2-EPLRS is a terrestrial-radio-based line-of-sight system that relies on a dense population of systems in order to maintain connectivity for network integrity and maintenance of the common operational picture (COP). The line-of-sight requirement is a limitation for a widely dispersed force. The EPLRS-based system is communications accredited (hardware encrypted) for both unclassified and secret information processing and can interface into the ABCS. It provides the user a wide set of tools, including navigational and map tools, self location provided through the precision lightweight GPS receiver (PLGR) equipment; digital terrain elevation data, point-to-point and circular terrain analysis tools, reports tools,and text messaging.

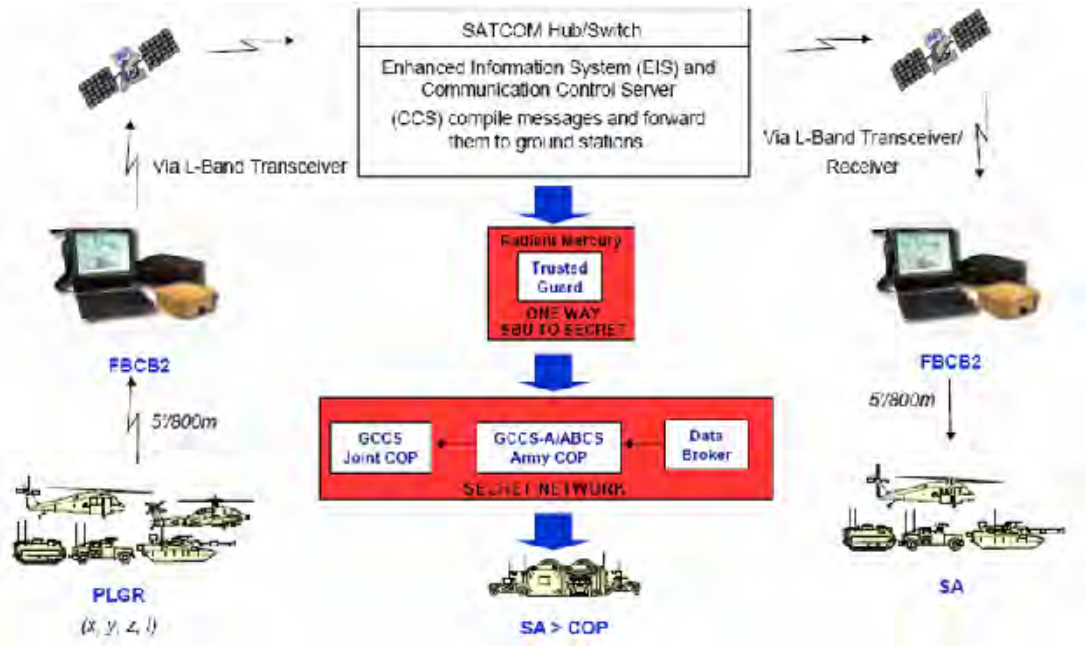


Figure 8: FBCB2-BFT Network During OIF

The FBCB2-BFT that was fielded for OEF and OIF escaped the terrestrial line-of-sight limitations associated with the FBCB2-EPLRS. The BFT version with its L-band transceiver satellite link provided over-the-horizon capabilities and thereby reduced the need for a dense population of closely associated systems to maintain network integrity. Because of bandwidth limitations, BFT does not have the complete set of tools provided by EPLRS; however, BFT provides many of the same capabilities: the same map and navigational tools, global position system (GPS), digital terrain elevation data, terrain analysis tools, and a limited text messaging and e-mail capability. The BFT was not ABCS interoperable because it lacked the hardware-encrypted secure communications accreditation but relied on digital encryption with a one-way entry into the Global Command and Control System–Army (GCCS-A). This one-entry allowed for populating the COP and dissemination of the blue picture across the classified GCCS network. All FBCB2-BFT equipped platforms within the network also received the locations of all other BFT systems within the network. There was a capability to separate out organizations from the widely disseminated display, and this was used for special operations forces' locations. The generated COP was a near-real-time picture of the blue forces. The BFT update rate was every five minutes or a movement of 800 meters for ground vehicles and every minute or 2300 meters for air.[31]

Both FBCB2-EPLRS and FBCB2-BFT can be locally or remotely challenged and, by erasing the computer hard drive, destroyed if compromised.

ORGANIZATIONAL STRUCTURE

Army Field Manual 3-90.2 states, "The role of the tank and mechanized infantry battalion task force is to fight and win engagements on any part of the battlefield. The task force (TF)

[31] Conatser, "Blue Force Tracking."

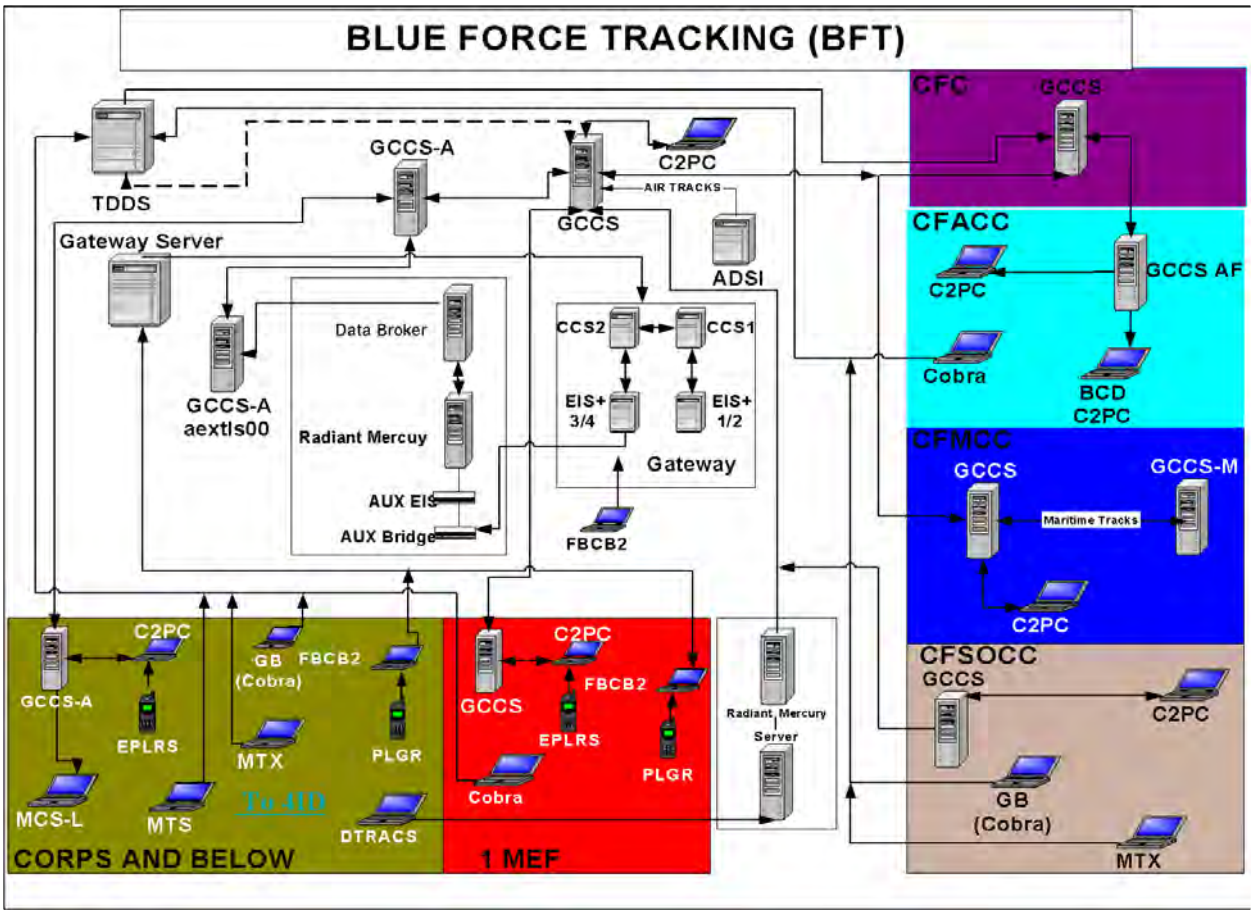


Figure 9: OIF BFT Architecture and the Joint Common Operational Picture

combines the efforts of its company teams, combat support, and combat service support elements to execute tactical missions as part of a brigade or division operation. Mechanized infantry and armor battalions are an essential part of the Army's principal formation for conducting sustained combined arms and close combat land operations."[32]

Mechanized infantry and armor battalions are organized, manned, and equipped to conduct high-intensity combat operations continuously. Brigade commanders task-organize their tank and mechanized infantry battalions into task forces by cross-attaching companies between them. The brigade commander determines the mix of company teams in a battalion task force. This task organization is designed to increase the task force's capabilities beyond those of pure tank and mechanized infantry battalions and allows the brigade commander to tailor his force for the missions assigned.

This cross-attachment is generally done at the battalion level because battalions have the necessary command, control and support capabilities to employ combined arms formations. Similarly, the TF commander may require cross-attachment of platoons to form one or more company teams for specific missions.[34]

---

[32] *Field Manual 3-90.2 The Tank and Mechanized Infantry Battalion Task Force*, (Washington, D.C.: Headquarters, Department of the Army, 2003), p. 1-1.

[33] Ibid, para. 2-2.

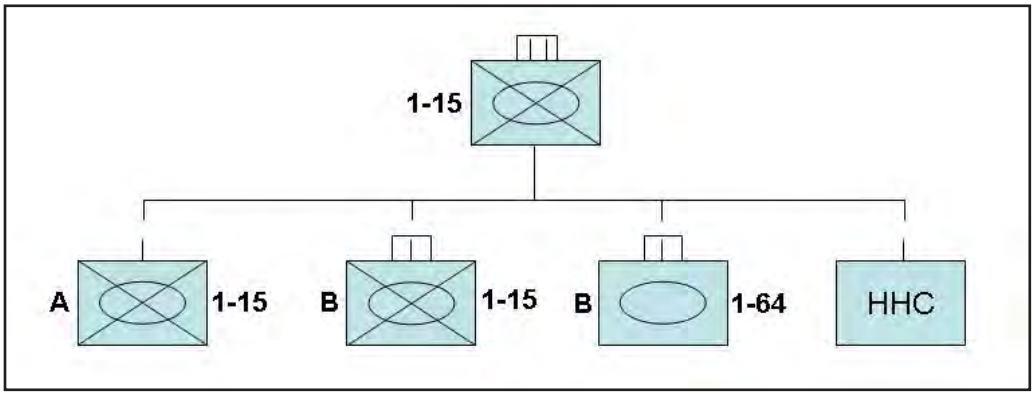


Figure 10: TF 1-15 IN Organization at As Samawah, 23-24 March[34]

The command and control of the battalion task force during combat operations is usually exercised via organic line-of-sight secure single channel air-ground radio systems (SINCGARS). A non-digitized task force like 1-15 IN operates a task force command net, an operations and intelligence (O&I) net, and an administrative-logistics (admin-log) net. It typically maintains contact with its controlling brigade commander and headquarters via SINCGARS on brigade FM nets and via mobile subscriber equipment (MSE), all of which are line-of-sight systems.

During OIF, the FM nets operated by the battalion task forces were generally adequate—due to the relatively close proximity of the companies—for the command and control of task force operations. These voice nets were essential in providing situational understanding at the company and battalion task force level. However, the brigade nets used to exercise command and control of the task forces were typically strained or inadequate. MSE nodes were not established while the brigade command posts were on the move, which they usually were during the majority of the offensive maneuver phase of OIF, and the FM nets were of limited use because of the wide dispersion of the task forces.

The only improvement or added capability provided at the battalion task force level in terms of an increase in command, control, communications, and computers (C4) was the addition of the FBCB2-BFT. These blue force tracking systems were fielded to the majority of 3 ID maneuver units during the late January–February 2003 timeframe. TF 1-15 IN received its FBCB2-BFTs in February. The fielding to 1-15 IN was standard for 3 ID. Each company commander's and company executive officer's combat vehicle was equipped with FBCB2-BFT. The battalion scout platoon leader's vehicle also received the FBCB2-BFT. The task force commander's combat vehicle and the task force S-3's (operations officer) combat vehicle were both equipped with FBCB2-BFTs. Finally, the task force tactical operations center received two systems, one vehicular mounted and one laptop type. These systems provided increased situational awareness through the visual representation of all other blue force maneuver units and provided an alternate means of communications over extended distances and beyond line-of-sight using the text messaging capability.

---

[34] Figure 9, TF 1-15 IN Organization at As Samawah, 23-24 March and Figure 10, TF 1-15 IN Organization 24-25 March, were drawn by Colonel Charlton during his interview at the U.S. Army War College on 9 May 2006.

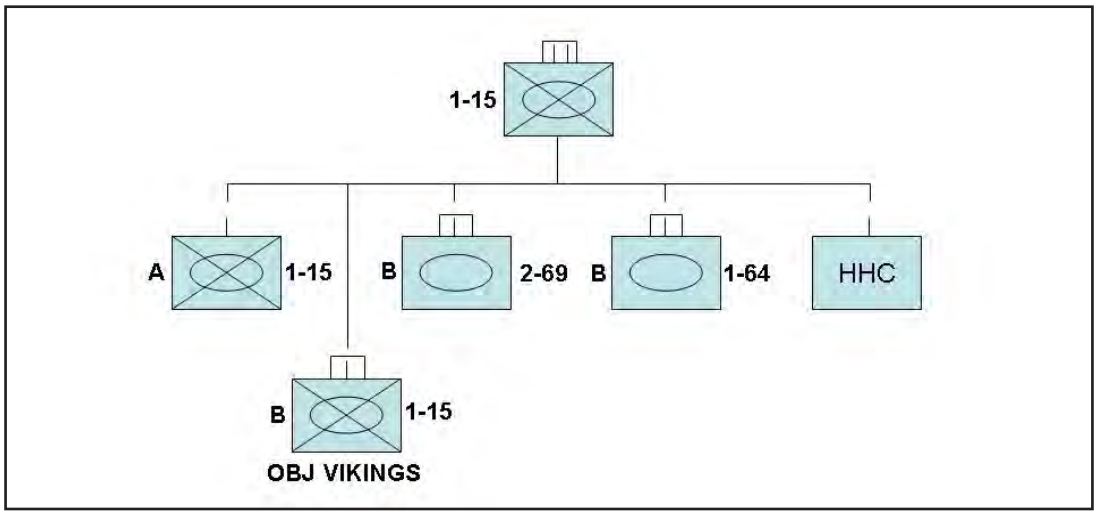


Figure 11: TF 1-15 IN Organization 24-25 March

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES USED

Prior to the fielding of the FBCB2-BFT, the battalion task force commander's as well as the company team commanders' situational awareness was gained through personal observations, face-to-face interactions with others, and situation and spot reports that came over the FM radio nets.

Reports of unit locations were posted on map boards covered with acetate. The accuracy of the locations posted on the maps was dependent upon two variables: one, whether the person sending the report was reading his location from a GPS receiver or was calculating his position using a map and compass, and two, whether the person(s) receiving the report had copied the report correctly and then posted the information correctly onto the map board. Both the reporting and the posting of the information provide plenty of opportunity for error. At best, the unit locations posted on the map board are transitory, only a picture at any given time. The currency of the location for any single company team is largely based on the battalion's standing operating procedure (SOP) as to how often the information is updated, usually in terms of time or by actions, such as when crossing phase lines, occupying positions, or enemy contact. Besides all of the operational graphics and control measures, the battalion task force commander usually keeps track of his scout platoon and each of his company team positions. The battalion command post with its tactical operations center (TOC) maintains the task force picture as well as tracking the information from the other units reporting to the brigade. Company team commanders tracked the locations of each of their platoons and adjacent company positions. The operational picture of friendly forces depicted on these map boards is error prone, highly perishable, and is not shared; in fact, it exists nowhere outside of the TOC.

Navigation requires the constant monitoring of one's own position. Prior to the GPS, navigating across desert environments was especially difficult—doubly so for nighttime navigation. Most movements and maneuvers involved the use of a map and natural and manmade features such as river beds and road intersections, general azimuths from compasses, and distance traveled—usually obtained from odometers. The GPS was first used as a navigation aid by tactical commanders in combat during Desert Storm. Using the GPS, one is able to instantly acquire accurate grid

readouts of one's current location and then post the information to the map or trace the position along the map to determine location. Navigation always requires maps of different scales that can be applied to the terrain where one is operating. Operations in and around built-up areas require more detail than vast areas of open terrain. Having the right maps requires detailed planning, then ordering, pick up, and storage of the map products.

This battalion task force (TF 1-15 IN) normally received orders (warning orders, operations orders, and fragmentary orders) and operational graphics from the BCT TOC via paper and acetate (hard copy) during scheduled face-to-face briefings, by courier, or, for warning and fragmentary orders, by FM radio communications. At the battalion task force, orders and the accompanying graphics were passed to the subordinate company teams via paper and acetate products produced at the battalion TOC and distributed to the commanders during scheduled face-to-face briefings. Frequently, warning and fragmentary orders were passed over FM communications. All orders received over FM radio require someone to copy the information and then update maps as required.

Independent dispersed company team operations have previously been limited by the range of FM communications or the ability to establish retransmission nodes to extend the FM communications range. The risk factor for a company team operating beyond FM communications range in a lethal combat environment is significantly increased, often to an unacceptable level. Additionally, any retransmission node(s) required to maintain communications would probably require additional security forces to remain viable.

Link ups between or with other units were done by the use of pre-designated grid coordinates. This required all of the units concerned to send representatives to the correct location at the correct time.

IMPACT OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

The application of the FBCB2-BFT, even though only lightly fielded, allowed TF 1-15 IN to exercise command and control in a substantially different way than they had previously in training. TF 1-15 IN changed the way it sent orders and operational graphics to its subordinate teams. This saved time for the company team commanders because the graphics were input directly into their FBCB2 maps. It also reduced errors, as everyone in the TF who had the system had the same graphics.

The FBCB2-BFT provided a level of situational awareness not previously experienced. This level of situational awareness reduced the amount of radio traffic between the TF commander, his TOC, and subordinate commanders.[35] In particular, unit position reporting was no longer the high priority it had been. After the experiences at As Samawah, the TF 1-15 IN commander converted to the digital map board presented by his FBCB2-BFT. This was his tipping point from analog to digital command and control.[36]

---

[35] Charlton, "Digital Battle Command: Baptism by Fire." Lieutenant Colonel Charlton points out "FBCB2 greatly improved my ability to battle track friendly units and improve my situational awareness....I did not have to call to get a company commander's location."

[36] Interview with Colonel Charlton. Charlton stated that As Samawah was his tipping point from analog to digital and from that point on he navigated using only the maps provided by the FBCB2 and received his situational awareness as to his company team locations from the FBCB2-BFT instead of maintaining his acetated map board. The FBCB2-BFT became his primary means for delivery of graphics and orders to his subordinate commanders, and allowed for routine communications traffic to be passed over the L-band system, freeing up his FM radio nets for high priority traffic.

The quality and variety of map and imagery products available in the FBCB2 reduced the requirement to carry a large volume of maps. Unit commanders had a wide variety of scalable maps and imagery products that covered the entire region at the level of detail desired without the requirement to sort and transport all possible paper map sets.

TECHNOLOGY AS AN ENABLER

The FBCB2-BFT enabled rapid link ups between units, even during night and under adverse weather conditions. The TF 1-15 IN commander pointed out that his link ups with the 3-7 CAV commander at As Samawah and his night link up in RAMS with the 2nd BCT commander were enabled by the FBCB2-BFT. Additionally, the linkup of TM B, 1-15 IN, which remained at VIKINGS, with the remainder of TF 1-15 IN was enabled by FBCB2-BFT.

The communications provided by the L-band BFT system enabled effective command and control over dispersed forces. TF 1-15 IN was effectively able to maintain communications with and situational awareness of TM B, 1-15 IN seventy kilometers away at Objective VIKINGS. An otherwise unacceptably high-risk mission for a company team was successfully conducted with an acceptable level of risk. Additionally, the system provided the primary means by which 3rd BCT was able to effectively command and control its forces spread well over one hundred kilometers.

The increased situational awareness provided by the FBCB2-BFT not only reduced the volume of radio traffic but it enabled the TF commander and his subordinate commanders to concentrate on the fight instead of giving frequent position and situation reports.[37]

The FBCB2-BFT enabled accurate and easier land navigation across the desert and in built-up areas, even under the most difficult of circumstances, such as at night and in sandstorms, where visibility is limited.[38]

The FBCB2-BFT enabled the dissemination of orders and graphics in a digital format that was immediately available and useable by the company teams.

The level of situational awareness provided by the FBCB2-BFT enabled the TF commander to make decisions faster with a higher degree of confidence in his decision making.

The FBCB2-BFT map and imagery products enabled a greater degree of flexibility. Commanders and their operations centers no longer needed to stop and dig out maps and other imagery products and set these products into a useable configuration (such as map boards) in order to react to mission changes.

---

[37] Charlton, “Digital Battle Command: Baptism by Fire.”

[38] Ibid. Charlton states “We were all using FBCB2 1:50,000-scale maps to track our movements since the sandstorm created zero-visibility conditions. We were literally dead reckoning through the sandstorm using the FBCB2 system.” He goes on to state, “The digital maps and imagery were a tremendous capability—I literally had the entire country of Kuwait and Iraq at my fingertips. I could pan across maps, zoom in, change to imagery, zoom in on imagery, change scale, and even change the color of the gridlines on the map....It enabled us to navigate through narrow streets and alleys of Baghdad or determine if a canal road was suitable for tracked vehicle movement.”

NETWORK CENTRIC INSIGHTS

This battle story as seen from a network centric point of view yields some interesting insights regarding the FBCB2-BFT role in network centric operations.

1. FBCB2-BFT significantly improved the quality of individual information. The almost instantaneous GPS readout of one's own location and display on a digital map greatly assisted in navigation. The need to copy a grid and then locate the grid on a map was eliminated. This was not only faster, but it also eliminated errors in posting coordinates to maps. Another example of improved quality of information was the availability, quality, and scalability of map and imagery products available to the user and accessed with relative ease.

2. The system increased quality of shared information. Position reporting was now fed automatically through the BFT and updated the displays shared by everyone else who had access to the data. The shared common operational picture was now accurate within five minutes (or faster depending on movement or the one minute refresh rate for aircraft). An immediate effect of this shared situational awareness was a reduction in the number of radio communications.

3. The level of automatically shared information resulted in increased situational awareness for the task force, the brigade combat team, and the force at large. Effects of this increased level of situational awareness at the tactical (task force) level are demonstrated by the relative ease in which link ups were affected and a reduction in fratricides.[39]

4. The FBCB2-BFT mission data loader enhanced information sharing. This is demonstrated by how the task force simultaneously transferred operational graphics to all subordinate commanders and the scout platoon at As Samawah. This information sharing of operational graphics provided for an increased level of shared situational awareness of current and upcoming missions. This digital sharing of the graphics also increased the quality of information available to the user because the graphics did not require further transfer to map boards where errors may occur in the map posting process.

5. As the task force learned from its experiences and grew to understand the capabilities and quality of information provided by the FBCB2-BFT, it adapted new procedures using this new network. Routine reports were sent via text messaging instead of over the FM radio nets, orders and graphics were digitally transmitted, and GPS-updated digital maps and the common operational picture of unit locations provided on these digital maps were used in place of manually updated map boards.

---

[39] Ibid. Charlton states "I am certain that FBCB2 battle tracking capabilities were instrumental in preventing fratricide." Additionally, the U.S. Army War College Network Centric Warfare Case Study of V Corps and 3 ID during OIF found abundant anecdotal evidence that increased situational awareness allowed for commanders to maneuver smarter and reduced unexpected encounters with other friendly forces, resulting in a reduction in fratricides.

6. The increased situational awareness in the form of the common operational picture and the increased level of communications affected a unit's ability to dynamically self-coordinate.[40] This feature was amply demonstrated when TM B, 1-15 IN was sent on an independent mission to Objective VIKINGS, and even more so when the team departed VIKINGS for its linkup with its parent battalion task force, which had repositioned to RAMS the day before. TM B, once relieved at VIKINGS, was able to navigate over a twenty-four-hour period and conduct the linkup with its parent organization based on the information provided by the FBCB2-BFT.

7. The FBCB2-BFT technology and network (the science) facilitated increased mission effectiveness and accomplishment by TF 1-15 IN and 3rd BCT. The science helped advance the art of battle command resulting in better and faster decisions made by commanders.

---

[40] U.S. Department of Defense., Transformation Planning Guidance (U.S. Dept. of Defense, 2003 [cited]); available from access online version http://purl.access.gpo.gov/GPO/LPS29618. "Dynamic self-coordination is described as an increase of freedom of low-level forces to operate near-autonomously and re-task themselves through exploitation of shared awareness and commander's intent. These units can rapidly adapt when important developments occur in the battlespace and eliminate the step function character of military operations." Note that Alberts and Hayes in Power to the Edge state that the term self-coordination is consistent with the term self-synchronization as discussed in Network Centric Warfare. David S. Alberts and Richard E. Hayes, Power to the Edge: Command, Control in the Information Age, Information Age Transformation Series (Washington, D.C:. CCRP Publication Series, 2003), 36, in note 18. Also, see David S. Alberts and Richard E. Hayes, Power to the Edge: Command, Control in the Information Age, Information Age Transformation Series (Washington, D.C.: CCRP Publication Series, 2003), 36. In note 18, the authors state that the term self-coordination is consistent with the term self-synchronization as discussed in Network Centric Warfare.


Prudens
Futuri

Battle Stories
The "Five Simultaneous Attacks"

THE "FIVE SIMULTANEOUS ATTACKS"

This battle story highlights the impacts of new technologies, the Automated Deep Operations Coordination System (ADOCS), the Hunter Unmanned Aerial Vehicle (UAV), and process innovations that changed the way V Corps planned and conducted corps' shaping operations resulting in greater mission effectiveness. Ultimately, the story is about how the V Corps intelligence and fires communities processed and used the high quality of information provided by Hunter UAV and other systems, how they shared information using ADOCS, how this sharing increased situational awareness and understanding, and how new processes were developed that, when combined with the increased situational awareness and collaboration, produced synchronized effects in the execution of the corps' shaping operations.

CONTEXT OF THE BATTLE

This story examines V Corps' shaping operations that set the conditions for the success of the decisive operations against the Saddam Hussein regime and its forces in and around Baghdad. The specific focus is on the five simultaneous attacks that occurred from 31 March to 1 April 2003.

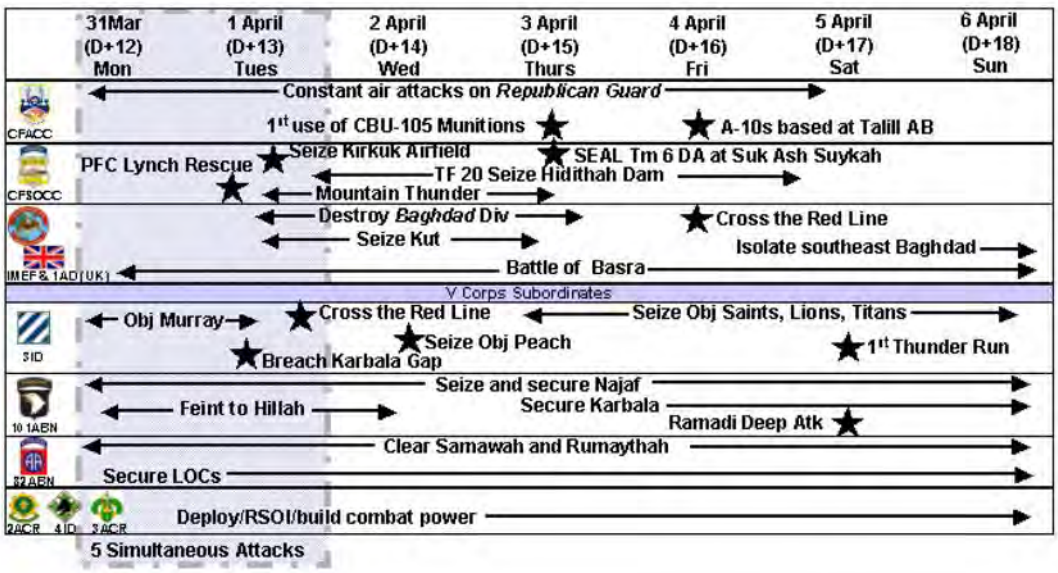


Figure 1: Timeline [1]

[1] Figure 1, Timeline, provided courtesy of *On Point.*

TERRAIN

The Karbala Gap is a narrow corridor with little room to maneuver, only about one-and-a-half kilometers wide with an escarpment that had to be crossed; yet this approach offered V Corps the best high-speed avenue of approach to Baghdad and avoided the preponderance of Iraqi forces arrayed on the east side of the Euphrates River.

> The narrow gap between Bahr al-Milh Lake (Buhayrat ar Razazah) and the city of Karbala offered the only relatively open approach to the outskirts of Baghdad. Other routes crossed a river or entered the mazes of irrigation ditches and soft agricultural land along the Euphrates River valley. Attacking through the Karbala Gap also avoided the urban sprawl in the Euphrates Valley; the lake afforded protection of the corps' left flank, and once north of the gap, maneuver space opened to the west…. This natural chokepoint, further cluttered by irrigated farm fields, offered obvious advantages to the defenders, having all of the attributes of a classic engagement area. That is to say the Karbala Gap afforded good fields of fire to the defenders and limited maneuver space and few exits for the attackers. Here, the Iraqis could bottle up the 3rd Infantry Division (3 ID) and destroy it with a combination of artillery, tank, and antitank missile fire.[2]

ENEMY FORCES

By 28 March 2003, "V Corps and I MEF knew a lot more about the enemy, including that the assumption that the Iraqis would not fight was wrong. On the other hand, assumptions on the quality of Iraqi regular force effectiveness had proved fairly accurate. The demonstrated ferocity and tenacity of paramilitary forces were important and unpleasant surprises. While the CFLCC, corps, and MEF all knew much more about how the enemy fought, they continued to have difficulty finding and tracking units, especially the paramilitary forces. Finally, the Iraqis had been able to force V Corps and I MEF to fight in cities that they had hoped to bypass or seize in stride. Regardless of the changes in task organization, forces available, and general conditions, defeating the regime still required attacking into the capital."[3]

V Corps' main concern in the vicinity of the Karbala Gap was the Medina Republican Guards Division, which was much better equipped than the 11th Infantry Division units they had met at Tallil and An Nasiriyah. The Medina Division's prewar strength was estimated at 96 percent. The Medina Division was using tactical practices of dispersion and concealment, making its units difficult to locate and attack with air interdiction. The poor weather, "The Mother of All Storms," from 25 through 27 March also hampered unmanned aerial vehicles (UAVs) and strike coordination and reconnaissance (SCAR) observation aircraft efforts to locate the enemy forces in and around the Karbala Gap.[4]

As V Corps continued its attack north, its lines of communication (LOCs) were becoming increasingly long and vulnerable to a constant stream of attacks from Iraqi paramilitary forces, who

---

[2] Gregory Fontenot, Colonel, US Army, Retired, E.J. Degen, Lieutenant Colonel, US Army, and David Tohn, Lieutenant Colonel, US Army, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 246.

[3] Ibid., 243.

[4] Charles E. Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," in *The Land Warfare Papers* (Arlington, Virginia: The Association of the United States Army, Institute of Land Warfare, 2004), 10.

were fighting much harder than had been predicted during prewar planning. These attacks were having an effect on the advancing 3 ID, as it started to run low on food, water, and ammunitions.

FRIENDLY FORCES

From the onset of the attack into Iraq and even during the planning process, Lieutenant General William S. Wallace had planned for a "tactical" pause to consolidate combat power and build sufficient logistics for the push to Baghdad. He "understood that once we crossed the Karbala Gap it was one attack all the way to Baghdad. We weren't going to slow down; we weren't going to stop. We didn't want to give the opportunity to the enemy to mass fires or counterattack. That meant continuous flow all the way to Baghdad."[5]

LTG Wallace recalled the decision-making leading up to the attack through the Karbala Gap as the

> most vexing decision that we had to make collectively was when to initiate the main attack through the Karbala Gap to Baghdad. All of the commanders, all of us, understood that upon crossing the Karbala Gap…we were inside the enemy's red zone. If he had the ability to counterattack, he could do that; if he had the ability to mass fires, he could do that; if he was going to use chemical weapons, this was probably one of the last opportunities to use them because of the very narrow choke point we were going through.[6]

LTG Wallace therefore established three decision criteria that had to be met before the attack through the Karbala Gap could begin. First, knowing that the attack could not be sustained with vulnerable lines of supply stretching all the way back to Kuwaiti ports, he required sufficient logistics forward, into logistics support area (LSA) Bushmaster outside An Najaf, to support the attack to Baghdad. Second, he knew he had to consolidate the 3 ID's combat power:

> What I didn't want to do was to get the 3 ID into the fight in and around Baghdad without some degree of flexibility in terms of the division. This, in my judgment meant you had to take the 3 ID's 3rd Brigade, which was strung out back along the Tallil to As Samawah area protecting the lines of communication, and get them up onto the escarpment closed with the rest of the division.[7]

The third criterion Wallace established was the location and condition of the Iraqi Medina Republican Guard Division. This became the priority for the corps' intelligence collection effort.

V Corps had all but ceased moving north from 25 to 29 March, and the corps used this time to prepare for the attack through the Karbala Gap. From 25 to 27 March, the entire area was hit by combined sand and rain storms where visibility was often less than one hundred meters. It was during this time that the corps focused on resupply and on cleaning up the major supply routes and key chokepoints between the Kuwaiti border and An Najaf. Combat certainly had not stopped or even slowed during the refit operations, especially along the LOCs and around the cities of As Samawah and An Najaf. During the planning process prior to the war, the corps had realized that

---

[5] Interview with Lieutenant General William Scott Wallace, Commander, V Corps. Interview conducted by John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired, on 28 April 2004.

[6] Ibid.

[7] Ibid.

the LOCs would be vulnerable to enemy attacks and therefore had planned on avoiding the urban areas; however, the enemy forces, particularly the Fedayeen and other paramilitary forces, attacked with such ferocity that the corps was struggling to secure the LOCs with the available forces. In order to consolidate the 3 ID, LTG Wallace assigned the 101st Airborne Division (Air Assault) the mission to relieve remaining 3 ID forces around An Najaf and to isolate and clear An Najaf. That mission was begun after the weather cleared on the 28th of March. In addition, he asked the CFLCC commander, LTG David McKiernan, for the 82nd Airborne Division, the CFLCC reserve. McKiernan agreed, and on 26 March LTG Wallace ordered the 82nd to relieve the 3rd Brigade Combat Team (BCT) and take over the area from Tallil to As Samawah. By the twenty-ninth, both the 82nd and the 101st were securing the LOCs.

During this time of consolidation, MG Buford Blount, the 3 ID commander, and his subordinate commanders and staff had been planning a brigade-sized attack to the east to seize a bridge over the Euphrates River towards Al Hillah; the attack was to begin two days prior to the Division's attack through the Karbala Gap. This attack was designed to portray that the U.S. main effort would advance towards Baghdad along the east side of the Euphrates using the high speed avenue of approach provided by Highways 8 and 9, something that the corps and division had tried to portray all along and that the Iraqis had expected and prepared for. Thus the plan was designed to draw a reaction from the Iraqi forces and to achieve tactical surprise when the 3 ID attacked through the Karbala Gap two days later. Separately, the 101st had been planning a limited attack to the west. LTG Wallace and his G-3, COL Steve Hicks, were aware of these separate plans and saw an opportunity for the corps to shape operations[8] for the upcoming attack to Baghdad. COL Hicks recalled that, in the forty-eight to seventy-two hours prior to the kickoff of the attacks, set for 31 March,[9] the plan grew from the initial two separate attacks into five near simultaneous attacks, enough activity to get the Iraqi forces moving and then subject them to operational fires.[10]

---

[8] *Field Manual 3-0 Operations*, (Washington, D.C.: Headquarters, Department of the Army, 2001). Paragraph 4-86, "Shaping operations at any echelon create and preserve conditions for the success of the decisive operation. Shaping operations include lethal and nonlethal activities conducted throughout the area of operations (AO). They support the decisive operation by affecting enemy capabilities and forces, or by influencing enemy decisions. Shaping operations use all elements of combat power to neutralize or reduce enemy capabilities. They may occur before, concurrently with, or after the start of the decisive operation. They may involve any combinations of forces and occur throughout the AO."

[9] "Five Simultaneous Attacks" group interview with Steve Hicks, Colonel, U.S. Army, G-3, V Corps; Rob Walter, Lieutenant Colonel, U.S. Army, Deputy G-2, V Corps; and Michael McGee, Lieutenant Colonel, Deputy Commander, 4th Air Support Operations Group, U.S.A.F. Interview conducted by Gary Agron, Colonel, U.S. Army, John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired., Group interview, 21 May 2004.

[10] *FM 3-0,* Paragraph 4-13. "Operational fires are the operational-level commander's application of nonlethal and lethal weapons effects to accomplish objectives during the conduct of a campaign or major operation. They are a vital component of any operational-level plan. Assets other than those supporting tactical maneuver normally furnish operational fires. Commanders direct operational fires against targets whose destruction or neutralization they expect to significantly affect a campaign or major operation. Planning operational fires includes allocating apportioned joint and multinational air, land, and sea means. Operational fires can be designed to achieve a single operational-level objective, for example, interdiction of major enemy forces to create the conditions for defeating them in detail." Paragraph 4-14. "Operational maneuver and operational fires may occur simultaneously but have very different objectives. In general terms, operational fires are not the same as fire support, and operational maneuver does not necessarily depend on operational fires. However, operational maneuver is most effective when commanders synchronize it with, and exploit opportunities developed by, operational fires. Combining operational fires with operational maneuver generates asymmetric, enormously destructive, one-sided battles."

On 28 March the weather had cleared, and LTG Wallace met with LTG McKiernan and LTG James T. Conway, commander I MEF, at Jalibah. "The meeting began with McKiernan providing his assessment on enemy forces and asking some key questions of his subordinates, including their satisfaction with the level of risk along the LOCs. In McKiernan's words, 'we did the wargaming and we looked at the running estimate' of the situation. Both Wallace and Conway had some concerns they believed they needed to address prior to crossing the red line or red zone that referred to entering the inner defensive cordon outside of Baghdad. Wallace briefed his plan for a series of attacks designed to set the conditions for the assault to isolate Baghdad."[11]

By 29 March, V Corps was getting 3 ID combat power forward, the corps' logistic situation was improving, and the 101st Airborne Division (Air Assault) and 82nd Airborne Division were in position to take over the security of the LOCs. Two of the three criteria established by Wallace were well on their way to fulfillment. However, the location of the Iraqi Medina division was proving difficult. From an intelligence perspective it was a collection "nightmare" due to the poor weather in the days leading up to the attack and the enemy's use of dispersion and concealment.[12] The corps originally believed there was a large enemy force in hide sites northeast of Karbala, and in fact some forces were located there by various sources, including elements of the 101st a week earlier, but no large forces were located. Four days of air interdiction conducted by the Air Force against the Medina Division forces had minimal effects, only reducing the division by four percent.[13] The absence of large numbers of enemy forces in the Karbala Gap further raised suspicions that the Iraqis might use chemical weapons.

THE ATTACKS

The corps' G-3 had synchronized all the attacks to paint the picture that the corps would now turn east across the Euphrates for the attacks to Baghdad, hopefully to draw the enemy out and then kill them with operational fires under the direction of the corps' fires effects coordination center (FECC). On the morning of 30 March, 3 ID's 3-7 Cavalry moved forward and established a screen along Phase Line Dover just south of the Karbala Gap. The attacks began on 31 March at 0300Z /0600 local time. 3 ID's 2nd BCT was the main effort, conducting a reconnaissance in force to Objective Murray (vicinity Al Hindiyah) to cause enemy forces to reposition and reinforce the corps' deception objectives. The 2/101st Aviation Regiment conducted an armed reconnaissance out to the west of Mihl Lake against enemy radar sites and other targets. The 1st Brigade, 101st Airborne Division attacked to seize an Iraqi Military Training Facility and an airfield vicinity An Najaf to disrupt paramilitary operations. The 2nd Brigade, 101st conducted a feint towards Al Hillah supporting the main effort. The 2nd Brigade, 82nd Airborne Division attacked to seize a bridge over the Euphrates at As Samawah and conduct a feint north along Highway 8 towards Ad Diwaneyah, cutting enemy LOCs.

The intelligence collection effort during the attacks was set to monitor enemy reactions. The corps' assets included the Hunter UAV as well as numerous other intelligence collection sources. The corps received additional coverage from the CFLCC with the Predator UAV.

---

[11] Fontenot, Degen, and Tohn, *On Point*, 245.

[12] Five Simultaneous Attacks Group Interview.

[13] Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," 10.

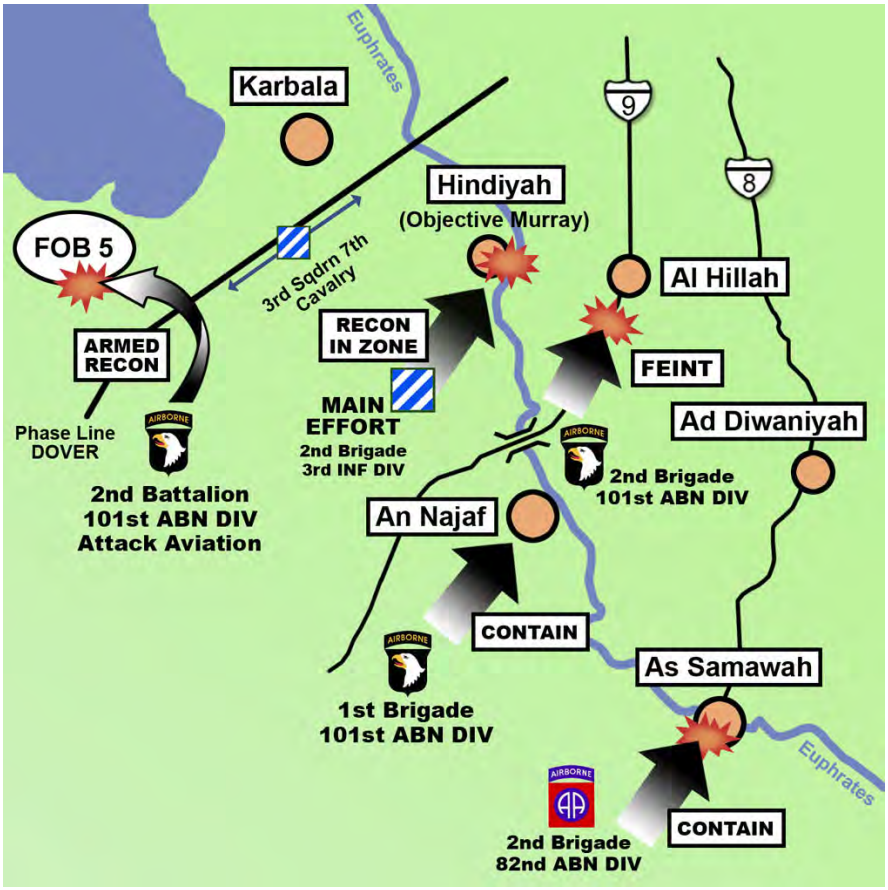


Figure 2: V Corps Attack Plan[14]

Waiting for the Iraqi reaction to the attacks was the corps' intelligence center (Analysis and Control Element or ACE) and the corps' FECC. These two elements shared responsibility for much of the corps' shaping efforts and worked in a very close relationship. In simple terms, the ACE identified targets and passed these to the FECC where the best method of servicing the targets, either by artillery systems or by airpower, was decided and implemented.

The attacks succeeded. Believing that V Corps armor forces were crossing the Euphrates (which they were not) and that the attack was coming up Highway 8, the Iraqi military leadership called for reinforcements. The Iraqi forces began to reposition down Highway 8 into defensive positions during broad daylight. This was the first appearance of Republican Guard forces, the 10th and 15th Brigades of the Medina Division.[15] The Iraqis also reacted by making their first large-scale use of artillery firing from built-up areas. Other brigade-sized forces from the Republican Guard Hammurabi and Nebuchadnezzar Divisions were also found in the area waiting for the V Corps advance up Highway 8. These reactions subjected the Iraqi forces to devastating joint fires.

Receiving multiple indications of the Iraqi reactions to the attacks, the V Corps ACE began developing targets and rapidly disseminated these into the FECC using ADOCS. The ACE also

[14] Figure 2, V Corps Attack Plan, provided courtesy of *On Point.*

[15] Summarized Interview of Colonel Steve Boltz, V Corps, G-2. Interview by Lieutenant Colonel David Tohn., May 8 2003. This interview was provided by the Center for Army Lessons Learned, Ft. Leavenworth, KS.

directly input UAV feeds into the FECC so they could also observe the nature of the enemy's response. Also closely integrated into the ACE and FECC was the U.S. Air Force's 4th Air Support Operations Group (ASOG). Almost immediately,

> Fighter-bombers directed by the 4th ASOG streaked in to attack those targets, primarily tanks on heavy equipment transporters, artillery, armored vehicles and supporting wheeled vehicles in columns on the roads. Control of the attacks was a joint proposition. Corps G-2 concentrated its Unmanned Aerial Vehicles in that area and used them to track individual Iraqi weapons systems, which ASOC controllers then vectored in air strikes to destroy. A particular virtue of that style of battle was that the G-2 and the ASOC obtained an immediate battle damage assessment and therefore could confidently target follow-on air strikes against other targets. Such an immediate BDA was not usually available when firing MLRS missions at such targets, nor was it available to assess the results of theater-directed air interdiction missions.[16]

By 1 April, the Medina Division was largely destroyed.

Based on the Iraqi reactions, LTG Wallace now knew that the enemy had expected V Corps forces to cross the Euphrates and that the Karbala Gap was clear of major enemy forces. There would be no major armor to armor fight with the Medina Division in the Karbala Gap. Beginning at midnight on 1 April, the 3 ID, led by the 3rd BCT, attacked through the Karbala Gap. By 1630 on 2 April, 3ID forces seized Objective Peach, a bridge over the Euphrates River near Salman Al Husayn. The 3 ID continued to push the attack and, by early afternoon on 3 April, was engaged in seizing Objective Saints, which would cut Highways 1 and 8 south of Baghdad, cutting the Iraqi LOCs and trapping the Iraqi forces to the south, unable to reinforce Baghdad. The night of 3–4 April found massive Iraqi movements along the highways headed north, reacting to 3 ID's actions at Saints. The corps' G-2 used the available Hunter UAVs to locate and identify enemy forces. Using ADOCS to coordinate with the FECC, the enemy forces were then subjected to massive air-delivered fires. The effects were devastating to the Iraqis; approximately 25 percent of the corps' total kills for the entire attack to Baghdad were attributed to these fires.[17]

General Wallace cited the five attacks as an especially good example of the power of joint operations and the reciprocal relationship between ground maneuver and joint fires:

> I believe it was one of those classic cases of a maneuver action setting up operational fires, which in turn set up for a successful decisive maneuver, which took place the following day and over the following 48 hours. Because 48 hours later, we owned Baghdad International Airport and Objective SAINTS. We had begun the encirclement of Baghdad. From my perch, my perspective, my retrospection that was a tipping point in the campaign.[18]

---

[16] Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," 13. Dr. Kirkpatrick points out that much more was involved than just the destruction of enemy targets. More significant were the effects of that destruction on the enemy and the influence of joint fires on mission accomplishment. In V Corps' experience, joint fires not only enabled the corps to conduct operational maneuver, but operational maneuver in turn set the conditions that allowed joint fires to have dramatic battlefield effects.

[17] Five Simultaneous Attacks Group Interview.

[18] Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," 14.

TECHNOLOGY DESCRIPTION

Automated Deep Operations Coordination System (ADOCS)

The Automated Deep Operations Coordination System (ADOCS) was a joint mission management software application. It provided a suite of tools and interfaces used in the fire support coordination (Army aviation, field artillery, Air Force air, etc.) for horizontal and vertical integration across battlespace functional areas. Originating as a Defense Research Projects Agency (DARPA) Program, ADOCS evolved into the "go to war" automated support system for deep operations in several theaters. It was installed on over five thousand systems worldwide. ADOCS was also a major segment of the intelligence application package for Theater Battle Management Core System (TBMCS) functionality at wing and squadron level. Key integration functions within ADOCS included Joint Time Sensitive Target management, Intra-Air Operations Center Targets management, Air Tasking Order planning, Indirect Fires management, Counterfire and Artillery Common Operational Picture, Combat Search and Rescue, Air and Ground Battlefield Management, and No Strike and Restricted Target lists maintenance.

ADOCS was labeled one of the "unsung heroes" of Operation Iraqi Freedom for its ability to close the seams between the varied service-specific battle command systems. Through the integration of multiple sources of information, ADOCS was a uniquely capable total mission integration and coordination system. Not only did ADOCS portray the comon operational picture to display the state of the battle, but ADOCS was capable of using that information to streamline the necessary steps in mission coordination and execution. Deployed from the divisional artillery up to the Combined Joint Task Force Headquarters, ADOCS lived up to its billing: planning, coordinating, and executing with horizontal and vertical integration across the joint battle space.

As seen in figure 3, ADOCS provided a single unified display across joint systems by using the existing C4ISR infrastructure. This C4ISR infrastructure is depicted in figure 4, and ADOCS mission managers and tools are shown in figure 5.

The Joint Time Sensitive Targets Manager (JTSTM) in ADOCS allows for target creation, vetting, coordination, and execution across the joint command structure. It enables a Joint Force Commander to effectively employ any weapons system available in his battlespace in a timely manner as needed to engage fleeting targets.

The Intra-air operations center Targets Manager (ITM) provides a tool for the Air Operations Center to coordinate and engage those targets that have a significant impact on the conduct of the air battle. The ITM allows the users to coordinate, deconflict, match aircraft to the target, and submit the request to TBMCS for a change to the Air Tasking Order (ATO). The digital coordination and deconfliction features of the ITM greatly reduce detect-to-destroy times for Air Operations Center AOC critical targets. The ITM is also capable of linking its mission data to the JTST, Fires, and Intelligence, Surveillance, and Reconnaissance (ISR) managers in ADOCS for joint visibility and engagement.

The ISR Manager in ADOCS allows the intelligence community to coordinate multiple collection platforms in a synchronized collection effort on the target. Following the cross-queue collection effort, ADOCS has the ability to pass the mission to its other target execution managers. Similarly, the JTST and ITM managers in ADOCS can send missions to the ISR manager for detailed collection prior to determining the course of action.

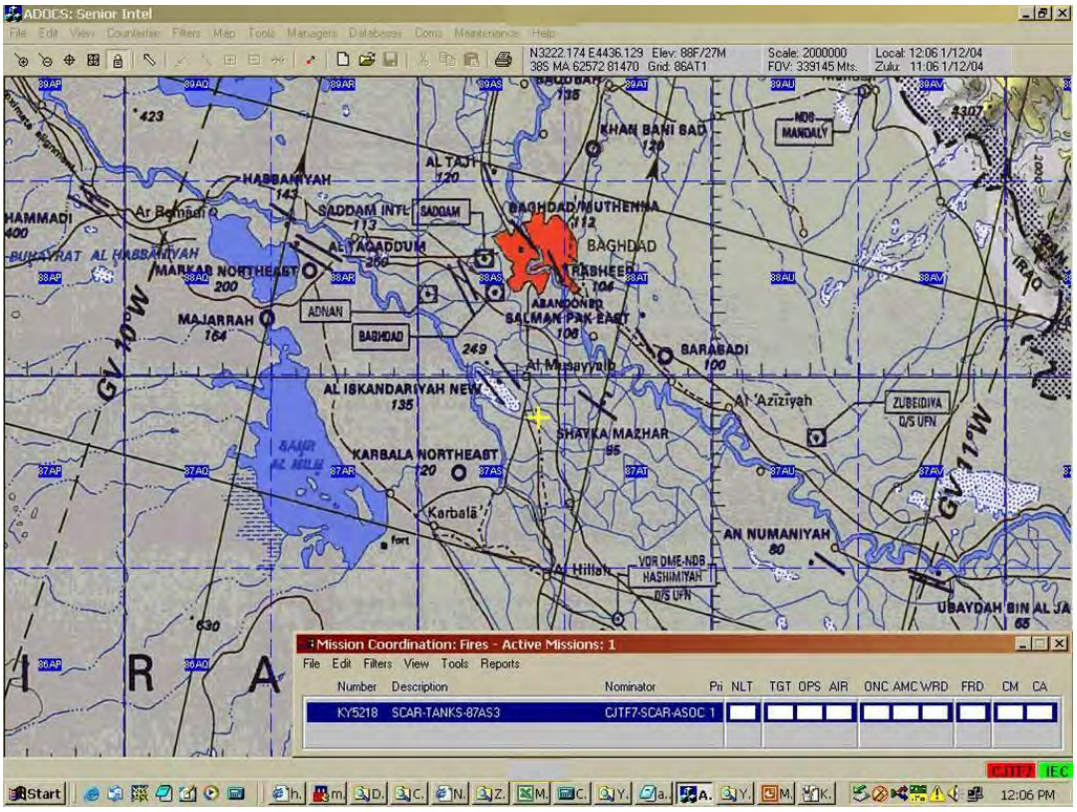


Figure 3: ADOCS Screen

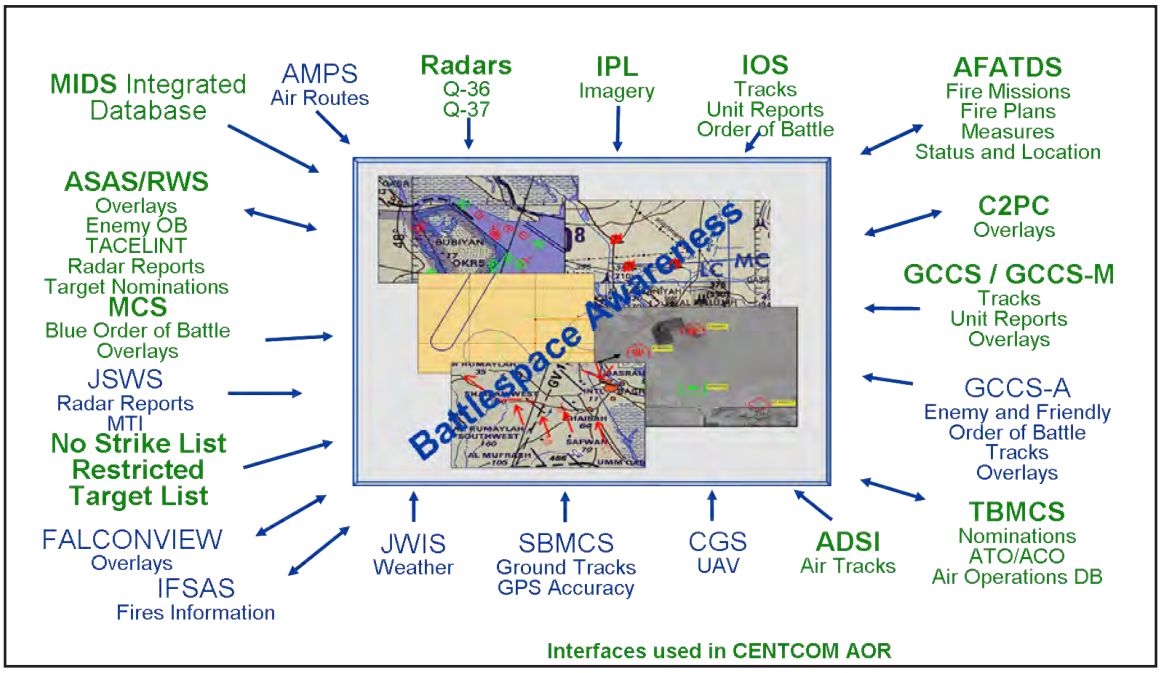


Figure 4: C4ISR Infrastructure Feeding ADOCS

Figure 5: ADOCS Mission Managers and Tools

The Air Tasking Order Planning and Execution function provides more effective employment of air assets through timely and improved information flow for the identification, assignment, and nomination of targets. It enables the service-level commander and staff to allocate critical air resources in a more efficient manner through early assessment of potential and planned missions. ADOCS also provides the ability to monitor ATO execution through all phases and provides immediate visibility into air nominations throughout the targeting process, including distributed eight- and four-hour updates to allow for detailed target validation prior to strike. ADOCS also supports analysis to assess the changes and movements of the Fire Support Coordination Line (FSCL) on current and planned missions in the ATO. It provides immediate visibility of targets exposed or covered by movements in the FSCL.

ADOCS also contains mission managers that allow the user to coordinate and execute indirect fires including tube artillery; multiple launch rocket systems, ship fired missiles, and coordinated engagements by seaborne Special Operations Forces. Not only does ADOCS have the ability to weapon-target pair and begin the engagement process, but it always performs conflicts checks against the targets to prevent fratricide and to ensure that there is no unnecessary collateral damage.

The Counterfire Common Operational Picture (CF-COP) function provides a near-real-time picture of the artillery battle. It allocates tube and rocket counter-battery resources for more efficient counterfire operations through digital integration at multiple echelons; from Joint/Combined level down to tactical firing units. CF-COP also includes munitions allocation and weapon system status. Weapon-target pairing provides improved use of available munitions to maximize lethality while conserving time and munitions for follow-on engagements.

The Combat Search and Rescue (CSAR) manager in ADOCS allows the local rescue coordination center to plan, coordinate, and execute search and rescue operations across the joint battlefield. It consolidates all of the critical information elements into an in-depth mission roll-up, the agencies involved in Personnel Recovery are able to view and track the progress of the recovery operation. ADOCS uses the ATO to automatically recommend recovery assets for direct pairing with a particular mission. The CSAR manager also allows dynamic tasking of other assets to assist in the recovery operation.

ADOCS supports coordination of certain air space through it is Airspace Coordination Request (ACR) manager. The ACR Manager can conduct time and altitude, zone and corridor deconfliction. ADOCS also allows airspace requests to be modified and coordinated across boundary lines and through the echelons. The ACR manager is also seamlessly integrated with the Tactical Airspace Integration System (TAIS) for airspace management and visibility. ADOCS can display the Airspace Control Order (ACO) from both TAIS and TBMCS and constantly compares missions against the protected airspace to alert the users of potentially dangerous conflicts.

Although ADOCS is not the source of the No Strike List (NSL) or Restricted Targets List (RTL), these two essential target lists are present in ADOCS and are constantly referenced in all phases of mission development in ADOCS. As soon as a target is created in ADOCS, both of these lists are checked to make sure that the collateral damage estimated for the target is not in the protected target areas contained in the NSL and RTL. ADOCS also allows for users to add additional targets to the NSL and RTL while coordinating these additions among the service and joint operations centers.

Hunter Unmanned Aerial Vehicle

The following description of the Hunter Unmanned Aerial Vehicle is taken from Army-technology.com.[19]

> Hunter is a joint tactical unmanned aerial system in service with the U.S. Army. In 1989, the U.S. Army, Navy and Marines initiated a joint unmanned aerial vehicle program. TRW (now Northrop Grumman) and Israeli Aircraft Industries (IAI) Malat Division won a low rate initial production (LRIP) contract in 1993 to supply seven Hunter systems. The systems entered service in 1996. Hunter has also been sold to France and Belgium.
>
> The Hunter system is capable of carrying out the following missions: real time imagery intelligence, artillery adjustment, battle damage assessment, reconnaissance and surveillance, target acquisition and battlefield observation.
>
> **RQ-5A**
>
> The RQ-5A Hunter air vehicle is a fixed wing, twin tail boom aircraft with a dual rudder. It is propelled by two Moto-Guzzi petrol engines, each developing 60hp.
>
> The air vehicle can be launched from a paved or semi-paved runway or it can use a rocket assisted (RATO) system, where it is launched from a zero-length launcher using a rocket

---

[19] *Hunter RQ-5A / MQ-5B/C Tactical Unmanned Aerial Vehicle, USA/Israel* (Army-technology.com, 2006 SPG Media Limited a subsidiary of SPG Media Group PLC, 2006 [cited March 22 2006]); available from http://www.army-technology.com/projects/hunter/.

Figure 6: Hunter UAV

booster. The RATO launch is useful on board small ships and in areas where space is limited. The air vehicle can land on a regular runway, grassy strip or highway using arresting cables.

Payloads

The primary payload on the RQ-5A is the Multi-Mission Optronic Payload (MOSP), which includes television and forward looking infrared (FLIR) to provide day/night surveillance capability. U.S. Army Hunter's are being fitted with sensors including a third-generation FLIR and a spotter for the day TV camera.

Hunter is capable of carrying other advanced mission payloads and has been used as a payload demonstration platform. Payloads have included a laser designator and various communications systems. A communications relay payload extends VHF/UHF communications beyond line of sight. Electronic countermeasures payloads have included communications warning receiver, communications jammer and radar jammer supplied by Northrop Grumman. In June 2003, Northrop Grumman tested a Hunter UAV equipped with a SAR/MTI (synthetic aperture/moving target indicator) radar payload.

Ground Control Station

The GCS-3000 Ground Control Station manned by two operators, tracks, commands, controls and communicates with the air vehicle and its payload. One ground control station can control one air vehicle or two air vehicles in relay. An enhanced mission planner provides flexible automated tactical mission planning and access to digital terrain elevation data (DTED), CD ROM map data and data from the Defense Mapping Agency (DMA).

The GCS has three control bays and an optional intelligence bay. The Pilot Control Bay controls the flight of the air vehicle. An Observer Control Bay controls the payload functions. The Navigation Control Bay is equipped with a digital map display which traces the flight path and monitors the progress of the mission. The Intelligence Bay provides data processing and distribution capabilities.

The communications uplink channels (UPL-1 and UPL-2) and the downlink channel (DNL) use fixed coded frame format. An optional spread spectrum modem on the main uplink channel provides anti-jam capability.

Remote Video Terminal

A Remote Video Terminal is used at tactical operations centers to receive and display real-time video and telemetry from the airborne vehicle.

ORGANIZATIONAL STRUCTURE

V Corps Fires Effects Coordination Center (FECC)

By 2001, V Corps began the process of reorganizing the scope and method it used to control its fires for conducting deep operations. The corps was using the lessons learned during the operations in the Balkans and adopted the developing concept of the FECC, which expanded beyond the traditional corps deep operation coordination cell (DOCC).

The V Corps FECC combined the traditional members of the DOCC and other non-standard battlefield operating system (BOS) representatives under one roof and one leader. The traditional DOCC included the corps' main fire support element (FSE), G3 air, air defense element (ADE), airspace command and control (A2C2), rescue coordination center (RCC) liaison, and air liaison officer (ALO) along with the V Corps Artillery tactical operations center (TOC). The FECC added the ability to plan and execute extended range lethal fires using the Army tactical missile system (ATACMS) and nonlethal effects, such as operational security (OPSEC), military deception, psychological operations (PSYOPS), special information operations (IO), information assurance, physical security, counterdeception, counter-PSYOPS, and counterintelligence.

The FECC was not just a bigger DOCC. The DOCC focused primarily on planning and executing deep fires in the traditional linear corps' fight. However, the primary focus of the FECC was the application of lethal and nonlethal fires and effects across a dispersed noncontiguous battlefield. The FECC provides one central clearinghouse for planning, developing, and executing synchronized and coordinated effects throughout the expanded battlespace. The need for an FECC was described by LTC Roy Perkins in an article in *Field Artillery*.

> In recent years, conflict has changed. Brigades fight in areas larger than Vietnam-era divisions. Divisions currently conduct operations that corps executed during Operation Desert Storm. The counterfire fight is no longer fought at the corps level. With the extended range of most indirect systems, the burden of counterfire has shifted to the division artillery or the reinforcing brigade TOC. The corps fight has transitioned into employing long-range artillery fires, primarily the Army tactical missile system (ATACMS), as well as Army attack helicopters and joint fires: air interdiction (AI), Navy Tomahawk land-attack missiles (TLAMs), electronic warfare (EW) and close air support (CAS). Additionally, the corps plans and executes nonlethal effects, such as operational

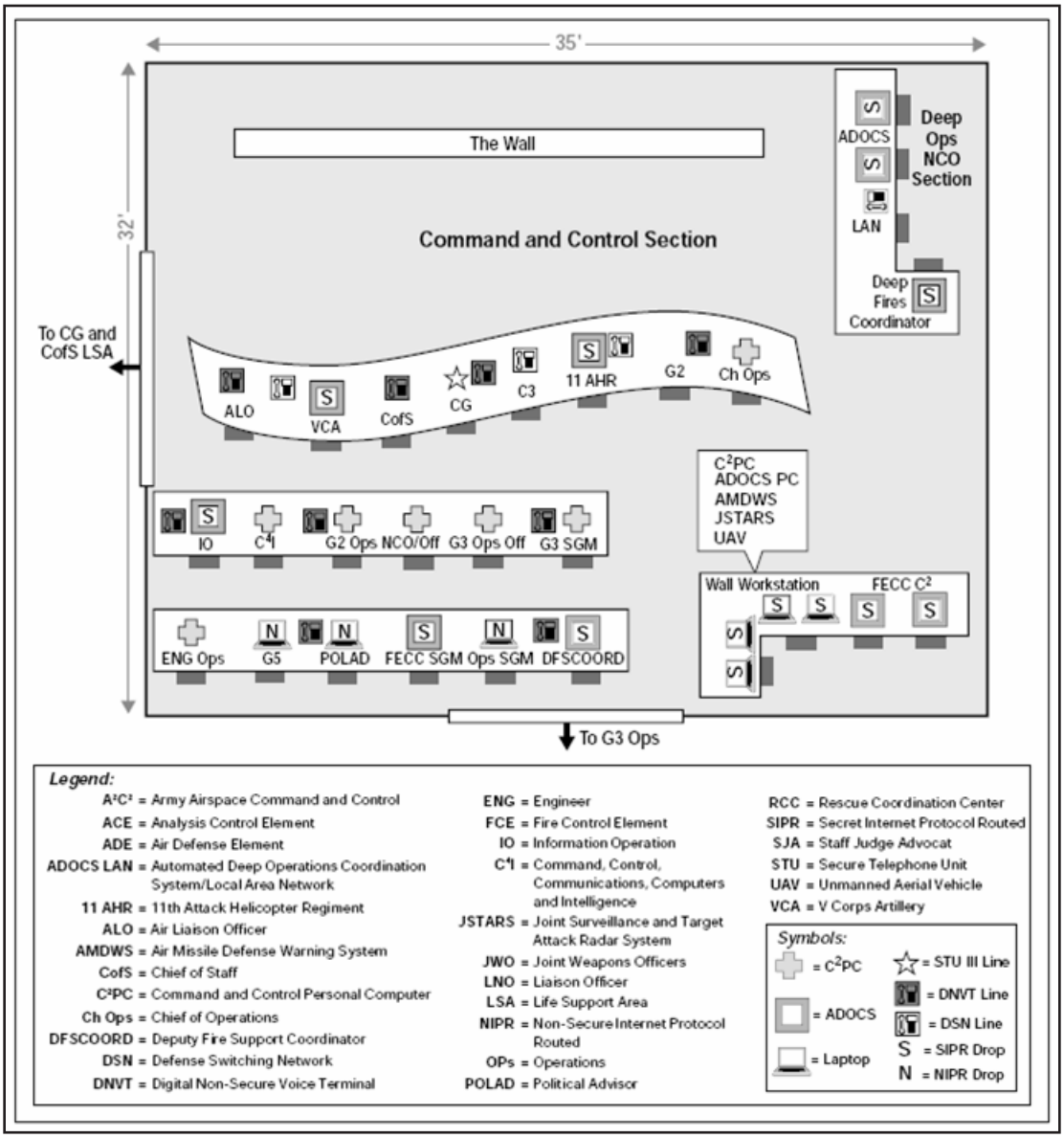


Figure 7: V Corps Original FECC Layout, 2001[20]

security (OPSEC), military deception, psychological operations (PSYOP), special information operations (IO), information assurance, physical security, counterdeception, counter-PSYOP, and counterintelligence. Public affairs and civil affairs also can help attain IO objectives.

The corps now focuses more on bridging the tactical and operational levels of war, a role once reserved for numbered Armies and Army service component commands. A FECC recognizes this change and provides the organizational structure to support it.[21]

---

[20] Roy E. Perkins, Lieutenant Colonel, U. S. Army, "V Corps FECC," *Field Artillery, HQDA PB6-01-5*, no. September-October 2001 (2001).

[21] Ibid.

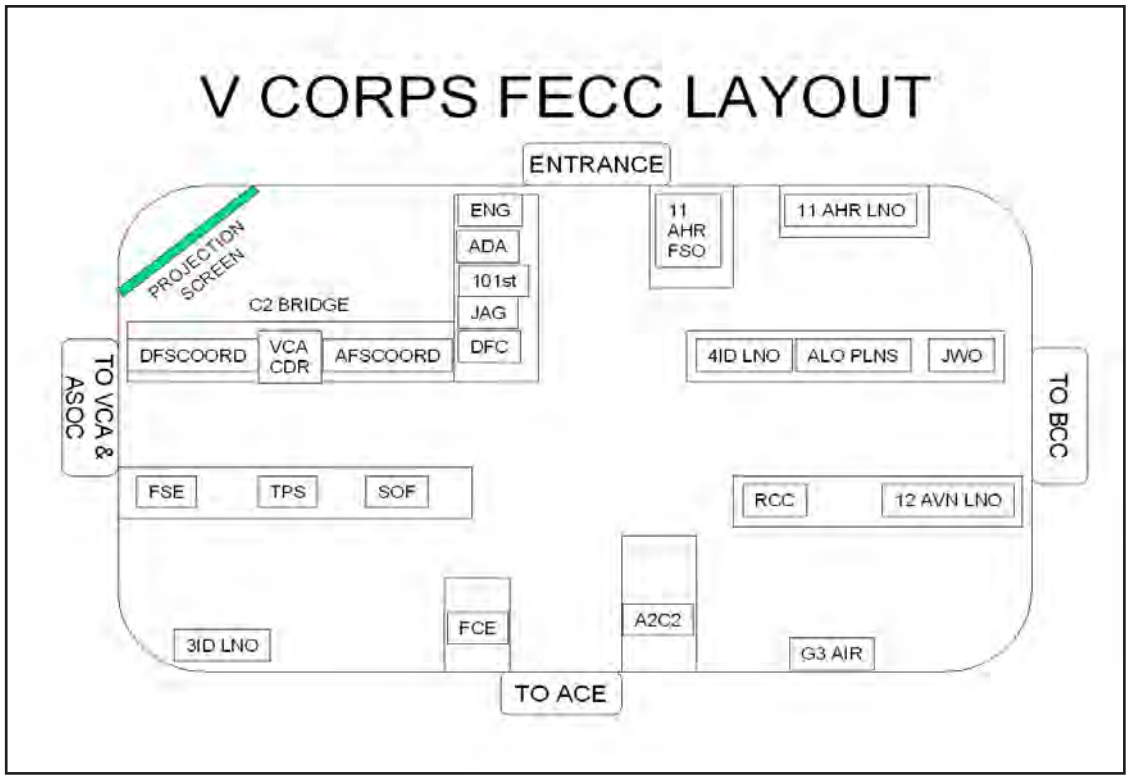


Figure 8: V Corps Reorganized FECC, 2003

Between the summer of 2002 and February 2003, the V Corps FECC again reorganized and reconfigured in order to maximize communications and information sharing, increase situational awareness, and increase the collaboration/coordination between sections to improve situational understanding. To accomplish this, each battlefield operating system (BOS) element was grouped generally by their respective function. The layout of the FECC, with all elements facing each other, allowed for rapid information sharing, close coordination, and improved situational understanding between sections. The two walkways through the FECC allowed leaders to circulate between sections to get "eyes on" during critical phases of the fight.

The FECC used numerous command, control, communications, computers, information, surveillance and reconnaissance (C4ISR) systems to track the battle and produce products to visualize targeting, airspace, and operations. The system used to integrate all of these systems was ADOCS. It allowed users to draw information from the multiple systems and to manipulate that data to better inform decision makers. Leaders in the FECC were able to quickly merge data passed from the G-2's ACE, match the target location against current no-strike lists, view satellite imagery of the terrain, make decisions on aimpoints or munitions, and pass the target to the fire coordination element (FCE) for artillery fires or the Air Force's air support operations center (ASOC) for close air support.

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES USED

Dr. Charles Kirkpatrick, V Corps Historian, summarized the previous methodology used for corps shaping fires:

> In the early fall of 2002, V Corps had no intimation it would be the beneficiary of close air support that was much different from the CAS delivered during the first Persian Gulf War. In fact, Air Force doctrine for air support to shape the battlespace had not changed significantly in two decades and was familiar to everyone involved. The process on the Army side was equally well understood. The corps G-2 and field artillery intelligence officer developed and passed targets to the fires effects coordination cell (FECC) for analysis. If the FECC determined the best attack method was air, then the joint warfare officer (JWO), an Army officer in the FECC, nominated the target through the coalition Forces Land Component Command (CFLCC) to the daily targeting board at the Combined Air Operations Center (CAOC). At some point, usually one to three days later, squadrons would be directed to fly missions against those targets.
>
> Obviously, such a process required close management because any target other than a structure might reasonably be expected to move between detection and the appearance of an airplane overhead. Thus, the corps intelligence section was obliged to use intelligence assets to constantly track and update the nominated target's position and report those updates to the CAOC, up to five updates in two days. The process was inefficient, involved a lot of man-hours and was fraught with the possibility of losing contact with the enemy target. Beyond that, the process did not offer any opportunity to direct air support strikes on targets in the corps area of operations on short notice. When fleeting targets appeared, the only option was to strike with corps artillery, presuming the targets were within range of the artillery available.
>
> The prewar paradigm was a simple one. Theater aviation—that is, aerial interdiction—attacked both long and short of the FSCL (fire support coordination line) to shape the battlefield for future corps operations. The corps nominated effects—although not really targets——based on its planning; the Air Force controlled the aerial interdiction that delivered those attacks. Meanwhile, corps general support artillery suppressed enemy air defense to enable deep attacks by corps aviation that shaped the corps battlespace.[22]

---

[22] Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom," 1-2,, 7. Note: The FSCL is defined in FM 1-02, Operational Terms and Graphics as a "fire support coordinating measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Fire support coordination lines (FSCLs) facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. An FSCL does not divide the area of operations by defining a boundary between close and deep operations or a zone for close air support. The FSCL applies to all fires of air, land, and sea-based weapons systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse effects on, or to the rear of, the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander."

IMPACT OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

Two of the biggest obstacles for the advancement of new processes for utilizing more responsive fires were the relatively short range of U.S. artillery systems and the lack of a mechanism to allow for the air support operations center (ASOC) to find, clear, and kill targets when they were identified.

The first obstacle was cleared when the Army deployed the tactical missile system (ATACMS). The second obstacle required an integration of the ASOC (the portion of the ASOG that typically served more of an air control function, clearing aircraft entering a corps area on planned missions and in the case of CAS passing them off to the forward air controllers located at the division and below) intelligence, and targeting elements with the corps' G-2 and FECC. Due to the innovation and desire of the deputy ASOG commander to provide more responsive and effective air fires to the corps and the willing support of the corps' G-2 and the fire support coordinator, new processes were developed.

The 4th ASOG integrated its targeting and intelligence elements with the corps' ACE and FECC. Now, the ASOC had situational awareness of the latest enemy and friendly situations and could direct available sorties throughout the corps area in concert with the corps' efforts to shape the battlespace.

Now, using the intelligence feeds from multiple sources (ELINT, COMINT, HUMINT, etc.) that came into the ACE, the ASOC was able to help the ACE confirm targets by diverting available strike coordination and reconnaissance (SCAR) sorties (an armed reconnaissance aircraft with an attached imagery pod) to confirm targets and then the SCAR was immediately available to direct CAS onto the targets. This was particularly useful when the intelligence feed came from a source other than a UAV. The UAV feeds provided streamed video, allowing intelligence operators to instantly verify enemy activity.

Once enemy targets were identified in the ACE, it was often referred to as throwing up a jump ball in the FECC to see who and what would be used to service the targets as the targets were passed from the ACE into the FECC via ADOCS. Target servicing decisions were based on which system was the most responsive and would best provide the required effects. The V Corps' clearance of fires process, as described below, allowed all members in the FECC to instantly see the targets as they came out to the FECC and allowed for rapid coordination and execution within the FECC and even among headquarters such as the CAOC for clearing airspace or bringing in CAS. ADOCS was the primary means of coordination within the fires community between CENTCOM and the corps for time-sensitive high-value targets.

V Corps Clearance of Fires

Target acquisition assets forwarded their target data for deep attacks to the ACE. The ACE sent the target nominations to the FECC via ADOCS for clearance. The ADOCS operator would then examine the target according to its type, location, and target acquisition system target location error and compare it to the High Payoff Target List (HPTL) and then notify the FECC Battle Captain. The Battle Captain would simultaneously examine and compare the target data with the HPTL and decide whether to engage the target with ATACMS or CAS. If he determined ATACMS was the best system to engage the target, he would announce the fire mission. The Battle Captain and the Army Airspace Command and Control (A2C2) would forward the data via ADOCS to the

CFLCC battlefield coordination detachment (BCD),[23] who would clear airspace over the target. The Battle Captain then determined whether the target could be engaged. In this procedure he consulted with the Special Forces LNO and the Staff Judge Advocate (SJA) LNO. The primary device for these checks was the ADOCS, which could portray the terrain with up to four different map scales and satellite imagery with unit and fire support graphic overlays. The Battle Captain and the LNOs would examine the target on the ADOCS 1:25,000 map scales and satellite imagery. The paper 1:250,000 map provided a redundant check. The Battle Captain ensured fires would not violate unit boundaries or fire restrictions. The SF LNO would ensure the target was not on a long-range surveillance (LRS) team. The SJA LNO checked to see if the fires on the target would violate the law of war or the Rules of Engagement (ROE). Since deep attack targets were by definition well forward of maneuver units, those units were not consulted. However, target location was checked in order to ensure it was correct and not in a maneuver unit AOR. When and if the BCD determined airspace was clear, they would notify the FECC via the ADOCS and by phone. When the target was cleared in accordance with all these concerns, the Battle Captain would order the ADOCS operator to forward the target to the Advanced Field Artillery Tactical Data System (AFATDS) for execution. The AFATDS operator would in turn send the firing data to the appropriate MLRS battalion to fire. The final clearance of fires would be executed at the battalion level.[24]

TECHNOLOGY AS AN ENABLER

The ADOCS seamlessly merged data from multiple sources, and it was highly praised by both the V Corps and 3 ID users. Throughout the war, the corps' FECC used ADOCS as the system of choice to develop and attack targets.

In the case of targeting, ADOCS was able to display the merged data from multiple intelligence intercepts and graphically display those against other targeting information, such as the No Strike List, Restricted Target List, or Indirect Fire capabilities.

ADOCS also allowed the targeting officers to conduct terrain association between UAV feeds and satellite photos to validate target grid locations. ADOCS enabled quicker collaboration and decision making during the targeting process and resulted in the ability to attack targets more quickly than previously possible. ADOCS was responsible for reducing fratricide. There are numerous examples of how ADOCS helped reduce fratricides. In particular, it allowed for the rapid dissemination of information in order to clear airspace for the firing of missiles and allowed for deconfliction with special operations forces that might have been working in the area.

The Hunter UAV provided imagery that enhanced the planning and targeting processes and enabled real-time acquisition of high-payoff targets and time-sensitive targets. Hunter UAV enabled dynamic targeting in real time, and enabled real-time assessments of effects on targets.

---

[23] *Joint Publication 1-02: Department of Defense Dictionary of Military and Associated Terms*, (Washington, D.C.: Joint Chiefs of Staff, 2001 (As amended through 20 Mar 2006)), 64. The BCD is "an Army liaison provided by the Army component or force commander to the air operations center (AOC) and/or to the component designated by the joint force commander to plan, coordinate, and deconflict air operations. The battlefield coordination detachment processes Army requests for air support, monitors and interprets the land battle situation for the AOC, and provides the interface for exchange of current intelligence and operational data."

[24] V Corps Artillery, *Clearance of Fires in OIF*, (Heidelberg, GE: V Corps Artillery, APO AE 09081, 2004).

NETWORK CENTRIC INSIGHTS

The following insights are derived from this battle story:

1. The Hunter UAV with its ability to conduct day and night surveillance and provide real-time video and coordinates of enemy targets improved the quality of information and provided actionable intelligence to the intelligence and fires effects coordination centers.

2. The information from Hunter UAV was integrated into ADOCS, where the information rapidly increased shared situational awareness and allowed for rapid situational understanding[25] and battlefield visualization,[26] which increased the speed of decision making and target execution.

3. The shared situational awareness provided through ADOCS encouraged, and allowed for improved collaboration within the corps and between the corps and other headquarters.

4. The creation of the FECC, the FECC and ACE layout, and the integration of the ASOC intelligence section into the ACE were new organizational structures and processes that were instrumental in greatly increased mission effectiveness. Specifically, the initiative and innovation of officers in the 4th ASOG resulted in new TTPs for the employment of CAS in support of the corps' shaping operations. This process change resulted in greater mission effectiveness for the CAS sorties and resulted in greater freedom of maneuver for the ground forces.

5. ADOCS, with its multiple source fusion capabilities, provided decision makers with an extremely reliable multidimensional common operating picture. Using the ADOCS "vehicle," information was distributed across the battlefield both horizontally and vertically. This speed-of-light distribution of information greatly improved two key tenets of the conceptual frame work: information sharing and shared situational awareness. The use of ADOCS resulted in a dramatically increased collaborative capability.

6. Hunter UAV feeds allowed the intelligence and fires communities greater ability to rapidly and accurately match targets and weapon platforms resulting in a greater probability of hit and kill—increased mission effectiveness.

7. ADOCS and Hunter UAV together enabled rapid targeting and decision-making processes resulting in more effective and responsive deep fires (shaping operations), battle synchronization, and overall increased mission effectiveness.

---

[25] *FM 3-0*. Paragraph 11-46, defines situational understanding as "the product of applying analysis and judgment to the common operational picture (COP) to determine the relationship among factors of mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC). Situational understanding enhances decision making by identifying opportunities, threats to the force or mission accomplishment, and information gaps. It helps commanders identify enemy options and likely future actions, the probable consequences of proposed friendly actions, and effects of the environment on both. Situational understanding based on a COP fosters initiative in subordinate commanders by reducing, although not eliminating, uncertainty."

[26] *Field Manual 100-15 Corps Operations*, (Washington, DC: Headquarters, Department of the Army, 1996). Chapter 2, page 2-1, Battlefield visualization is "the process whereby the commander develops a clear understanding of his current state, envisions a desired end state and, subsequently, visualizes the sequence of activity that will move his force from its current state to the end state."


Prudens
Futuri

Battle Stories
Logistics

This battle story highlights the impact of new technologies or, in many cases the lack thereof, on the logistics efforts of V Corps during the maneuver phase of Operation Iraqi Freedom (OIF). The story will look at the combat service support (CSS)[1] conducted by the 3rd Corps Support Command (COSCOM) and the technologies it utilized at a time when the Army was in a transition from a stockpile-based support system to a distribution-based[2] support system. The 3rd COSCOM's use of satellite tracking systems for in-transit visibility enabled convoy tracking and extended communications. This in-transit visibility and extended communications greatly increased the COSCOM's level of situational awareness and resulted in greater logistics agility and mission effectiveness. On the other hand, units not equipped or trained with new technologies were less agile, less effective, and in some cases, proved a detriment to the overall logistics effort.

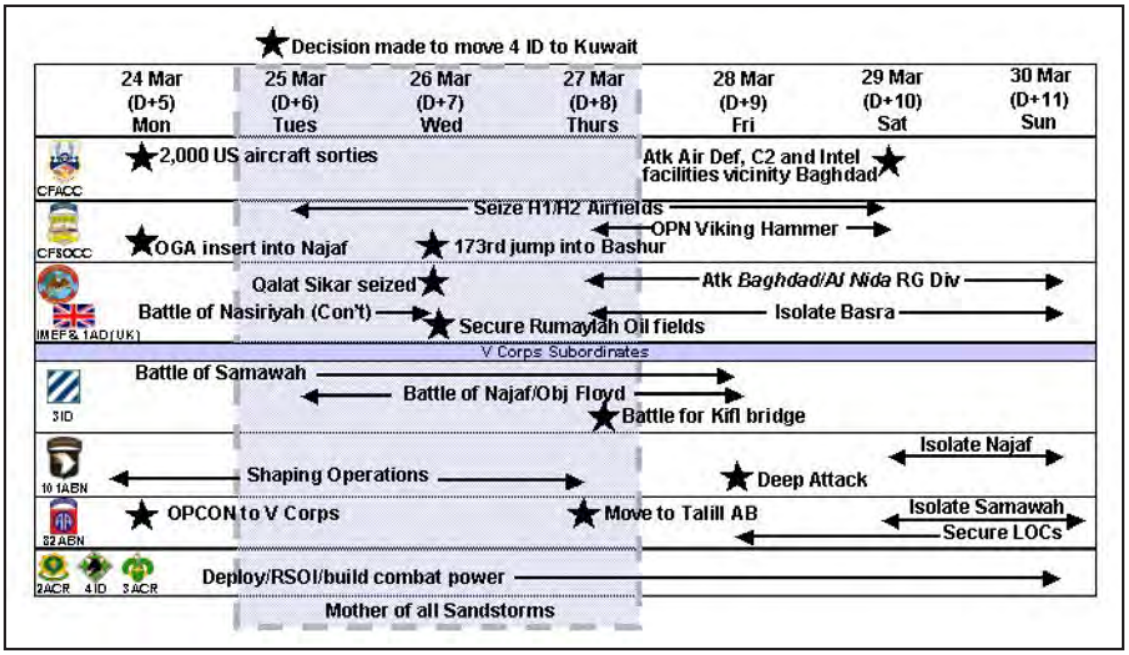


Figure 1: March Up-country Sequence of Events [3]

---

[1] *Field Manual 4-0 (FM 100-10) Combat Service Support*, (Washington, D.C.: Department of the Army, 2003), 1-1. Definition of Combat Service Support: "The essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistics systems, it includes but is not limited to that support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield."

[2] Eric Peltz et al, *Sustainment of Army Forces in Operation Iraqi Freedom: Battlefield Logistics and Effects on Operations* (Santa Monica, CA: RAND, 2005), xi. "Distribution-based logistics means limited inventory to cover small disruptions in distribution flow and enough supply to cover consumption between replenishments. The primary reliance is placed on frequent, reliable distribution rather than on large forward stockpiles."

[3] Figure 1, March Up-Country Sequence of Events, courtesy of *On Point*.

CONTEXT OF THE BATTLE STORY

This story looks at V Corps logistics operations that sustained the force. Specifically, this story will focus on the timeframe from 24 to 30 March 2003, when V Corps was trying to build sufficient logistical capabilities forward into Objective RAMS (which became Logistics Support Area (LSA) BUSHMASTER) for the final push to Baghdad.

ENEMY FORCES

By 24 March 2003, just four days after the initiation of the ground attack into Iraq, paramilitary forces were threatening V Corps' lines of communications (LOCs)[4] from An Nasiriyah to As Samawah to An Najaf. The major threat to the LOCs was from the Iraqi paramilitary forces (the Al Quds, the Saddam Fedayeen, Regime Death Squads, and the Ba'ath Party Militia). These paramilitary forces were mostly dressed in civilian clothes; they were poorly trained and armed mostly with small arms, machineguns, rocket-propelled grenade (RPG) launchers, and mortars. Though poorly trained, the paramilitaries were fanatical and fought with determination. In many cases, the paramilitaries forced Iraqi civilians to fight as part of the resistance and executed those not willing to fight.[5] These paramilitary forces were no match for the armored formations of the 3 ID, but they posed a significant threat to the thin-skinned logistic vehicles that followed and supplied the combat formations. The paramilitary forces used cities like As Samawah and An Najaf as bases from which to stage attacks outside the cities, using small ten to twenty man ambushes and pickup trucks either mounting machineguns (such trucks were referred to as technicals) or carrying troops to attack forces moving up the LOCs. The attacks from As Samawah caused V Corps to divert its convoys from Highway 8 to an alternate, less capable route, Highway 28. Similarly, in the area south of An Najaf, in what was designated Objective RAMS, the paramilitary forces were "swarming all over…in technicals and were dug in using spider holes along Highway 28 in restrictive terrain."[6]

FRIENDLY FORCES

3rd COSCOM Prepares for Combat.

The monumental task of providing the support for V Corps and its forces was the mission of 3rd COSCOM. This U.S. European Command based unit provided V Corps its support requirements in Germany and now in Iraq. This organization, a V Corps unit, was involved in all of the V Corps planning and training for the buildup, deployment, and attack into Iraq. As part of this preparation, 3rd COSCOM also conducted two logistic terrain walks, or staff rides. During the first terrain walk, they reviewed the battle for Berlin and the logistic challenges the Russian Army faced as it moved its heavy forces across Poland. The second terrain walk looked at the Allied invasion at Normandy: how supplies were stockpiled, the landing of forces, the clearing of ports, movement forward, and LOC issues. From these exercises, terrain walks, and extensive reviews of lessons

---

[4] *Joint Publication 1-02 Department of Defense Dictionary of Military and Associated Terms*, (Washington, D.C.: Joint Chiefs of Staff, 2001 (As amended through 20 Mar 2006)), C-2. "Lines of communications - All the routes, land, water, and air, which connect an operating military force with a base of operations and along which supplies and military forces move."

[5] 3rd Infantry Division, *Operation Freedom: Third Infantry Division (Mechanized) "Rock of the Marne" after Action Report,* Final Draft, (U.S. Army, 3rd Infantry Division (Mechanized), Ft. Stewart, GA, 2003), Operational Overview, Battle of As Samawah: 22-24 March.

[6] Ibid., Operational Overview, Battle for OBJ RAMS: 22-23 March.

learned and observations from Desert Storm, 3rd COSCOM gained an understanding of many of the logistical challenges it would face during OIF. Brigadier General Charles W. Fletcher Jr., 3rd COSCOM commander, and his staff also had a great appreciation for the command and control challenges they would face over the extended distances of Iraq.

The COSCOM commander realized that if his organization could not command and control over extended distances they could not meet their mission requirements. Having little in the way of organic communications capabilities, the 3rd COSCOM based its logistics support plan, including the logistics headquarters locations, on the 22nd Signal Brigade's signal support plan, which planned on establishing eleven signal nodes on the battlefield. In theory, these nodes would provide the COSCOM with communications connectivity between headquarters elements all the way from the ports in Kuwait to the most forward elements in Iraq as well as connectivity with the movement control teams along the supply routes.

Understanding that combat service support units in general, and transportation units in particular, lack radios in their vehicles—in some cases only one FM radio per forty vehicles—the COSCOM knew it would be faced with a significant challenge in trying to communicate with individual convoys as they traversed the extended distances. Communications with the convoys would be critical if the logisticians were to have any flexibility in their distribution management scheme for providing combat service support to rapidly advancing combat formations. Communications would also be critical for providing some level of situational awareness to the convoys as they traveled the LOCs from logistics bases to their distribution points. With this in mind, 3rd COSCOM began buying satellite telephone systems for convoy communications. Further, from their experiences gained in tracking convoy movements returning from operations in the Balkans in 1999 using DTRACS (the Defense Tracking, Reporting and Control System, a commercial satellite-based tracking system used in Europe) the COSCOM was now used to and planned on in-transit visibility of its convoys during combat operations. They realized that tracking critical convoy movements was essential to this entire effort of sustaining the corps' forces while simultaneously building sufficient logistics forward to support future operations. Therefore, the COSCOM purchased additional DTRACS, deploying with about one thousand vehicle-mounted DTRACS. During the planning and preparations for combat, BG Fletcher had pushed for U.S. Central Command (CENTCOM)[7] to lease the necessary satellite coverage to support DTRACS in the Iraqi theater of war. The satellite was leased, but not until a week prior to the start of combat operations.[8] The COSCOM was now certain it would have a means of tracking its convoys and an ability to text message with those convoys through DTRACS.

---

[7] U.S. Central Command, headquartered in Tampa, Florida, is one of DOD's five geographic combatant commands, CENTCOM's area of responsibility encompasses 27 countries in Southwest Asia, South and Central Asia, and the Horn of Africa. USCENTCOM was in command of all joint military operations during Operation Iraqi Freedom.

[8] Interview with Brigadier General Charles W. Fletcher Jr., Commander, 3rd Corps Support Command (COSCOM) During Operation Iraqi Freedom, Mar- May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, videotaped on 20 August 2004. BG Fletcher recalled that the COSCOM tried for six months before the war to get the Intel 502 satellite leased so that they would have the coverage in theater. He finally was able to meet with LTG McKiernan, the commander of U.S. 3rd Army and USCENTCOM's Combined Forces Land Component Commander, during a visit to Kuwait and explained the need for the satellite coverage. With the coverage coming only a week before the start of combat operations, there was no real opportunity to continue training with DTRACS in theater before crossing into Iraq.

After arriving in Kuwait, the COSCOM also received a number of the Army-procured movement tracking systems (MTS), providing an additional means of tracking convoy movements and another means to text message with those convoys. Between DTRACS and MTS, the COSCOM had as much of an ability to track its convoy movements as the corps had for tracking combat forces through the blue force tracking systems. This composite network was informally called "log force tracking."

Throughout its preparations COSCOM developed tactics, techniques, and procedures (TTP) for how their units should use DTRACS and for using radio frequency identification (RFID) tags to track commodities and specific items of supply as they moved in convoys in order to develop and maintain a full logistics common operational picture (LCOP). They planned on using the commercially purchased satellite telephones for emergencies and as a backup to the text messaging in the DTRACS and MTS systems. The COSCOM made plans for the incorporation of additional corps support groups (CSGs) and separate battalions that would fill out the COSCOM in Iraq. They also trained their soldiers in field-craft, marksmanship, and convoy movement and protection.

Despite all of the planning and preparations, due to operational security considerations the 3rd COSCOM was not able to discuss or coordinate any of these activities with the CONUS-based divisions it would end up supporting or with the CSGs that would join the COSCOM in Iraq. Therefore, the standard operating procedures (SOPs) and reports used by the European-based V Corps forces differed from those by the CONUS-based units.[9] There were also wide discrepancies in the use of the available technologies and the training levels of the combat service support soldiers that would be integrated into the COSCOM upon their arrival in theater.

Sustaining Combat Operations.

"There are certain hard facts that apply to even the most modern and best equipped armies. Soldiers must eat, drink, and sleep. Tanks, Bradleys, and other vehicles require fuel and at least some maintenance or they will grind to a halt."[10]

Army Field Manual 3-0 specifies that "Effective CSS in offensive operations demands CSS operators who foresee requirements and prepare to meet them before they occur. Force commanders require a simple concept of CSS that is responsive and flexible enough to adjust while executing offensive operations. To sustain momentum and provide freedom of action to exploit success, they integrate CSS considerations into plans. To ensure continuity of support, plans include provisions for CSS units to follow exploiting forces."[11]

When the ground combat forces began their attack into Iraq on 20 March, the units were to have uploaded five days of supplies (Class I—food and water—and Class III (P)—packaged petroleum products, e.g., oils and hydraulic fluids) to carry with them, and an additional two days of supplies was to be carried

---

[9] Ibid. During this interview, BG Fletcher went into great detail on the 3rd COSCOM road to war preparations. He also outlined many of the problems that resulted from the lack of coordination with stateside units and with the Reserve Component forces.

[10] Gregory Fontenot, Colonel, US Army, Retired, E.J. Degen, Lieutenant Colonel, US Army, and David Tohn, Lieutenant Colonel, US Army, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 146.

[11] *Field Manual 3-0, Operations*, (Washington, D.C.: Headquarters, Department of the Army, 2001), 12-11, paragraph 12-28.

by the forward support battalions supporting each brigade combat team (BCT).[12] Units also were carrying their Class V ammunition basic load and as much Class IV (barrier materials like sand bags and wire) and Class IX (repair parts) as they could possibly carry. However, the plan for most units was to upload their food and water the last day before crossing the line of departure; so units were still uploading when the order to attack came about twenty-four hours earlier than expected. As a result, many of the attacking units of the 3 ID moved with less than their five days of food and water.[13]

Fuel for the armored and mechanized formations and all the wheeled vehicles, some ten thousand vehicles total, was another area that required forward capacity as the attack began. 3rd COSCOM extended the initial reach of the 3 ID by embedding additional fuel trucks with the each of the BCTs and with the cavalry to meet the division's two initial refuel requirements. This allowed the 3 ID to refuel twice without using the fuel in its organic refuelers.

Classes of Supply	
Class	***Supplies***
I	Subsistence, gratuitous health and comfort items.
II	Clothing, individual equipment, tentage, organizational tool sets and kits, hand tools,unclassified maps, administrative and housekeeping supplies and equipment.
III	Petroleum, fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer and antifreeze compounds, components, and additives of petroleum and chemical products, and coal.
IV	Construction materials, including installed equipment, and all fortification and barrier materials.
V	Ammunition of all types, bombs, explosives, mines, fuzes, detonators, pyrotechnics, missiles, rockets, propellants, and associated items.
VI	Personal demand items (such as health and hygiene products, soaps and toothpaste, writing material, snack food, beverages, cigarettes, batteries, and cameras—nonmilitary items).
VII	Major end items such as launchers, tanks, mobile machine shops, and vehicles.
VIII	Medical material including repair parts peculiar to medical equipment.
IX	Repair parts and components to include kits, assemblies, and subassemblies (repairable or non-repairable) required for maintenance support of all equipment.
X	Material to support nonmilitary programs such as agriculture and economic development (not included in Classes I through IX).
Miscellaneous	Water, salvage, and captured material.

Figure 2: Classes of Supply[14]

During the initial three days of the attack into Iraq, the 3 ID had advanced over 350 kilometers.[15] By 24 March, 3 ID combat formations had already successfully taken Objective FIREBIRD (Tallil Airbase) and had advanced to Objectives RAMS and RAIDERS (both vicinity of An Najaf), about 400 kilometers into Iraq. Many of the 3 ID units that had crossed into Iraq without their initial five days' load of food and water were now running out of those commodities; this was causing problems.

The COSCOM had crossed into Iraq with approximately 25 percent of the transportation assets that they had estimated they would need, and they had to limit the support provided based on the transportation capability. They focused on the distribution of fuel, ammunition, food, water, and the transport of critical non-roadmarching assets such as bulldozers.[16] To make matter worse, the

---

[12] 3 ID, *Operation Iraqi Freedom After Action Report*, Ch 1, Continuous Offensive Operations Over Extended Distances: Topic E - Logistics.

[13] BG Fletcher Interview, Aug 2004.

[14] *FM 4-0*, 6-4, Table 6-1.

[15] 3 ID, *Operation Iraqi Freedom After Action Report*, Executive Summary, Key Lessons Learned, paragraph a.

[16] BG Fletcher Interview, Aug 2004. See also, Peltz, *Sustainment of Army Forces in Operation Iraqi Freedom: Battlefield Logistics and Effects on Operations*, 38. 3rd COSCOM had only 191 cargo trucks available at the start of combat operations, and the 377th TSC had a total of 298 trucks of the 930 required.

Iraqi paramilitary forces attacking the V Corps LOCs were becoming a major threat to the support forces in their unarmored vehicles.

Despite these difficulties, the 3rd COSCOM was succeeding in tracking and managing its convoys as they moved over the supply routes. Log force tracking was providing the critical information and situational awareness necessary to meet the daily sustainment requirements of the advancing combat formations. Transportation distribution managers had tracking visibility of their convoys, and updates on the enemy situation could be provided to the convoys in a timely manner.

By 24 March,Tallil Airbase had become forward logistics base (FLB)[17] CEDAR and was receiving the supplies needed to shorten the truck turnaround times as the COSCOM moved supplies forward. Also by the twenty-fourth, Objective RAMS, which would become logistics support area (LSA) BUSHMASTER, was being secured by the 3 ID's 2nd BCT.

As early as 23 March, 3 ID had to divert forces around As Samawah as its 1st and 2nd BCTs advanced to their objectives of RAMS and RAIDERS, west and north of An Najaf. On 24 March, 3 ID's 3rd BCT was spread over a distance of about one hundred miles. It was engaged in isolating As Samawah with one of its Task Forces, TF 1-15 Infantry (IN). TF 1-30 IN was providing the

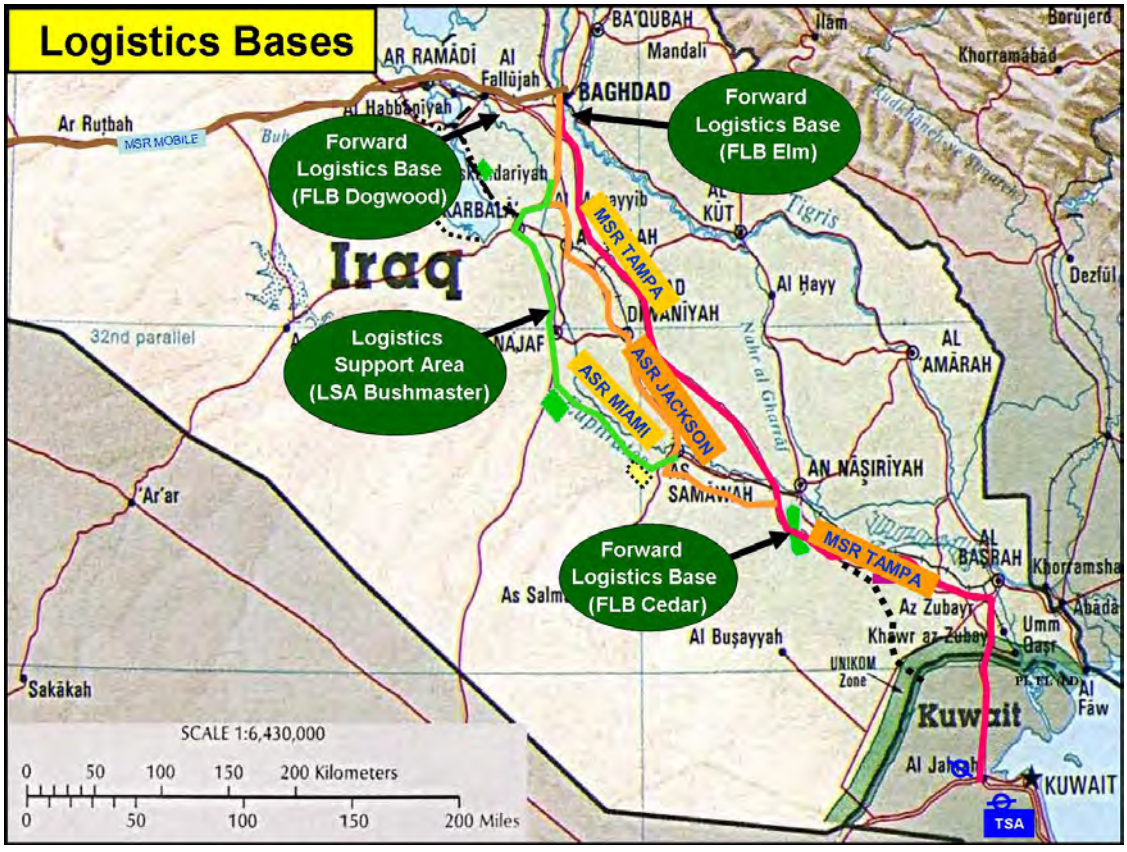


Figure 3: Logistics Bases and Supply Routes[18]

[17] *FM 4-0*, 6-3. "A forward logistics base is used on a temporary basis as support elements operate forward to reduce the distances users have to travel to receive support."

[18] Figure 3, Logistics Bases and Supply Routes, graphics from BG Fletcher briefing.

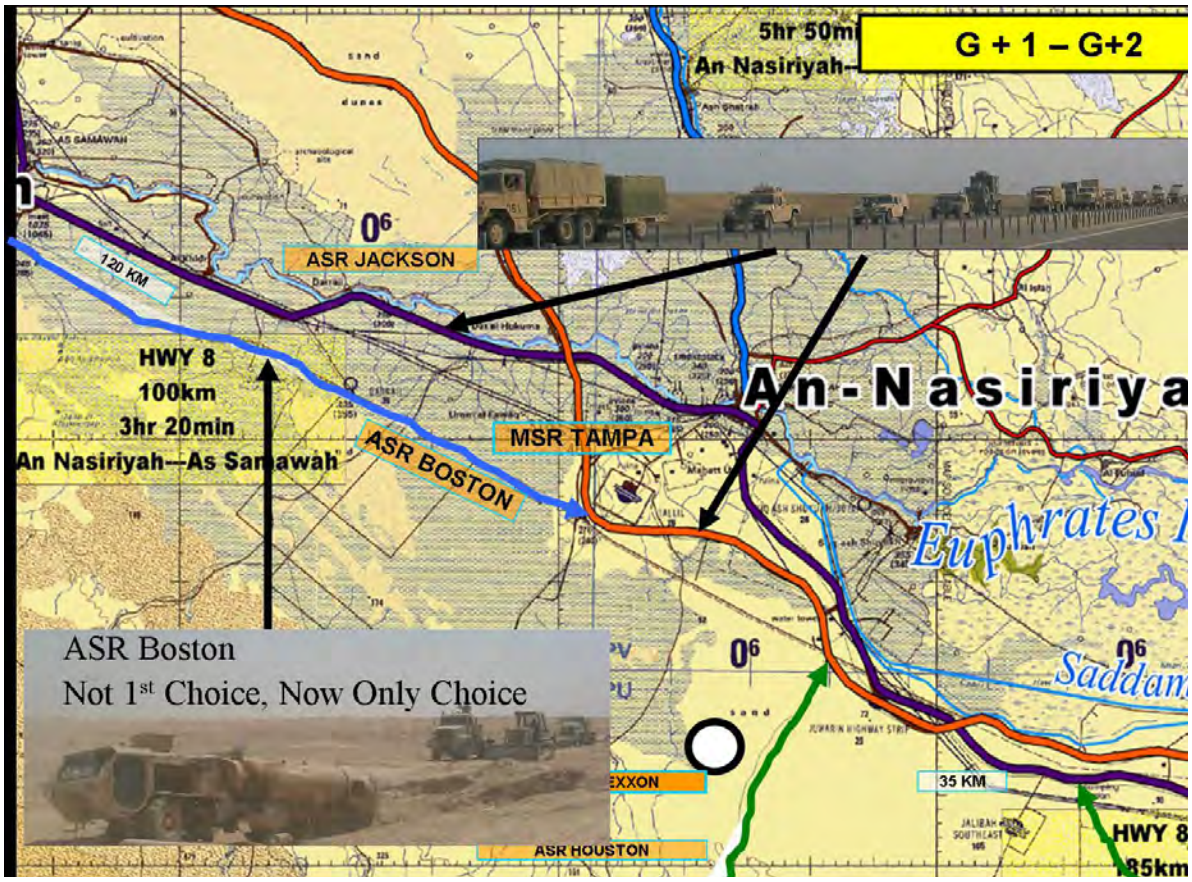


Figure 4: Convoys Divert to Alternate Supply Route Boston[19]

security at Tallil airbase. TF 2-70 Armor and the Brigade Reconnaissance Troop were attempting to secure the LOCs from Tallil Airbase to As Samawah in an effort to keep the paramilitary forces away from the supply routes and to isolate the An Nasiriyah area.

3rd COSCOM was now faced with ever increasing challenges in trying to support V Corps and, specifically, 3 ID as the attack continued toward Baghdad. As the combat forces advanced deeper into Iraq, the longer turnaround of the transportation assets hauling the supplies only increased the difficulties. The challenge was further compounded by the requirement to meet the daily consumption needs (especially water) of the units that had crossed into Iraq without their five days of supply and by the enemy actions against the LOCs. Besides meeting the daily needs of the force, the COSCOM also needed to prepare to build up the necessary supplies forward into LSA BUSHMASTER that would sustain the force as it advanced from Karbala to Baghdad, as well as continuing to integrate new logistic units arriving in Kuwait into its scheme of support.

The corps had originally planned to utilize improved highways and roads for their supply routes as they moved north, bypassing the dangerous urban areas along the way.[20] However, the enemy was fighting differently than expected, using fanatical paramilitary forces attacking out of the urban

[19] Figure 4, Convoys Divert to Alternate Supply Route Boston, photo from BG Fletcher briefing.

[20] Fontenot, Degen, and Tohn, *On Point*, 143.

Figure 5: Convoy Moves in Sandstorm[21]

areas all along the LOCs. The V Corps operations plan up through January 2003 relied upon the 1st Armor Division (1 AD) to secure the LOCs, however the 1 AD did not deploy. Securing the LOCs with the forces available was problematic for the Corps, and as the threat from the Iraqi paramilitaries grew, the COSCOM was forced onto alternate supply routes (ASRs). With the diversion around As Samawah and the threat from An Nasiriyah, the convoys began movement over ASR Boston, a single lane, paved and unpaved, pipeline maintenance road, to get to RAMS and BUSHMASTER. Using this ASR threw the 30 kmph movement planning factors out the window, slowing the movement by half. Then on 25 March, the sandstorm began.

Lieutenant General Wallace, the V Corps commander, and his subordinate commanders understood the need to build sufficient logistics forward for the final attack to Baghdad and had planned for a "tactical" pause to consolidate combat power and stockpile logistics.[22] The corps' plan was to launch the final attack to Baghdad with units back up to five days of supplies and LSA BUSHMASTER built up with sufficient supplies to support the attack. They understood that

[21] Figure 5, Convoy Moves in Sandstorm, photo from BG Fletcher briefing.

[22] BG Fletcher Interview, Aug 2004. BG Fletcher believed that V Corps was almost at its logistic culminating point by the time its forces arrived at An Najaf. FM 3-0 defines the culminating point as "that point in time and space where the attackers combat effective power no longer exceed the defender's or the attacker's momentum is no longer sustainable, or both." He also believed that LTG Wallace fully understood this during the planning process and had therefore nested the tactical pause inside the operational plan to avoid culmination.

the LOCs from BUSHMASTER forward would be at even greater risk to enemy counterattacks and interdiction; therefore, the corps could not rely on immediate logistic support using convoys coming out of Kuwait as a means of sustaining the 3 ID final attack to Baghdad. When the sandstorm hit, the corps had all but ceased moving north, and it used the time from 25 to 30 March to prepare for the attack through the Karbala Gap. During this time, the corps focused on resupply then on the using the 101st Airborne Division (Air Assault) and the 82nd Airborne Division to relieve the 3 ID forces from An Nasiriyah, As Samawah, and An Najaf and secure the LOCs while the 3 ID consolidated its combat power.

The 3rd COSCOM units had been using DTRACS and RFID tags in Germany and had honed their TTPs over the previous year. Every supply convoy in the corps was required to have either a DTRACS or MTS satellite tracker: two distinctly different but similar satellite tracking systems. COSCOM was able to use its joint deployment logistics model (JDLM) as an integrator to fuse the data from the two tracking systems into a single display, a battlefield visibility tool. Using the in-transit visibility they now received, the COSCOM was able to monitor the flow of their convoys and send text messages to the convoys with updated instructions or with warnings of enemy activity. As the convoys crept along ASR Boston during the sandstorm, they depended on GPS receivers for navigation and text messaging for their situational awareness.

The commercially purchased satellite phones with each movement control team and with the materiel management teams were the backup means of communicating the passage of convoys and the supplies carried by the convoy. Each convoy also carried a Satellite phone as a backup means of communications. Both COSCOM and V Corps planned for multiple means of communications in an effort to "harden" the communications lifeline.

Everything does not always go as planned, despite the best of preparations, and the logistics operations were no exception.

Above the 3rd COSCOM in the logistics structure was the 377th Theater Support Command (TSC), an Army reserve component organization that had the mission of providing theater level support to both V Corps and I MEF. The 377th TSC had been planning and preparing for this operation since the fall of 2001.[23] However, the 377th TSC was technology impaired; they did not have any satellite tracking devices for their trucks, and their soldiers did not have any training with RF tags. Therefore, initially there was no automatic in-transit capability for theater-level convoys moving throughout the area of operations and no way to immediately communicate with those convoys over the extended distances. The 3rd COSCOM was able to redistribute some of its DTRACS transponders so that all convoys moving in the corps' area had at least one transponder, providing the COSCOM a real-time means of tracking critical convoy movements or even a specific vehicle.

The 3rd COSCOM had planned and trained to have automatic supply asset visibility through the use of RFID tags that identified items or commodities either on the ground in a logistics base or moving on vehicles in a convoy. The COSCOM deployed thirteen portable RFID tag readers that were used at movement control points, at convoy support centers that were established along the supply routes, and in FLBs. However, the tracking of supplies, critical to a disciplined point distribution concept of support, was plagued by a lack of discipline in the process. Loads that left

---

[23] Fontenot, Degen, and Tohn, *On Point*, 147.

the depot in the United States for the theater carried RF tags, but, in many cases, the loads were reconfigured while enroute and the RF tags were never "re-burned" to reflect the new load. This meant that the reconfigured loads were now carrying supplies meant for different organizations than the original—un-reconfigured—RF tag indicated. In most cases, the loads were reconfigured in theater by the TSC soldiers. The TSC soldiers' unfamiliarity with supply tracking technologies was compounding the problems for the COSCOM in trying to manage distribution to its customers. The materiel managers were receiving the incorrect data from the RF tags on reconfigured loads. The sandstorms destroyed many of the RF tag readers, which only served to make a bad situation worse. After the sandstorms hit, attempts to track supplies using the RF tags were essentially abandoned. At the end of two weeks, all thirteen of the COSCOM's RF readers were inoperable due to the sandstorm or enemy attacks.

The lack of discipline in the distribution process also extended to accurate packing and shipping lists and the marking of containers carrying supplies. Shipping lists were often missing or inaccurate. TSC soldiers marked cargo containers with chalk indicating what class of supply the container carried; however, the container often carried the markings of some previous load, which had not been erased or remarked prior to transporting the new load. It required diligence and hard work at the forward supply bases to sort supplies out and to get them distributed to the right customers. The COSCOM also had to revert to a more manual system by sending teams of "expediters" back to work at the theater distribution center at Camp Doha, Kuwait. These expediters shepherded the critical materiel required by the Corps' units through the materiel management process.[24]

Another traditional means used by the COSCOM to track convoys was through established movement control points. However, the pre-selected locations for the movement control points and convoy service centers were located at major intersections along the supply routes. It also seemed that many of these intersections were favored locations for paramilitary attacks. Many of these movement control points had to be relocated.

Below the COSCOM and directly supporting the 3 ID was its division support command (DISCOM), the division's organic combat service support organization. The 3 ID DISCOM was also technology challenged, having received only nineteen MTS devices of an expected/authorized 384 systems to meet their distribution management needs for combat.[25] The nineteen systems were installed in Kuwait the month prior to the start of combat operations. The DISCOM placed these few systems at the nodes necessary to track critical logistic resources, with the forward support battalions supporting each BCT, and on critical convoys. Because of 3 ID's rapid and continuous advance, the division's organic and primary means of communications from battalion through division level, the mobile subscriber equipment (MSE), was not established except for periods of extended halts. The MSE theoretically provides the capability for both voice and digital connectivity and was the primary means for sending logistics status reports from units: a process known as "blasting SARSS data."[26] Without the MSE, DISCOM was operating with little or no information concerning the logistics

---

[24] Personal conversation with Colonel Thomas Kruegler. Colonel Kruegler was the V Corps Rear Command Post Chief of Staff during this period.

[25] Interview with Lieutenant Colonel William T. Gillespie Jr., Division Material Management Officer, Division Support Command, 3rd Infantry Division (Mechanized), Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired, videotaped on 6 May 2004.

[26] *FM 4-0*, Glossary. SARSS stands for Standard Army Retail Supply System.

status of the units it was supporting; therefore, the MTS was often the only means of gaining this information. In addition, by using the MTS, the DISCOM was able to have in-transit visibility of its most critical convoys and was able to provide updated instructions and warnings to these convoys.

It was only through the hard work of the 3rd COSCOM commander, operating forward from his assault command post in coordination with the V Corps Rear command post in Kuwait, and the COSCOM planners and executors at the COSCOM main command post collocated with the Corps Rear that the logistics effort was coordinated and was able to support V Corps and the fast-paced advance of the 3 ID. Technology gave the logisticians the in-transit visibility of the convoys and the means to communicate with those convoys. The soldiers that broke down the bulk supplies for distribution and drove the trucks provided the brute force that sustained the force through the friction of war.[27] By the end of March, the 3rd COSCOM was able to have the necessary levels of supplies in place that enabled V Corps to commit the 3 ID for the final swift attack to Baghdad. During this same time, they integrated arriving combat support units immediately into the supporting effort and provided support to the follow-on combat forces flowing into Kuwait and Iraq.

During the six weeks of major combat operations, "3rd COSCOM soldiers drove more than 14 million miles, supplied more than 55,000 tons of ammunition, 74 million gallons of bulk fuel, issued 43 million meals, provided 56 million gallons of potable water, filled more than 2.2 million requisitions for repair parts, and repaired helicopters and ground vehicles when and where required. For the first time in history, 3rd COSCOM's In-transit Visibility assets provided the corps with centralized visibility of combat service support operations on the battlefield."[28]

TECHNOLOGY DESCRIPTION

During the major combat operations of OIF, 3rd COSCOM used a variety of systems to attain an in-transit visibility of its combat service support operations. Figure 6 provides a view of some of these systems. The two main systems providing the COSCOM with its in-transit visibility were the DTRACS and MTS.

Defense Tracking, Reporting and Control System (DTRACS)[29]

DTRACS is an automatic identification technology used in Europe by USEUCOM[30] forces to maintain in-transit visibility of convoys moving in the theater.

---

[27] Carl von Clausewitz, Michael Eliot Howard, and Peter Paret, *On War* (Princeton, N.J.: Princeton University Press, 1984), 120-21. Clausewitz describes friction as the force that makes the apparently easy so difficult. He explains that action in war is like movement in a resistant element. Just as the simplest and most natural of movements, walking, cannot easily be performed in water, so in war it is difficult for normal efforts to achieve even modest results.

[28] 3rd Corps Support Command, *3rd Corps Support Command in Operation Iraqi Freedom* (3rd Corps Support Command website, 2006 [cited June 14 2006]); available from http://www.3coscom.army.mil/main/iraqi_freedom.asp.

[29] DTRACS system description and architecture provided courtesy of Mr. Ralston Mims, Deputy Project Manager, MTS. PMO Logistics Information Systems, 13141 N. Enon Church Rd, Suite 200, Chester, VA 23836.

[30] U.S. European Command, headquartered at Patch Barracks, Stuttgart-Vaihingen, Germany, is the U.S. military unified command with the regional responsibility for planning and conducting all U.S. military operations for most of Europe and Africa, excluding Egypt, Sudan, and the Horn of Africa countries.

Figure 6: Available Technologies[32]

DTRACS uses vehicle transponders, tracked by satellite receivers, and down linked through a network that provides commanders an in-transit tracking capability. DTRACS was used to track convoy departures, progress, and arrivals at destination during operations in Bosnia and Hungary in 1998. The system is composed of three main components, the Network Management Center (NMC), the Command and Control Station (CCS), and the Individual Mobile Communications Terminal (IMCT). The IMCTs communicate with the NMC using Ku band satellite communications. The CCS communicates with the NMC via internet protocol (IP) network connectivity. All communications between the IMCT and the CCS go through the NMC, as do communications between IMCTs.

The NMC receives and stores messages and tracking information from the subscriber units via commercial Ku band satellite. Messages are then forwarded to their intended destinations.

The CCS accesses the tracking information from the NMC via a network connection. The system software provides the capability to send and receive messages and view scalable map information with icon overlays, providing situational awareness.

The IMCT mobile units used in the vehicles use a ruggedized keyboard display unit and do not have any associated map displays. The unit provides a text messaging capability.

Using this system, 3rd COSCOM was able to monitor the locations and progress of their convoys and provide any situational updates to the convoys as required.

[32] Figure 6, Available Technologies, graphics from BG Fletcher briefing.

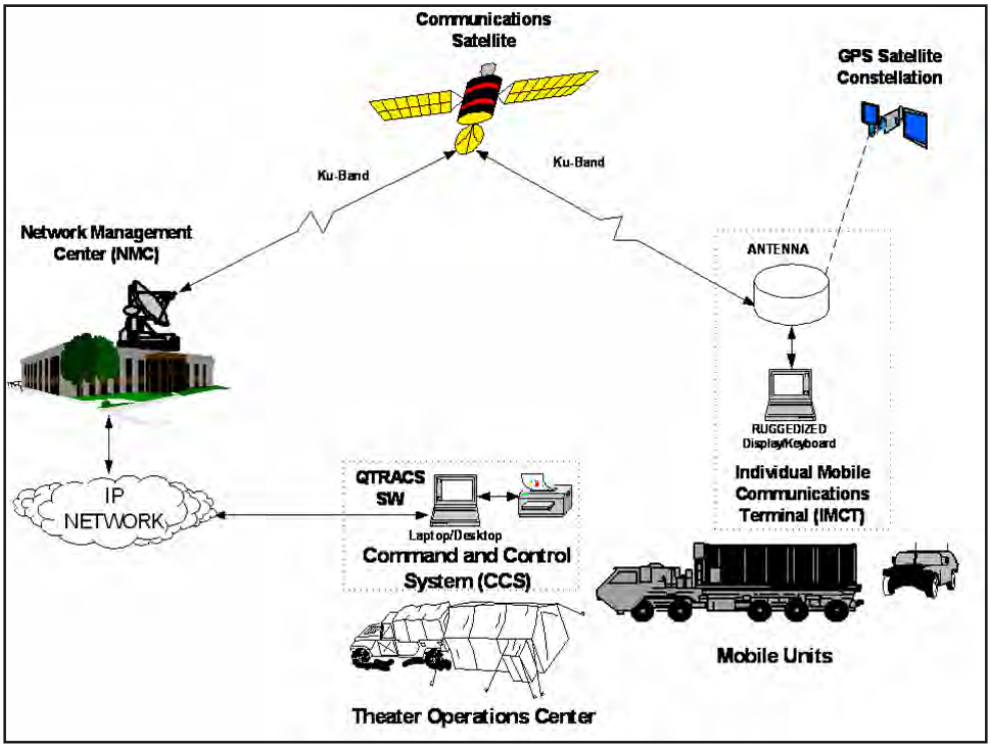


Figure 7: DTRACS System Architecture

Movement Tracking System (MTS)[32]

The MTS is a low-cost solution designed for the Army and its vehicle operators for tracking vehicles and communicating while on and off the road during war or peacetime. MTS is a mobile, satellite, two-way messaging system that is totally wireless from the MTS-equipped vehicles to the control station.

The MTS system is composed of four functional or equipment groups: the customer support segment (CSS), the commercial gateway segment (CGS), the control station (CS), and the mobile unit (MUV), which is the component of the system mounted on a unit's vehicles. In addition, a crossband satellite service is required to translate C or Ku bandwidth used by the CGS to the L band satellite bandwidth required by the CS and mobile users. All communications between the CS and mobile units are through the CGS.

The CSS provides the overall MTS system management, web access (including help desk), order processing, and repair processing. The CSS processes and routes status updates and messages between all other MTS components. CSS system management also includes the access verification of CS and mobile units to log usage for billing purposes. The CSS is currently operated and maintained exclusively by a commercial satellite vendor.

The CGS equipment is installed at a commercial satellite facility and provides the MTS modulation/demodulation schemes implemented to support the interface with the CS and mobile units. The CGS also converts the data to internet protocol packets for transmission to the CSS via the Internet. Backup communications between the CSS and the CGS is possible via dialup or ISDN services.

---

[32] MTS system description and architecture provided courtesy of Mr. Ralston Mims, Deputy Project Manager, MTS. PMO Logistics Information Systems, 13141 N. Enon Church Rd, Suite 200, Chester, VA 23836

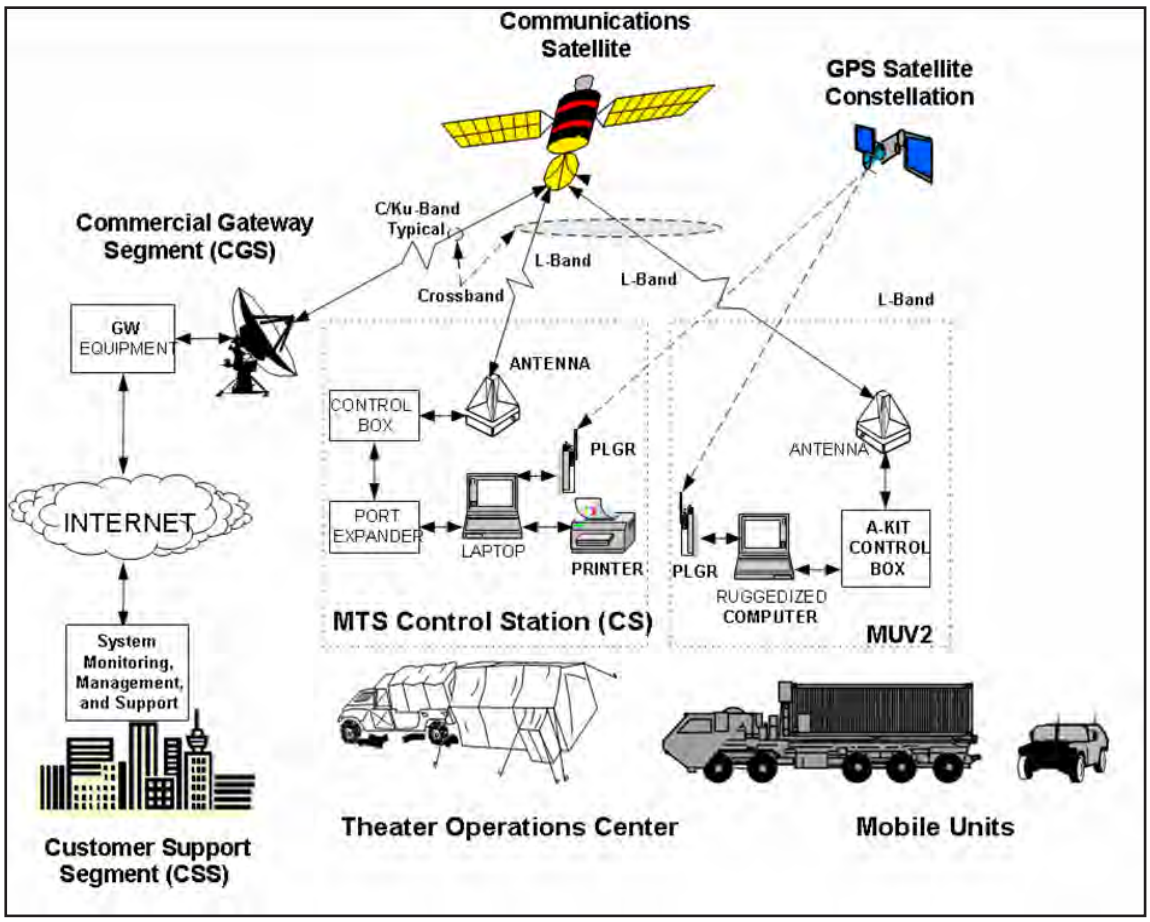


Figure 8: MTS Operational Architecture

The CS provides command functionality for the MTS and is typically operated from a mobile headquarters, such as a command tent or a parked van. The CS configuration consists of a laptop computer with CD-ROM drive for NIMA map loading, a satellite transceiver with 100-foot cable, a Precision Lightweight GPS Receiver (PLGR) and a portable printer. The CS communicates primarily using the satellite transceiver, but can operate via phone lines or Internet connections when available. The CS provides the capability to coordinate vehicle movements using text messaging and to display theater map with icon overlays of mobile-unit-equipped vehicles, itself, and other CS's. The CS also provides the physical interface to provide MTS data and data transmitted via MTS to other Standard Army Management Information System (STAMIS) units.

Mobile Unit V2 (MUV2) configuration is designated for permanent installation in a vehicle using an installation kit specific to the vehicle type. It consists of a satellite transceiver and ruggedized computer with appropriate cabling and a PLGR. It provides the capability to support text messaging and display NIMA theater maps with overlays of icons of MTS-equipped vehicles, including itself. The MUV2 also provides the physical interfaces required to support vehicle and load status interfaces. The MUV2 can also be reconfigured as a CS.

MTS technology allows the transportation coordinator to "talk" to the driver of any truck, regardless of location, at anytime without having to put up antennas or involve more soldiers. MTS is currently being adapted to incorporate radio frequency technology, an upgraded military global

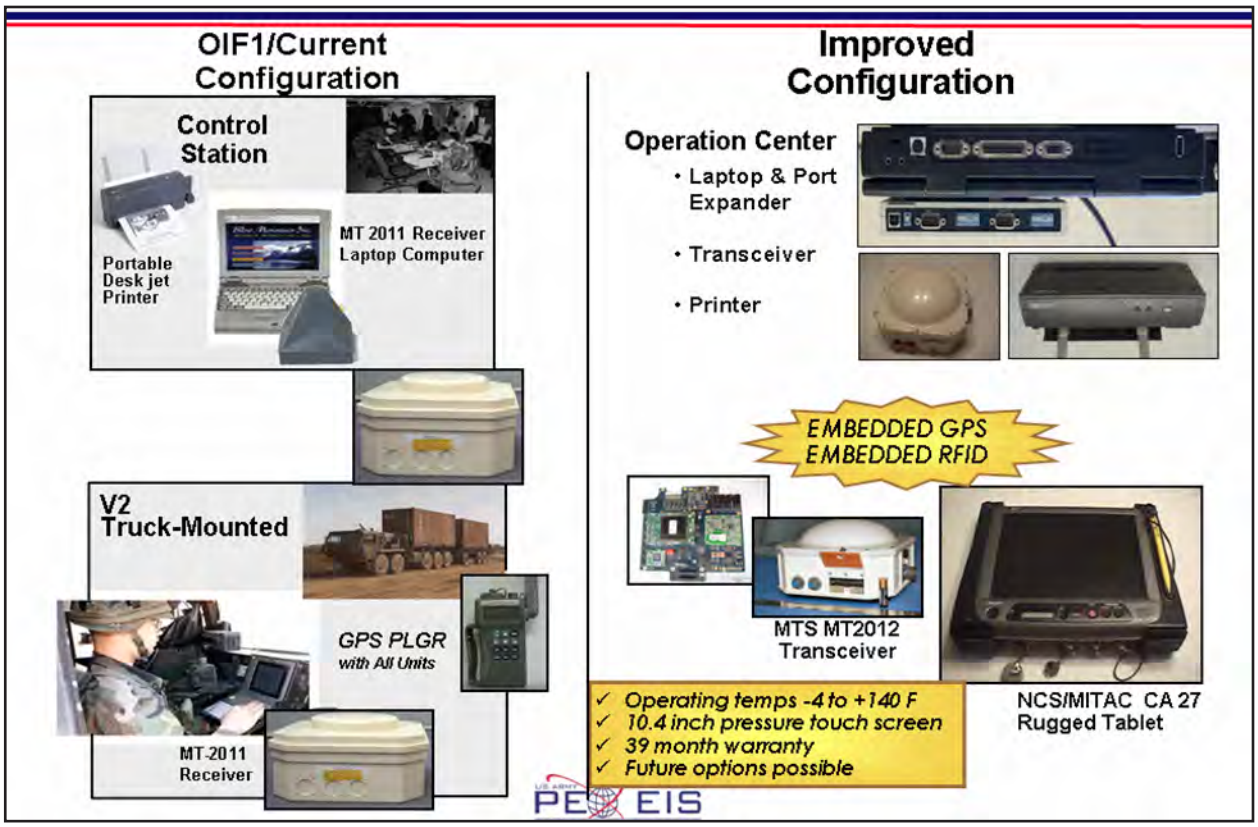


Figure 9: MTS Components and Configurations

positioning system (GPS) capability, automatic reporting of vehicle diagnostics (future), and other features that support greater in-transit visibility.

There are currently over 10,000 MTS devices fielded worldwide—almost 6,600 in Iraq alone.

ORGANIZATIONAL STRUCTURE

Responsibility for the logistical sustainment of the ground forces in the Iraqi theater of operations during OIF fell to the 377th Theater Support Command, a U.S. Army Reserve unit that provided the theater level logistical support for the U.S. 3rd Army and CENTCOM's Combined Land Force Component Command. V Corps' support organization is the 3rd Corps Support Command (COSCOM), and the 3 ID's support organization is its organic division support command (DISCOM).

The 3rd COSCOM provides logistics support to V Corps, enabling the corps to support a high level of combat over the duration of major operations. The COSCOM's support to the corps falls under the following general categories:[33]

- Command and Control of Support Operations. The 3rd COSCOM functions as V Corps' major subordinate command responsible for the direction and management of logistics and medical support for the corps.

[33] Mission and functions derived from 3rd COSCOM website on 15 June 2006, http://www.3coscom.army.mil/main/mission.asp

- Control Centers.
  - The Corps Material Management Center (19th CMMC) performs integrated supply and maintenance management of corps support assets.
  - The Corps Movement Control Center (27th Transportation Battalion) provides centralized movement control and highway regulation for moving personnel and materiel into, within, or out of the corps area of operations. They ensure the effective and efficient use of available transportation assets.
- Sustaining the Soldier.
  - Supplying rations, water, clothing, individual equipment, protective gear and shelter, and construction, barrier and fortification materials.
  - Provisioning for health and comfort items, field services, and health services.
  - Planning and coordinating secondary field services, such as bath and laundry.
- Arming the Corps. The 3rd COSCOM' ammunition supply companies provide the distribution of the ammunition, mines, and explosives.
- Fueling the Corps. The 3rd COSCOM's petroleum supply units and direct support supply units, working with the supporting transportation distribution system, store and distribute the bulk fuels and petroleum products.
- Fixing the Corps. The 3rd COSCOM's maintenance units repair and return damaged or disabled equipment to the using units. Their maintenance support teams operate forward into the division sector to perform on-site repairs. Where weapons systems or other major end items are destroyed, the COSCOM's heavy supply unit provides battle loss replacements.
- Moving the Corps. The 3rd COSCOM's transportation system provides the movement of troops and supplies about the battlefield.

To accomplish its mission and functions, the 3rd COSCOM, based in Germany, is organized with two active army corps support groups and three separate battalions (a special troops battalion, the corps materiel management center battalion, and a transportation movement control battalion) with a garrison strength of approximately four thousand soldiers.

During OIF, the 3rd COSCOM grew in size and capabilitiy throughout the period; as an example, from 19 March to 1 April, the number of trucks increased by 63 percent.[34] The COSCOM grew from its original two CSGs and three separate battalions to six CSGs and six separate battalions, a total of nineteen battalions; a logistics force of more than 17,000 soldiers. This force was a mix of active duty units from Europe and CONUS, and Army Reserve and Army National Guard units from all over the United States. Over 40 percent of these forces were from the Reserve Component.

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES

The U.S. Army learned from its Gulf War experience in 1991 and in the succeeding years through the high volume of deployments that the supply-based methodology of stockpiling huge quantities

[34] Peltz, *Sustainment of Army Forces in Operation Iraqi Freedom: Battlefield Logistics and Effects on Operations*, xix.

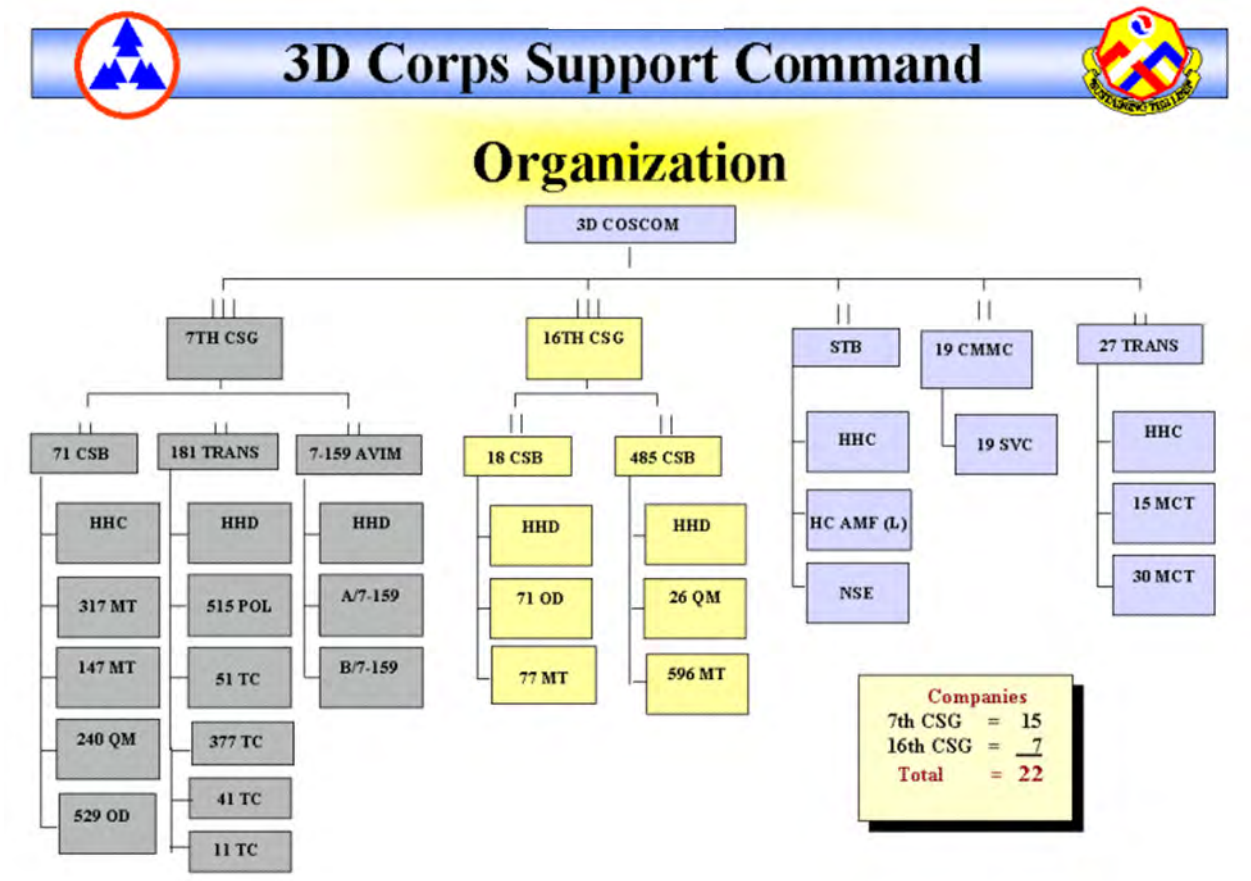


Figure 10: 3rd COSCOM Peacetime pre-OIF Organizational Structure

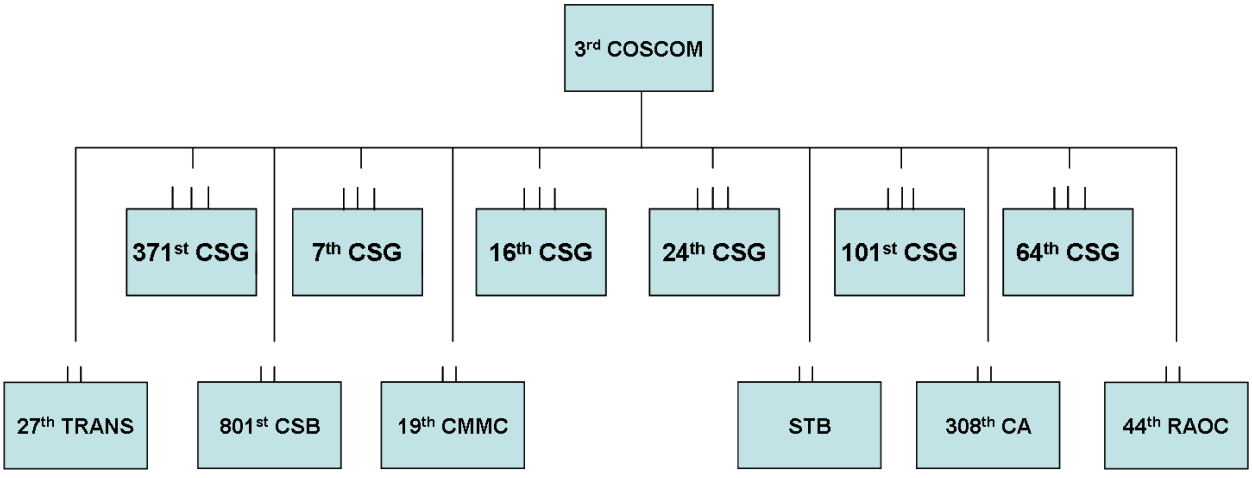


Figure 11: 3rd COSCOM Organizational Structure as it Grew During OIF

of all varieties of commodities was no longer feasible. During Desert Shield/Storm huge "iron mountains" of containers were stacked in Saudi Arabia. These containers had to be opened to determine what was in them, many having never been opened before being returned to the United States at the conclusion of the war. Many items had been reordered multiple times, as there was no item visibility until inventories were conducted.

The current FM 4-0 reflects this change in supply methodology:

> The Army has begun the challenging transition from a supply-based to a distribution-based CSS system. Distribution-based CSS replaces bulk and redundancy with velocity and control. During this transition, some units may not be able to execute all operations 100 percent according to distribution doctrine. However, only an agile distribution-based CSS system will allow Army forces to be strategically responsive and operationally effective across the full range of military operations. Distribution includes all the actions performed to deliver required resources (units, materiel, personnel, and services) to, from, and within a theater. Distribution-based CSS includes visibility, management, and transportation of resources flowing to supported forces, as well as the information systems, communications, and physical and resource networks of the distribution system.[35]

Movement control requires highly centralized planning and decentralized execution to attain maximum effectiveness and efficiency from the transportation available. The transportation movement request process is very similar to the U.S. Air Force air tasking order process in that it is a continuous process, planning days in advance, assigning loads to available assets, and then tasking units to execute in accordance with the developed order. Knowing the number and type of assets available and their locations is critical for both of these planning processes.

During the execution phase, prior to satellite-based tracking systems like the DTRACS and MTS, convoy movements were monitored through a series of movement regulatory checkpoints operated by movement regulatory/control teams. These teams reported the arrival of the convoys at the checkpoints. The reports were received at the movement control center, which monitored the flow of all logistics convoys on all routes. The movement control teams also passed along any required information and updates to the convoys as necessary.[36] All tracking of convoys was done manually and required reliable communications up and down the LOCs to pass information.

IMPACT OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

The 3rd COSCOM developed a number of new TTPs during the year leading up to OIF. These new TTPs were designed to maximize the effects of the technologies available within the corps and the COSCOM.

The satellite-based tracking systems provided a reliable means of over-the-horizon communications to link the COSCOM with its logistic convoys. Convoys could now receive situational awareness from the COSCOM and could also provide situational awareness back to the COSCOM.

For the COSCOM convoys with their satellite-based tracking systems "log force trackers," the movement control teams now served as a redundant means for monitoring and reporting convoy movements and providing the convoys with situational awareness.

[35] *FM 4-0*, paragraph 1-39.

[36] *Field Manual 100-10-1 Theater Distribution*, (Washington, D.C.: Headquarters, Department of the Army, 1999).

The fragility of the RFID readers and the lack of training and discipline in the supply system impaired or rendered useless the automated in-transit visibility of supply items and commodities—key enablers for a distribution-based logistics system.

TECHNOLOGY AS AN ENABLER

The application of satellite-based tracking systems, like the DTRACS and MTS, with their text messaging capabilities allowed the 3rd COSCOM, and to some degree the 3 ID DISCOM, to exercise a degree of command and control over their combat service support forces that would not otherwise have been possible.

The in-transit visibility of their convoys provided the COSCOM distribution managers a level of situational awareness unparalleled during combat operations. This level of situational awareness enabled movement and distribution managers, providing greater responsiveness and flexibility.[37] They were now able to observe the locations of convoys in relation to the maneuver forces that they were supporting (this maneuver information was displayed on the C2PCs with blue force tracking information) and make changes as required.

The communications afforded by the satellite-based tracking systems enabled convoys to request medevac assistance for battlefield casualties. Without these systems and their over-the-horizon communications capabilities, the convoys would not have had a means to request medevac.

Technology is the key enabler for a distribution-based logistics system. Only with technology will complete, accurate, and real-time information on current and projected supply levels be available to ensure the ability to control distribution and provide the needed "velocity" to sustain the combat forces.

NETWORK CENTRIC INSIGHTS

1. Satellite-based tracking systems (DTRACS and MTS) provided the convoy in-transit visibility that significantly improved the quality of shared information. Continuous position reporting was now fed automatically from vehicle-mounted DTRACS or MTS transponders through the satellite-based tracking systems to COSCOM and corps command post displays with a real-time picture of corps' convoy movements. The 3 ID DISCOM also shared in this improved quality of shared information, but only for the MTS equipped convoys.
2. The DTRACS and MTS systems not only improved the quality of shared information at the command posts but also significantly increased the situational awareness for the command posts and the in-transit convoys. The logisticians now knew where their convoys were, and with the text messaging capability of the systems, they could pass information directly to the convoys. This convoy in-transit visibility and the means to communicate with the convoys provided an agility[38] that did not exist previously. Convoys were now able to receive changes in routes, warnings of enemy activity, and other information that improved their situational awareness.

---

[37] *FM 3-0*, 12-3. Flexibility. "The key to flexibility lies in the expertise for adapting CSS structures and procedures to changing situations, missions, and concepts of operations. CSS plans and operations must be flexible enough to achieve both responsiveness and economy. Flexibility may include improvisation. Improvisation is the ability to make, invent, or arrange for what is needed from what is at hand. Improvised methods and support sources can maintain CSS continuity when the preferred method is undefined or not usable to complete the mission."

[38] Ibid., paragraph 4-58. Agility is "the ability to move and adjust quickly and easily."

3. The MTS provided greater individual situational awareness than did the DTRACS. The MTS provided the user almost instantaneous GPS readout of the user's own location and displayed it on a digital map, which greatly assisted in navigation. The user could also see the other MTS-equipped vehicles and their relation to each other on the scalable digital map displays, which provided a greatly increased level of shared situational awareness. The MTS allowed for limited intra-vehicle MTS text messaging communications, which also contributed to an increased level of shared situational awareness.
4. The increased situational awareness, in the form of a logistics common operational picture, and the increased level of communications connectivity affected the COSCOM's ability to dynamically self-coordinate. This enhanced the COSCOM's ability to adapt to the changing situation on the battlefield by anticipating changes and making the necessary adjustments to ensure mission accomplishment.
5. The satellite-based tracking systems technologies and networks facilitated increased mission effectiveness and accomplishment for the 3rd COSCOM and its distribution managers.
6. Different stove-piped systems, like the DTRACS and MTS, require ad hoc fixes like the JDLM to integrate the differing system inputs into one common operational picture.
7. The different levels of technology distribution will invariably create difficulties. The non-DTRACS or MTS-equipped TSC convoys were at greater risk and were not able to respond to the changes on a widely dispersed dynamic battlefield. The soldiers lacked the training that came with the equipment fielding process. In particular, the soldiers of the TSC did not understand the importance of the RFID tags and therefore took inappropriate actions regarding the tags and the tagged supplies and commodities. This lack of training created significant inaccuracies in the picture of supplies and commodities available in the theater. This lack of training and supply discipline created greater risk for the maneuver commanders, as the reliance on a distribution-based supply system requires not only an accurate picture of the limited supply assets, but also the means to effectively distribute the materials across a changing and widely dispersed battlespace.
8. Even though many of the enabling technologies for a distribution-based logistics system were either immature or only partially fielded during the maneuver phase of OIF, the satellite-based technologies that were used by 3rd COSCOM had a significant impact on their ability to sustain the V Corps' combat forces. These technologies (DTRACS and MTS) resulted in increased mission effectiveness for the COSCOM and an increased operational reach for the V Corps commander.

Battle Stories
Objective Peach

The attack to seize and secure Objective PEACH during the maneuver phase of Operation Iraqi Freedom (OIF) illustrates the impact of two new technologies on the battlefield: the Blue Force Tracking (BFT) system and TeleEngineering system. This vignette will highlight how TeleEngineering allowed the force to better prepare for the seizure of the bridge at Objective PEACH and how the BFT allowed the task force commander charged with securing the bridge to swiftly alter his mission from providing a bridgehead line to a hasty defense. Both of these actions were critical in maintaining the V Corps' rapid advance to Baghdad. The battle story presents a clear example of where improved quality of information, information sharing, shared situational awareness, and collaboration led to self synchronization and greater mission effectiveness.

CONTEXT OF THE BATTLE STORY

This battle story follows Task Force 3-69 Armor (AR) as it attacks Objective PEACH, a key bridge over the Euphrates River, and then defends the bridge against Iraqi counterattacks. The actions occurred on 2-3 April 2003.

ENEMY FORCES

On 1 April 2003, the majority of the Iraqi military forces in V Corps' area of operations were east of the Euphrates River, vicinity Ad Diwaneyah, Al Hallah, Al Hindiyah, and all the way south to An Nasiriyah reacting to the five simultaneous attacks conducted by V Corps on 31 March. There

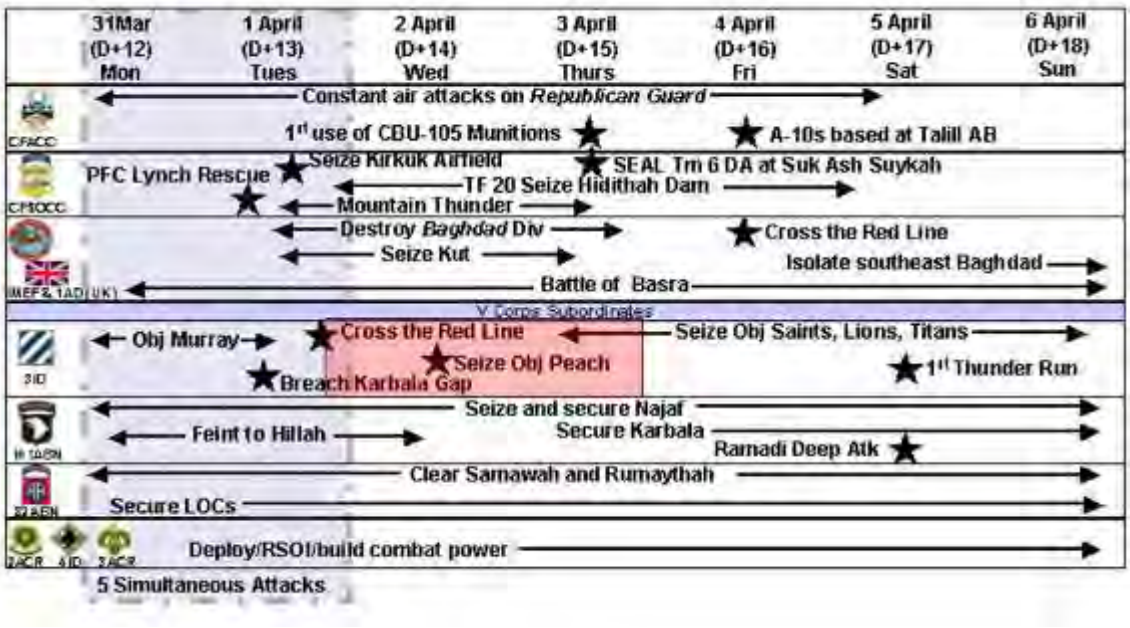


Figure 1: Timeline[1]

[1] Figure 1, Timeline, courtesy of *On Point*.

were the Republican Guard units – the Medina Division and brigades from the Hammurabi and Nebuchadnezzar Divisions – as well as units from other divisions, including the 11th Infantry and 34th Infantry Divisions. The reactions by the Iraqi military forces to the five attacks included moving reinforcements from the north and the repositioning of forces during daylight, which subjected the enemy to devastating joint operational fires. There were, however, large numbers of units still defending between the 3rd Infantry Division (3 ID) and Baghdad. The majority of the Hammurabi Division was located west of Baghdad, and there were numerous other units defending along the way that were capable of conducting limited maneuver and local counterattacks. Reinforcing the Republican Guard and other military forces throughout the V Corps area of operations were large numbers of the Saddam Fedayeen, Al Quds, and other paramilitary forces.

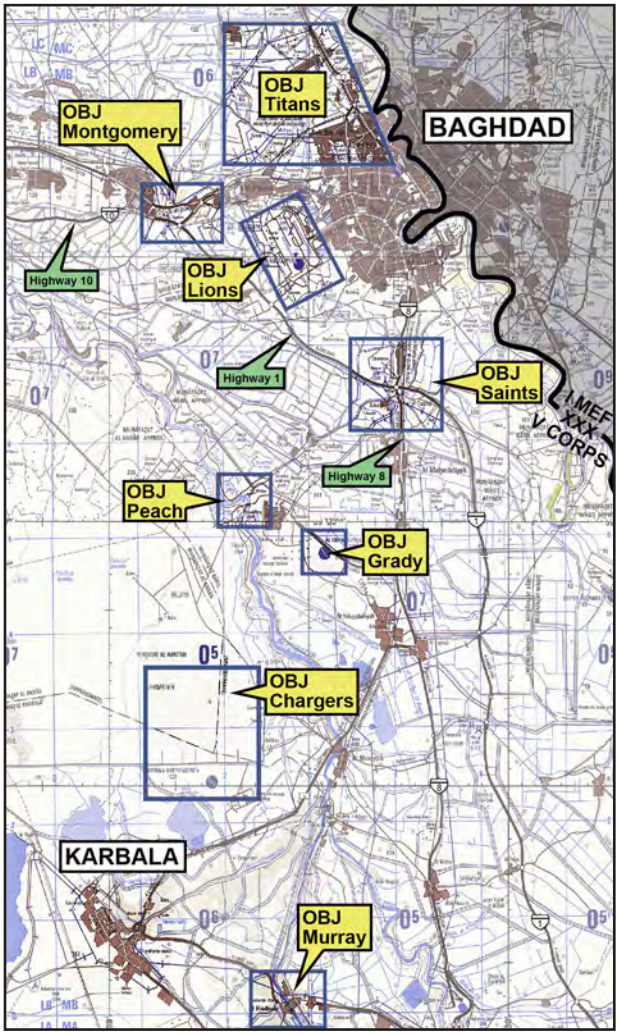


Figure 2: Objectives Near Baghdad

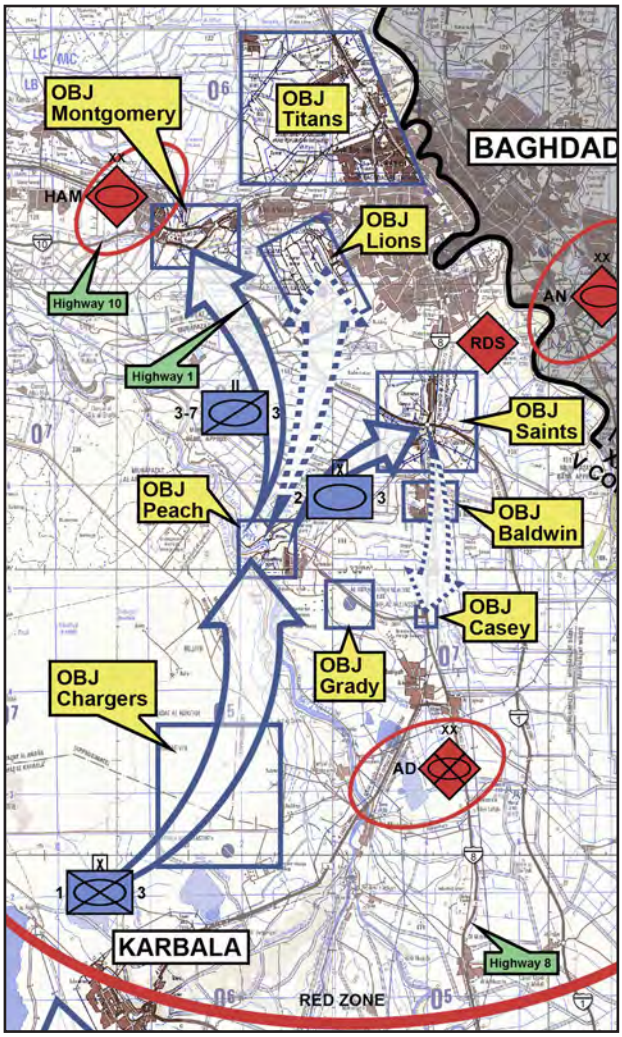


Figure 3: Enemy Forces Reposition, Karbala [2]

[2] Figure 2, Objectives Near Baghdad, and Figure 3, Enemy Forces Reposition Karbala, courtesy of *On Point*.

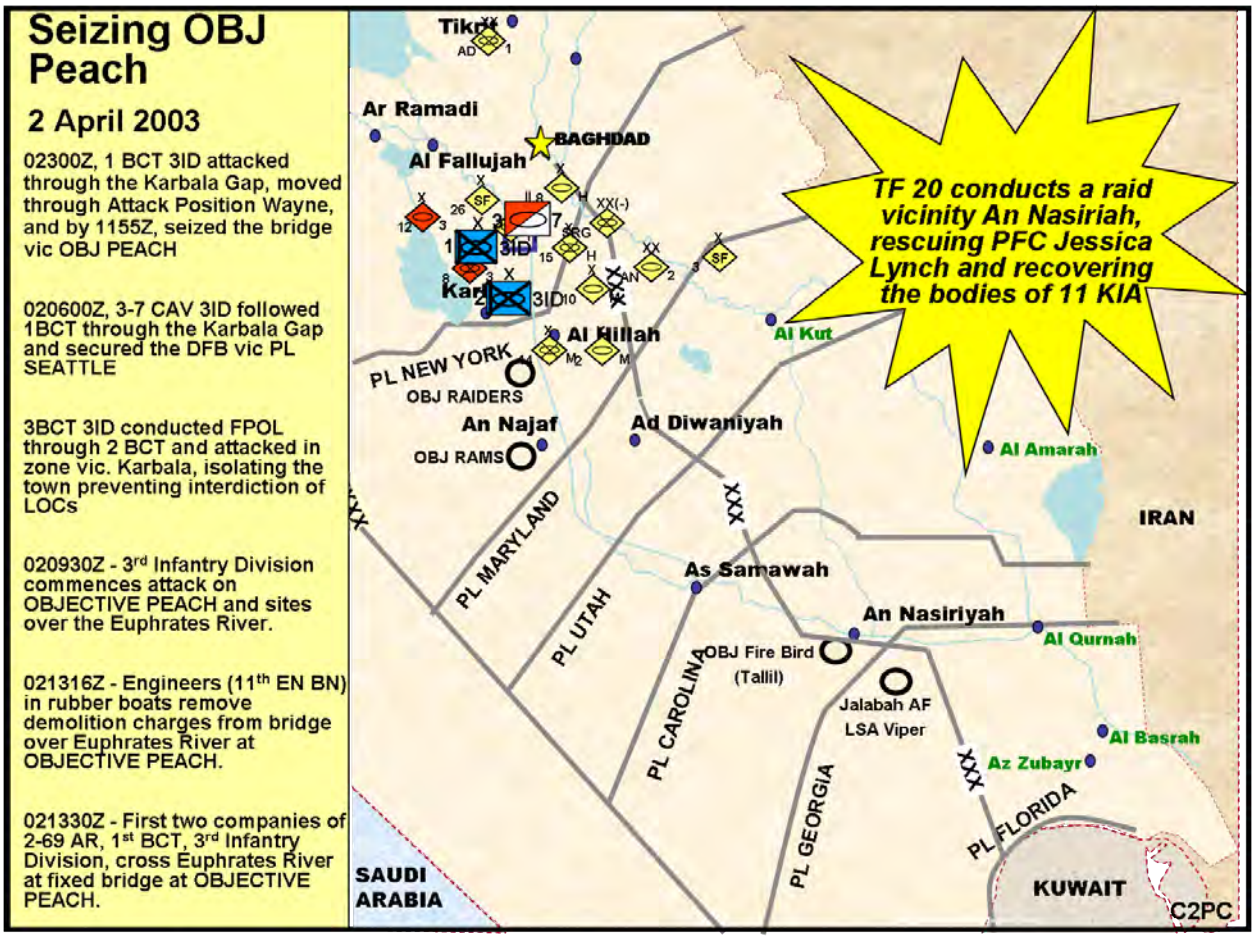


Figure 4: The Setting for the Battle at Objective PEACH [3]

FRIENDLY FORCES

By the 2nd of April, the 3 ID was advancing west to east from the Karbala Gap towards the Euphrates River to seize Objective PEACH and continue the attack to Baghdad. Lieutenant General William S. Wallace, V Corps commander, determined that the movement through the Karbala Gap and on to Baghdad needed to be both rapid and fluid, a continuous attack to Baghdad. He and all of the commanders knew that they were penetrating the enemy "red zone," and if the Iraqis were going to use chemical weapons, conduct large scale counterattacks, or mass artillery fires this was one of their last opportunities to do so.

The Euphrates River was the last natural obstacle between 3 ID and Baghdad. The bridge at Objective PEACH was located about thirty kilometers southwest of Baghdad and provided the best passage for the seizure of two key objectives, LIONS (Baghdad International Airport) and SAINTS (the key intersection of Highways 1 and 8). This four-lane class-70 bridge over the Euphrates River was required to support the forward movement of all V Corps ground combat

[3] Figure 4, The Setting for the Battle at Objective PEACH, courtesy of V Corps Historian, Dr. Charles E. Kirkpatrick, slide from V Corps briefing "The Road to 'Victory' in Operation Iraqi Freedom."

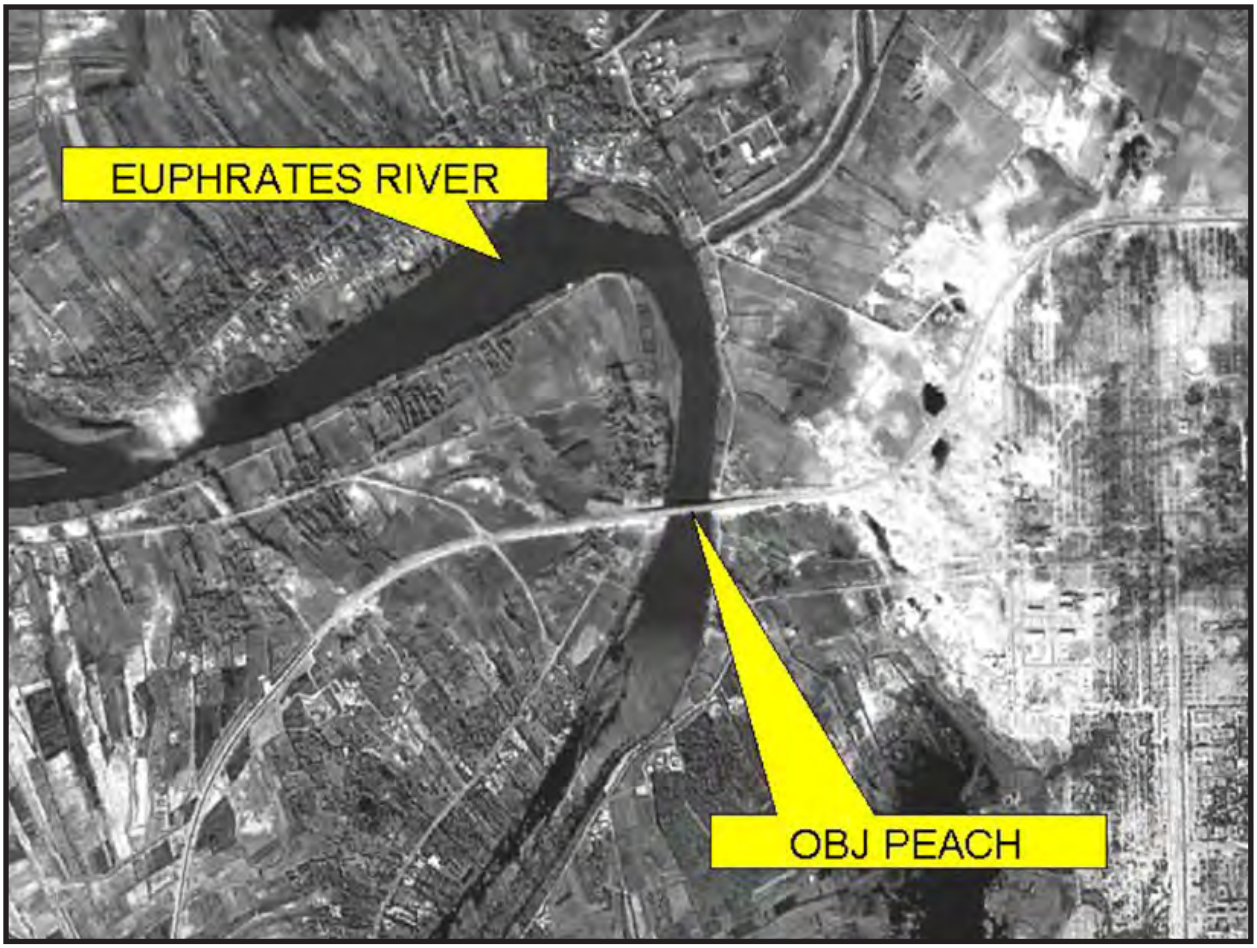


Figure 5: Aerial View of Bridge at Objective PEACH[4]

and support forces. Therefore, seizing and securing the bridge intact at Objective PEACH was vital to the corps' overall scheme of maneuver and critical to maintaining the corps' continuous rapid advance to Baghdad. If the Iraqis destroyed the bridge, the corps only had exactly enough bridging sections to make one bridge across the Euphrates River. The task of securing Objective PEACH went to 3 ID's 1st Brigade Combat Team (BCT) and specifically to battalion Task Force 3-69 AR, commanded by Lieutenant Colonel Ernest "Rock" Marcone.

LTC Marcone had previous experience in seizing a bridge; his unit had seized the bridge at Objective JENKINS, at Al Kifl north of An Najaf, on 25 March. There his lead unit got three tanks across the bridge before the Iraqi forces exploded preset demolitions damaging the bridge. Fortunately, the bridge was assessed as capable of supporting continued heavy traffic.[5]

The engineers learned a great deal from the bridge at Al Kifl. The engineers supporting the BCT were, in turn, supported by V Corps engineers from the 54th Engineer Battalion. The 54th had TeleEngineering Communications Equipment (TCE), which provided a reachback capability to

[4] Figure 5, Aerial View of Bridge at Objective PEACH, courtesy of *On Point*.

[5] 3rd Infantry Division, Operation Freedom: Third Infantry Division (Mechanized) "Rock of the Marne" after Action Report, Final Draft, (US Army, 3rd Infantry Division (Mechanized), Ft. Stewart, GA, 2003), Operational Overview, Battle of An Najaf: 25-28 March.

Figure 6: Bridge at Al Kifl [6]

engineering expertise in the U.S. Using a secure satellite link, the TCE was able to provide the engineers with video teleconferencing back to engineering expertise in the U.S. concerning the bridge at Al Kifl. With the information they received via the TCE, the engineers in the U.S. were able to determine the type of construction, assess the military load bearing capacity of the damaged bridge, and make recommendations on temporary upgrades and fixes the 54th Engineers could make to enhance the military utility of the bridge.[7] From the captured demolitions, the engineers were able to identify the type of explosives the Iraqis were using (German made) and the tactics, techniques, and procedures the Iraqis were most likely using to blow the bridges.[8]

THE ATTACK

For the attack from Karbala to Baghdad, the 3 ID had

> developed a relatively simple scheme of maneuver. The 3rd BCT would lead the attack, with the mission of isolating the town of Karbala…The 3rd BCT would isolate the eastern portion of Karbala, while 1st BCT would follow to isolate the western portion and seize key bridges on Highway 28 and a dam on the western side of the gap…. Once it seized the dam, 1st BCT would continue on, attacking to find remnants of the Medina brigade. Finally, the plan required the 1st BCT to seize Objective PEACH, the division's real crossing site over the Euphrates River."[9] The 2nd BCT was to depart from its feint objective vicinity Al Hillah and follow 1st BCT then pass through 1st BCT and cross the Euphrates at PEACH and continue the attack to seize Objective SAINTS. "The intended end state for these attacks envisioned 2nd BCT across the Euphrates, 1st BCT at the crossing site prepared

[6] Figure 6, Damaged Bridge at Al Kifl, photograph courtesy of On Point.

[7] Information provided by Mr. Jeff Williamson, Director, TeleEngineering Operations Center, 11 April 2006.

[8] Interview with Major Garth Horne, Battalion Operations Staff Officer (S-3), 11th Engineer Battalion, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall from PA Consulting, Greg Boehmer from PA Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 17 March 2004.

[9] Gregory Fontenot, Colonel, US Army, Retired, E.J. Degen, Lieutenant Colonel, US Army, and David Tohn, Lieutenant Colonel, US Army, On Point: The United States Army in Operation Iraqi Freedom (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 284-85.

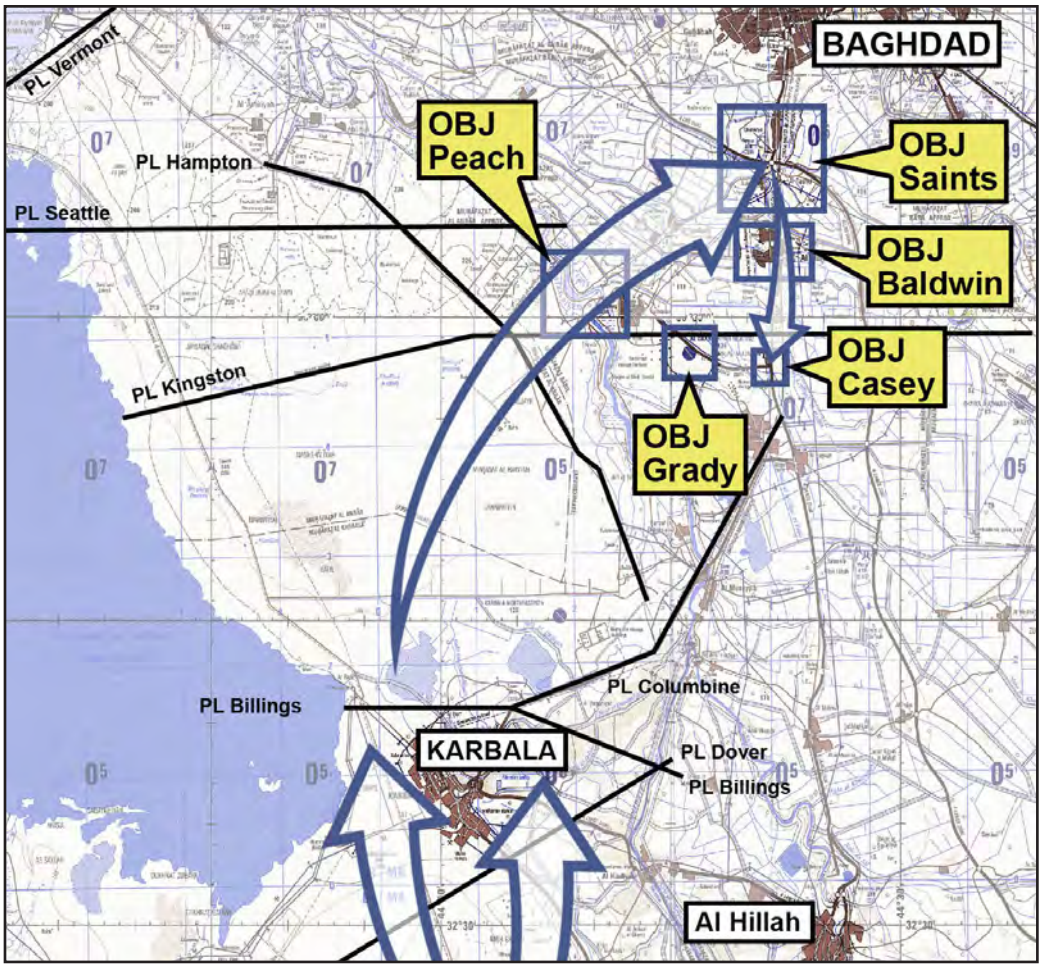


Figure 7: Scheme of Maneuver from Karbala Gap through Objective PEACH[10]

> to attack north to Objective LIONS, and 3rd BCT containing Karbala. Once the 101st arrived to relieve 3rd BCT at Karbala, the 3rd would cross the river at PEACH and attack north to seize Objective TITANS to isolate the western side of Baghdad.[11]

On 2 April at 0200, the 1st BCT began its attack into the Karbala Gap with two battalion task forces abreast, TF 3-69 AR on the right and TF 3-7 Infantry (IN) on the left, and one task force following. The fight through the Karbala Gap was quick as the Iraqi forces were mostly dismounted infantry and, after having been subjected to heavy artillery fires, "did not have the stomach for a fight."[12] The 1st BCT was through the gap by 0700 and by mid-morning was positioned in Objective CHARGERS, north of Karbala, where they began refueling in preparation for the attack to PEACH. After the rapid success in the Karbala Gap, the decision was made to continue pushing the attack to seize Objective PEACH.

---

[10] Figure 7, Scheme of Maneuver from Karbala Gap through Objective PEACH, courtesy of On Point.

[11] Fontenot, Degen, and Tohn, On Point, 284-85.

[12] Interview with Lieutenant Colonel Ernest Marcone, Commander, Task Force 3-69 Armor, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall and Greg Boehmer from PA Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, videotaped on 16 Mar 2004.

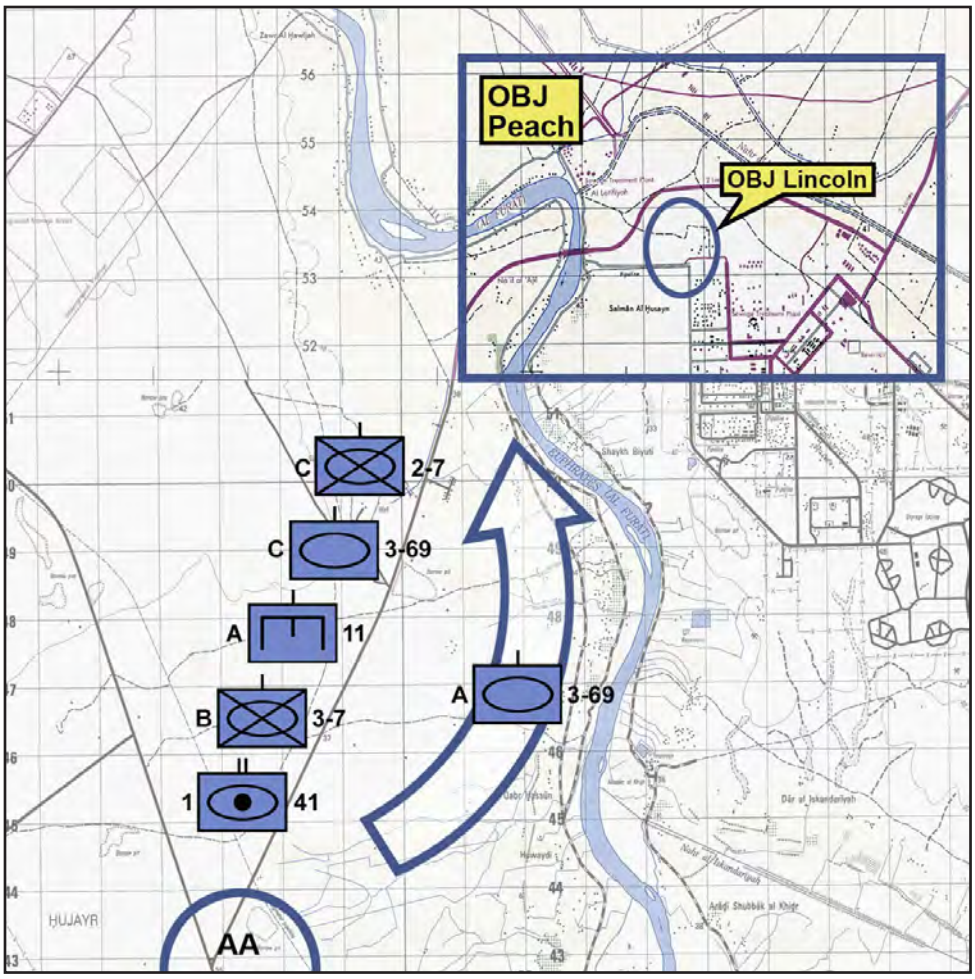


Figure 8, TF 3–69 Armor's Approach to Peach[13]

The 1st BCT plan called for TF 3-69 AR leading the attack to PEACH while TF 2-7 IN conducted a feint to the east towards the bridge at Musaib: an area where there were three class-70 bridges and where it was believed the Iraqis were expecting the 3 ID main effort to cross. TF 3-69 AR at that time consisted of two tank companies, two mechanized infantry companies, two engineer companies, a scout platoon, a chemical reconnaissance platoon, and a smoke generating unit; the TF also had an attack helicopter company providing over-the-shoulder coverage and 1-41 Field Artillery (FA) in direct support.[14]

TF 3-69 AR started moving out of CHARGERS at 1230. The battalion scout platoon and A Company (tank) conducted a limited attack to the east and then moved north along the river, attacking enemy forces south of the bridge and developing the situation around the bridge. Within forty minutes or so, the scouts were in contact with what was estimated to be about a battalion plus worth of dismounted infantry, mostly Fedayeen, on the west side of the bridge. LTC Marcone quickly sent forward his A Company tanks and attack aviation to clear the Fedayeen and attack up to the river line, securing the west side of the bridge by about 1430. The remainder of the task force had

[13] Figure 8, TF 3-69n Armor's Approach to Peach, courtesy of *On Point*.

[14] Ibid.

Figure 9: Engineers Surveying Bridge at Objective PEACH[15]

completed refueling in CHARGERS and then attacked along the primary route to the bridge; they were in contact with enemy forces most of the way to the bridge.[16]

Having learned from their experiences at Al Kifl just a week before, the task force had planned fires from both field artillery and air delivered precision joint direct attack munitions (JDAM) on the likely locations of the enemy engineers assigned to blow the bridge. While these fires were being placed on the enemy positions, the task force had close air support and attack helicopters attacking enemy positions on the east side of the river as engineers and infantry were preparing to cross the Euphrates in eight rubber boats to safe the bridge and clear enemy forces immediately on the west side of the bridge. Under the cover of smoke and suppressive fires, the troops in the rubber boats got across the river and secured the far side of the bridge. However, the enemy was able to set off one set of demolitions and blew a hole on the east side of the bridge. This explosion damaged one lane but did not endanger the viability of the bridge, and three lanes remained open for use. The pre-planned fires on the other likely firing locations worked well in destroying most of the firing locations for the demolitions. After a lodgment was established on the east side and the bridge safed, LTC Marcone immediately sent a company each of tanks and mechanized infantry across the bridge to secure a canal bridge and establish a bridgehead line in preparation for the follow-on forces from 2nd BCT. By 1630, LTC Marcone's task force held the bridge at PEACH; they expected to hold the bridge for approximately four hours until 2nd BCT forces would pass through on their attack to Objective SAINTS.

---

[15] Figure 9, Engineers Surveying Bridge at Objective PEACH courtesy of *On Point*.

[16] Interview with Lieutenant Colonel Marcone.

Originally, 2nd BCT was to follow 1st BCT through the gap and would have been about four hours behind the lead unit of the 1st BCT. The decision, made early in the morning, to continue the attack on to PEACH altered the division's timing and required 2nd BCT to change its route. Rather than following 1st BCT through the gap along congested roads, 2nd BCT quickly planned a new route to the east of Karbala that would allow the BCT to get through PEACH more quickly. However, after 2nd BCT started moving on its new route it quickly discovered that the route could not support the movement, and the BCT got bogged down. At about the same time as TF 3-69 AR was securing PEACH, the 2nd BCT commander decided to turn his BCT around and backtrack, moving back through the Karbala Gap as originally planned.

Back at PEACH, LTC Marcone did not know that 2nd BCT had taken an alternate route or that they had gotten bogged down. He observed in his tank-mounted FBCB2-BFT that the 2nd BCT had changed from its planned route following 1st BCT to moving east of Karbala; later he observed that they were now backtracking back towards the Karbala Gap. He concluded that they must have met some kind of obstacle and, making a quick time distance calculation from the information provided by his BFT, LTC Marcone estimated that 2nd BCT would not be passing through until sometime the next morning. Using this information, LTC Marcone decided to change his posture at the bridge from that of providing bridgehead security with a bridgehead line to preparing a hasty defense. Identifying key terrain and likely enemy avenues of approach, he pushed out his four maneuver units and engineers into defensive positions to the north and up to five kilometers east of the bridge. The 1st BCT commander, Colonel William Grimsley, pushed TF 3-7 IN across the bridge to take up defensive positions along the south of the bridgehead line. By 1815, the 1st BCT had two battalions in defense of the bridgehead; TF 3-69 AR covered the most dangerous avenues of approach. 1st BCT had received an intelligence report, "the best intelligence that I received during the war,"[17] that an Iraqi commando brigade was on the move towards them from the Baghdad International Airport area. Beginning around 2000 until around 0530 on 3 April, TF 3-69 AR was attacked by two Republican Guard brigades (the 10th Armored Brigade of the Medina Division and the 22nd Brigade) and the Iraqi 3rd Special Forces Brigade. The Task force was subjected to heavy Iraqi artillery and mortar fire throughout the night. Using their night vision equipment, TF 3-69 AR units were able to identify and engage the counterattacking Iraqi forces at extended ranges. TF 3-69 fires combined with artillery and close air support across the breadth and depth of the battlespace decimated the Iraqi counterattacks, the largest counterattacks mounted by the Iraqi forces during the war. LTC Marcone estimated the fighting was over by 0630 on the morning of 3 April.

The lead battalion task force of 2nd BCT began the passage through PEACH enroute to Objective SAINTS around 0845 on 3 April. Later that morning, 2nd BCT's TF 3-15 IN conducted a relief in place at PEACH, allowing the 1st BCT to prepare for its attack to Objective LIONS.

TECHNOLOGY DESCRIPTION

Force XXI Battle Command Brigade and Below – Blue Force Tracker (FBCB2-BFT)

The blue force tracker (BFT) was one of the most widely praised command and control (C2) systems of the maneuver phase of Operation Iraqi Freedom. It provided unprecedented situational awareness from the lowest tactical level to the highest strategic level.

---

[17] Ibid.

The Force XXI Battle Command Brigade and Below (FBCB2) is a digital command and control (C2) system consisting of both hardware and software integrated into platforms primarily at brigade and below. The system provides an automated network enabled C2 system facilitating the flow of battle command tactical mission requirements. It interfaces with Army and Joint C2 and other sensor systems on the battlefield, resulting in vertical and horizontal information integration. This shared common battlefield picture displays near-real-time information which contributes to situational awareness, provides graphics and overlays, and allows the exchange of C2 messages. The FBCB2 now comes in two variants. The standard FBCB2 using the enhanced positioning location and reporting system (EPLRS) is a terrestrial based system and was developed as part of the Army Battle Command System development process. The FBCB2 fielded for Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) was the FBCB2-BFT, a satellite based version of the FBCB2-EPLRS, which was rapidly developed and procured outside of the standard development and procurement process.

The standard FBCB2-EPLRS is a digital C2 system for brigade and below application that is part of the Army's digitized force known as the Army Battle Command System (ABCS). The FBCB2-EPLRS was developed during the mid-1990s and was fielded and concept proven with the 4th Infantry Division and 1st Cavalry Division at Ft. Hood, Texas as the first divisions in a digitized force. The FBCB2-EPLRS is a terrestrial radio based line-of-sight system that relies on a dense population of systems in order to maintain connectivity for network integrity and maintenance of the common operational picture (COP). The line-of-sight requirement is a limitation for a widely dispersed force. The EPLRS based system is communications accredited (hardware encrypted) for both unclassified and secret information processing and can interface into the ABCS. It provides the user a wide set of tools which includes: navigational and map tools; self location provided through the precision lightweight GPS receiver (PLGR) equipment; digital terrain elevation data; point-to-point and circular terrain analysis tools; reports tools; text messaging; and other tools.

The FBCB2-BFT which was fielded for OEF and OIF escaped the terrestrial line-of-sight limitations associated with the FBCB2-EPLRS. The BFT version with its L-band transceiver satellite link provided over-the-horizon capabilities and thereby reduced the need for a dense population of closely associated systems to maintain network integrity. Because of bandwidth limitations BFT did not have the complete set of tools as provided by EPLRS; however, BFT provides many of the same capabilities. BFT provided the same map and navigational tools, GPS, digital terrain elevation data, terrain analysis tools, and a limited text messaging and e-mail capability. The BFT was not ABCS interoperable because it lacked the hardware encrypted secure communications accreditation but relied on digital encryption with a one-way entry into Global Command and Control System – Army (GCCS-A). This one-entry allowed for populating the COP and dissemination of the blue picture across the classified GCCS network. All FBCB2-BFT equipped platforms within the network also received the locations of all other BFT systems within the network. There was a capability to separate out organizations from the widely disseminated display and this was used for special operations forces locations. The generated COP was a near-real-time picture of the blue forces. The BFT update rate was every five minutes or a movement of 800 meters for ground vehicles and every minute or 2300 meters for air.[18] Both FBCB2-EPLRS and FBCB2-BFT can be locally or remotely challenged and destroyed if compromised by erasing the computer hard drive.

[18] James Conatser, Captain, U.S. Army and Thane St. Clair, Captain, U.S. Army, "Blue Force Tracking - Combat Proven," ARMOR, September-October 2003 (2003).

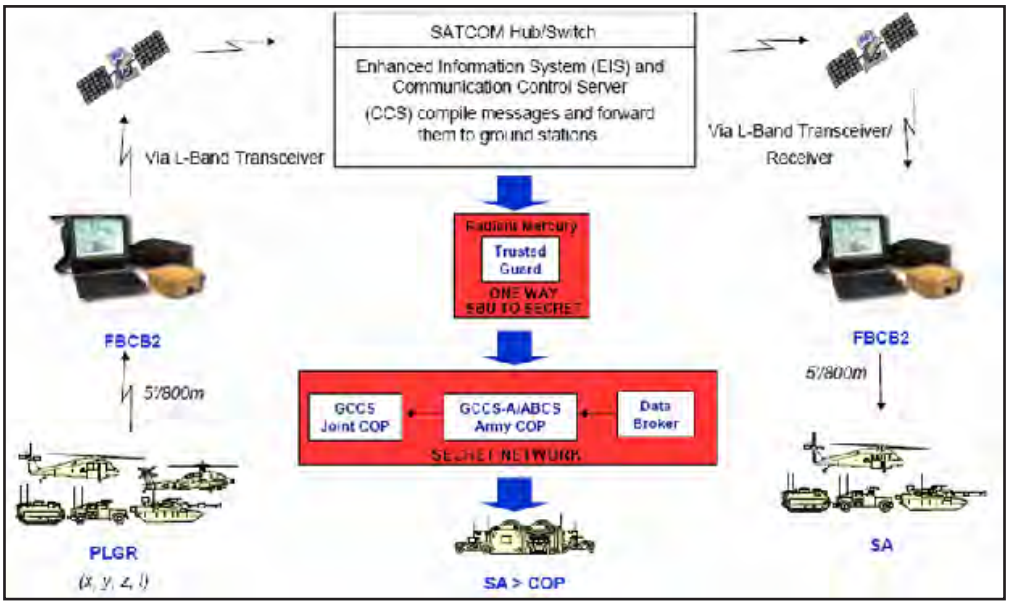


Figure 10: FBCB2-BFT Network During OIF

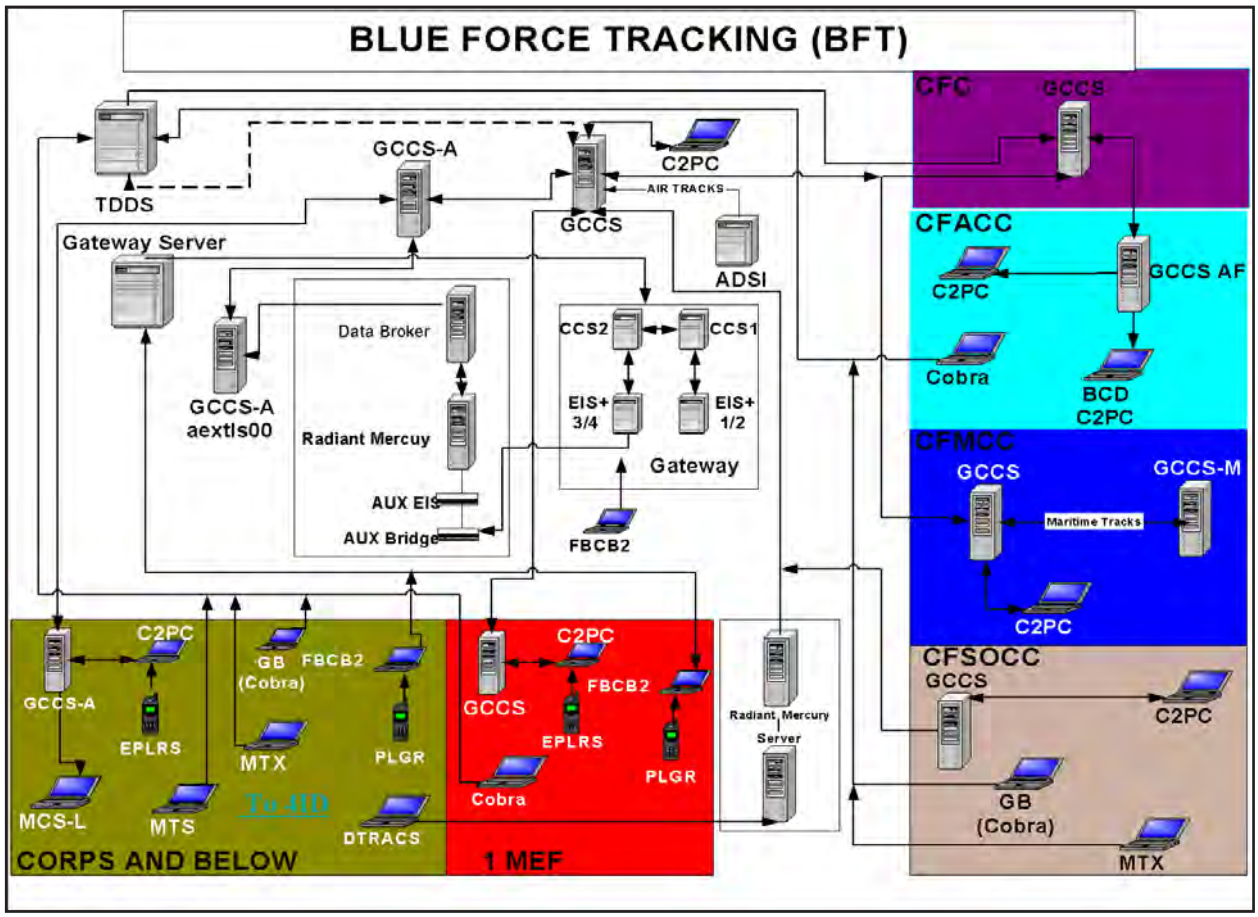


Figure 11: OIF BFT Architecture & the Joint Common Operational Picture

Figure 12: FBCB2-BFT Installations

TeleEngineering

TeleEngineering Operations is a technology "reachback" system developed by the U.S. Army Engineer Research and Development Center (ERDC) under the proponency of the U.S. Army Maneuver Support Center. TeleEngineering is simply "distance" or "reachback" engineering. When a complex problem is encountered in the field, soldiers can quickly send information via advanced communications links to the TeleEngineering Operations Center (TEOC). The Center can tap the technical expertise of the Corps of Engineers research laboratories, Corps districts and divisions, private industry, and academia to provide an expeditious answer to the problem.

The concept of reachback has been a cornerstone of the Corps' service for years. The name TeleEngineering reflects the increased capabilities provided by advanced high-speed communications that link the people with the problems to the people with the answers.

There are two different versions of the TeleEngineering Communications Equipment (TCE): a fixed-site version that is used in garrison (TCE-F) and a deployable (TCE-D) version that has been ruggedized for field use. The systems consist of a Polycom ViewStation capable of H.320-based conferencing, a Panasonic Toughbook, an encryption device, external hand-held camera, and other miscellaneous pieces. The deployable system uses auto-switching dual voltage power supplies and can operate from 110V to 220V AC or by using vehicle battery power.

Depending on their configuration, the systems can communicate point-to-point or they can be connected through a multipoint video teleconference (VTC) bridge at the ERDC TEOC to allow up to forty-four users in a secure VTC at a time. The data transfer rate and video connection for the deployable system is typically 64 kbs. This can be increased by adding additional satellite terminals. The system can also be used to send and receive non-secure e-mail traffic.[19]

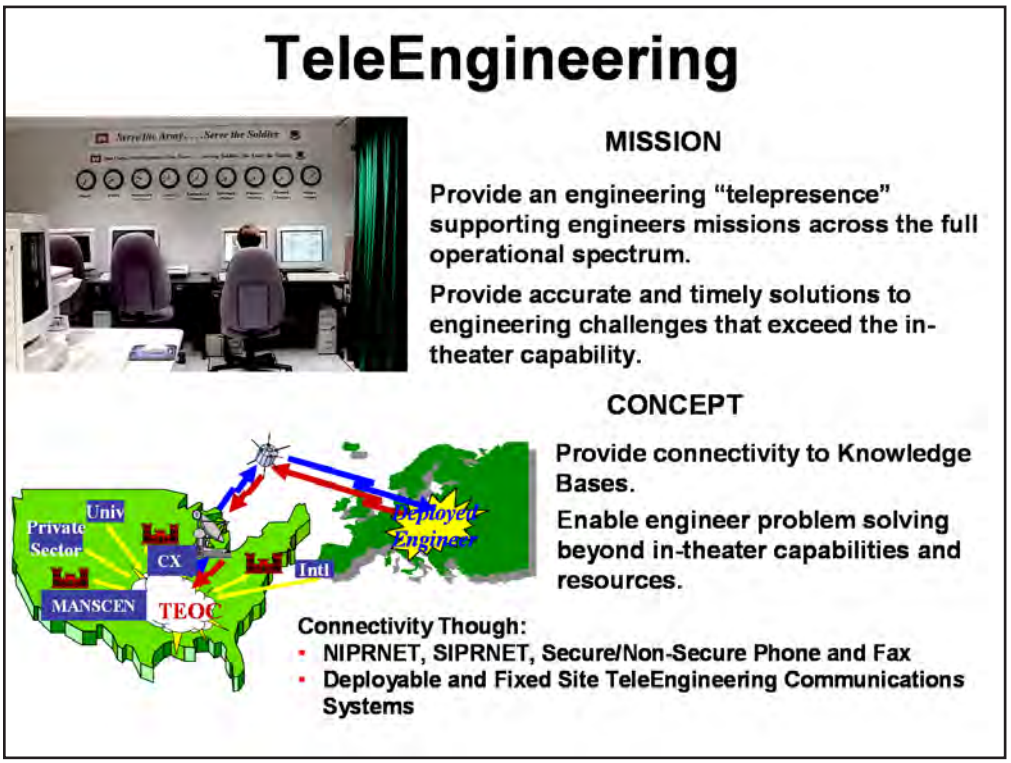


Figure 13: TeleEngineering Mission and Reachback Concept

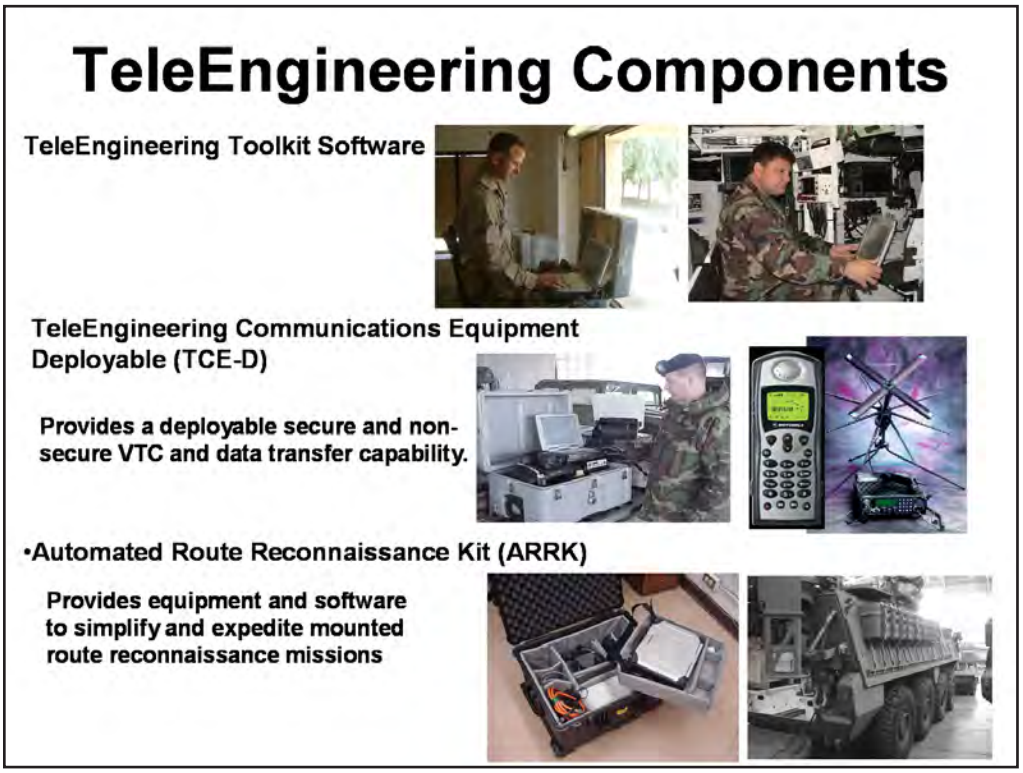


Figure 14: Deployable TCE (TCE-D)

ORGANIZATION STRUCTURE

Task Force 3-69 Armor at Objective PEACH

Army Field Manual 3-90.2 states "The role of the tank and mechanized infantry battalion task force is to fight and win engagements on any part of the battlefield. The task force (TF) combines the efforts of its company teams, combat support, and combat service support elements to execute tactical missions as part of a brigade or division operation. Mechanized infantry and armor battalions are an essential part of the Army's principal formation for conducting sustained combined arms and close combat land operations."

Engineering Expertise

- **Dam Breach and Hydrology Analysis**
- **Bridge MLC**
- **Bomb Damage Assessment**
- **Trafficability (On / Off Road)**
- **Force Protection (Hescos, AT Planner)**
- **Geological Information**
- **Frost/Freezing / Rainfall / Climate Information and Analysis**

Figure 15: Types of Available Reachback Expertise

Mechanized infantry and armor battalions are organized, manned, and equipped to conduct high intensity combat operations continuously. Brigade commanders task-organize their tank and mechanized infantry battalions into task forces by cross-attaching companies between them. The brigade commander determines the mix of company teams in a battalion task force. This task organization is designed to increase the capabilities of pure tank and mechanized infantry battalions and allows the brigade commander to tailor his force for the missions assigned.

Figure 16: Examples of Reachback Analysis Provided During OIF

[19] TeleEngineering Communications Equipment data from fact sheet provided by U.S. Army Engineer Research and Development Center, TeleEngineering Operations, dated May 2005.

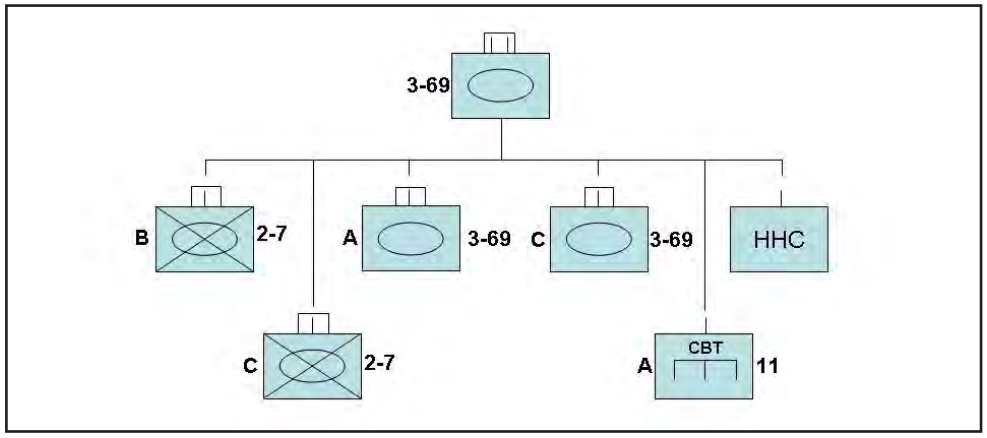


Figure 17: TF 3-69 AR Task Organization at Objective PEACH

This cross-attachment is generally done at the battalion level because battalions have the necessary command, control, and support capabilities to employ combined arms formations. Similarly, the TF commander may require cross-attachment of platoons to form one or more company teams for specific missions.[20]

The command and control of the battalion task force during combat operations is usually exercised via organic line-of-sight secure single channel air-ground radio systems (SINCGARS). Non-digitized task forces like 3-69 Armor operate a task force command net, an operations and intelligence (O&I) net, and an administrative-logistics (admin-log) net. It typically maintains contact with its controlling brigade commander and headquarters via SINCGARS on the brigade's FM nets and via mobile subscriber equipment (MSE), all of which are line-of-sight systems.

During OIF, the FM nets operated by the battalion task forces were generally adequate, given the relatively close proximity of the companies, for the command and control of task force operations. These voice nets were essential in providing situational understanding at the company and battalion task force level.

However, the brigade nets used to exercise command and control of the task forces were typically strained or inadequate. MSE nodes were not established while the brigade command posts were on the move, as they normally were during the majority of the offensive maneuver phase of OIF, and the FM nets were of limited use because of the wide dispersion of the task forces.

Blue force tracking systems were fielded to the majority of 3 ID maneuver units during the late January/February 2003 timeframe. TF 3-69 AR received its FBCB2-BFTs in February. The fielding to 3-69 AR was standard for 3 ID. Each company commander's and company executive officer's combat vehicle was equipped with FBCB2-BFT. The battalion scout platoon leader's vehicle also received the FBCB2-BFT. The task force commander's combat vehicle and the task force S-3's (operations officer) combat vehicles were equipped with FBCB2-BFTs. Finally, the task force tactical operations center received two systems, one vehicular mounted and one laptop type. These systems provided increased situational awareness through the visual representation of all other blue force maneuver units and provided an alternate means of communications over extended distances and beyond line-of-sight using the free text messaging capability.

[20] Field Manual 3-90.2 the Tank and Mechanized Infantry Battalion Task Force, (Washington, D.C.: Headquarters, Department of the Army, 2003), paragraph 2-2.

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES USED

Prior to the fielding of FBCB2-BFT, the battalion task force commander's situational awareness was dependent on the following: what he could personally observe, face-to-face interactions with his staff and commanders, reports he received and communications he had with his subordinate commanders via FM radio, reports and communications he received from his main command post (CP) via FM radio, and interactions with his brigade commander via FM radio or face-to-face.

Doctrinally,[21] the main CP is the task force commander's principal command and control facility. The main CP moves as required to maintain control of the operation. In linear operations environments, it locates behind the company team CPs and, if possible, out of medium artillery range. In non-linear operations (non-contiguous areas of operations), it locates where it can best support TF operations and where it is least vulnerable to potential hostile actions. The TF XO is responsible for supervising all staff activities and functions within the main CP. The main CP provides the following functions:

- Synchronizes combat, combat support, and combat service support activities in support of the overall operation.
- Provides a focal point for the development of intelligence.
- Supports situational understanding for the TF commander and subordinates by monitoring, analyzing, and disseminating information.
- Monitors and anticipates the commander's decision points.
- Plans future operations.
- Monitors sustaining operations.
- Coordinates with higher headquarters and adjacent units.
- Keeps higher headquarters informed.
- Serves as net control station for the operations and intelligence (OI) radio net and backup net control station for the command radio net.
- Provides terrain management.
- Provides a stable, secure planning facility.
- Produces and disseminates the commander's orders.
- Plans and controls ISR operations.

The main CP relies on FM communications for the operation of the TF's O&I net, admin-log net, and command net. To maintain communications for passing and receiving information from the brigade, the TF main CP uses MSE. The CP also operates on the brigades' FM nets. The TF main CP positioned itself to maintain connectivity with both the TF elements and the brigade tactical CP.

Prior to the introduction of the TeleEngineering capability the forward deployed engineers would make all engineering estimates based solely on their personal knowledge and experience and the reference materials on hand.

---

[21] Ibid., paragraph 3-8b.

IMPACTS OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

The application of new technologies on the battlefield allowed U.S. forces to fight in a substantially different way during the maneuver phase of OIF than they had during Desert Storm in 1991. V Corps forces fought using fewer forces, more widely dispersed, and at a higher operational tempo than was previously possible. Because of the widely dispersed forces and the rapid movement of forces around the battlespace, systems like the MSE that had previously provided the majority of the communications backbone from the battalion TF level and up were no longer able to meet the demands of the new operating environment.

Systems like the FBCB2-BFT provided users a real-time view of their own location and near-real-time view of other BFT-equipped forces. The BFT also populated the common operational picture (COP) of numerous networked command and control systems. The FBCB2-BFT also served as an alternate communications means when line-of-sight systems could not. Systems like the TCE provided reachback and access to data and expertise that otherwise was not readily available to engineers in combat formations.

TECHNOLOGY AS AN ENABLER

There were approximately 1,200 BFT systems fielded to forces and operating in the theater during OIF. These systems enabled a blue force COP that was accurate, relevant, timely/near-real-time, and provided to levels (tactical through strategic/national) not previously experienced.

The FBCB2-BFT enabled the TF commander at Objective PEACH to see where the 2nd BCT forces were and understand that they would not make the bridge crossing at the planned time. This information enabled the TF commander to quickly and accurately comprehend the changed situation. It enabled him to anticipate the delay in 2nd BCT's arrival and make adjustments to his task force's mission and posture in anticipation of enemy counterattacks. Without the information provided by the FBCB2-BFT, LTC Marcone would not have been able to make the quick and timely decisions that preserved the bridgehead.[22]

The TeleEngineering communications equipment enabled the forward deployed engineers in the combat formations to leverage the engineering expertise available in the U.S. The TCE, by way of the video pictures and oral descriptions of events, enabled the U.S.-based engineers to conduct timely analysis of the bridge construction and the military load classification of the damaged highway bridge over the Euphrates using man-hours and expertise unavailable to the 3 ID and V Corps combat engineers in Iraq.

NETWORK CENTRIC INSIGHTS

This battle story as seen from a netcentric point of view yields several insights.

1. FBCB2-BFT significantly improved the quality of individual and shared information. This system allowed wide dissemination of blue force dispositions in near-real-time through the FBCB2-BFT system and populated the common operational picture used at multiple levels from the tactical through the high strategic levels.

[22] Interview with Lieutenant Colonel Marcone.

2. The improved quality of individual and shared information resulted in increased situational awareness for the force. In this battle story, the ability to observe the 2nd BCT movements allowed LTC Marcone to develop a clearer understanding of his situation at PEACH in relation to the current state of friendly, follow-on forces.

3. The increased situational awareness and resultant understanding allowed for rapid decision-making and self-synchronization.[23] In this case, LTC Marcone understood the division and brigade commanders' intent[24] and, with the situational awareness provided by the FBCB2-BFT, developed a battlefield visualization of what needed to happen and took the appropriate and necessary actions.[25]

4. The process in 3 above, can be described as vastly improved command and tactical agility.[26] The result of this agility was improved mission effectiveness.

5. The TeleEngineering communications equipment significantly improved the quality of shared information by providing unparalleled reachback to leverage technical capabilities not readily available in theater. Forward deployed engineers were now able to share the information they had with engineers in sanctuary who were now able to view and assess engineering problems in a distant theater of operations. In this battle story, using audio and video sent from Iraq, the TeleEngineering Operations Center (TEOC) in the U.S. provided timely and accurate feedback on the conditions of the operationally important bridges over the Euphrates to the 54th Engineers on site.

6. The shared information enabled collaboration between engineers in the sanctuary of the U.S. in conducting detailed analysis. This collaboration improved the quality of the information. The TEOC engineers in sanctuary were able to conduct an analysis of the bridge at Al Kifl and then provide the 54th Engineers with the military load classification of the damaged bridge and make recommendations for upgrades and repairs to increase the capacity of the bridge.

---

[23] David S. Alberts, John Garstka, and Frederick P. Stein, Network Centric Warfare: Developing and Leveraging Information Superiority, 2nd Edition (Revised) ed., CCRP Publication Series (Washington, DC: National Defense University Press, 1999), 175. "Self-synchronization requires a combination of a rule set and shared awareness, enabling entities to operate in the absence of traditional hierarchical mechanisms for command and control. The rule set describes the desired outcome in various operational situations. Shared awareness provides a mechanism for communicating the ongoing dynamics of the operational situation and triggering the desired value-adding interaction."

[24] Field Manual 3-0 Operations, (Washington, D.C.: Headquarters, Department of the Army, 2001), 5-14. "The commander's intent is a clear, concise statement of what the force must do and the conditions the force must meet to succeed with respect to the enemy, terrain, and the desired end state."

[25] TRADOC Pam 525-70, (Ft. Monmouth, VA.: Headquarters U.S. Army Training and Doctrine Command, 1 October, 1995), para. 1-3. Battlefield visualization is "the process whereby the commander develops a clear understanding of his current state, envisions a desired end state, and visualizes the sequence of activity that will move his force from its current state to the end state."

[26] Field Manual 6-0 Mission Command: Command and Control of Army Forces, (Washington, D.C.: Headquarters, Department of the Army, 2003).Para. 2-40. "The speed and accuracy of a commander's actions to address changing situations is a key contributor to agility. Finally, commanders must anticipate the activities and effects that occur because of their decisions, including unintended second-order effects, effects caused by the enemy's reaction to friendly actions, and effects on future operations." FM 3-0. Para. 4-60. defines tactical agility as "the ability of a friendly force to react faster than the enemy. It is essential to seizing, retaining, and exploiting the initiative. Agility is mental and physical. Agile commanders quickly comprehend unfamiliar situations, creatively apply doctrine, and make timely decisions."

7. The improved quality of the information resulted in a shared understanding and increased mission effectiveness of the deployed engineers. The reachback TCE provided allowed the 54th Engineers to leverage information and data bases that in the past would have taken days or even weeks to access. This capability presented the engineers with the unique capability of not only solving technical problems but applying scarce assets efficiently while maintaining the tempo of the battle. Increased mission effectiveness is also reflected in the increased speed of decision making and in the mobility options provided to the force overall.


Prudens
Futuri

Battle Stories
Thunder Runs

The attacks that led to the collapse of the regime in Baghdad help to illustrate the impact of networks capable of delivering timely, relevant, and accurate information. The Force XXI Battle Command Brigade and Below–Blue Force Tracking (FBCB2-BFT) system and the Tactical Satellite (TACSAT) communications systems provided for rapid information sharing, improved the quality of information, increased shared situational awareness, enhanced collaboration, and resulted in increased mission effectiveness.

CONTEXT OF THE BATTLE STORY

This story focuses on the 3 ID attacks that isolated Baghdad and projected power into that capital, dominating Iraqi resistance and ultimately leading to the collapse of Saddam Hussein's Ba'ath Party Regime. The attacks occurred from 3 to10 April 2003.

ENEMY FORCES

On 3 April, the 3rd Infantry Division (3 ID) expected Iraqi forces in and around Baghdad to consist of the following: a brigade minus of the Special Republican Guard defending the Baghdad airport; the 17th Brigade of the Hammurabi Division defending southwest of the airport in the vicinity of the avenues that led into Baghdad; the 8th Brigade of the Hammurabi Division defending north

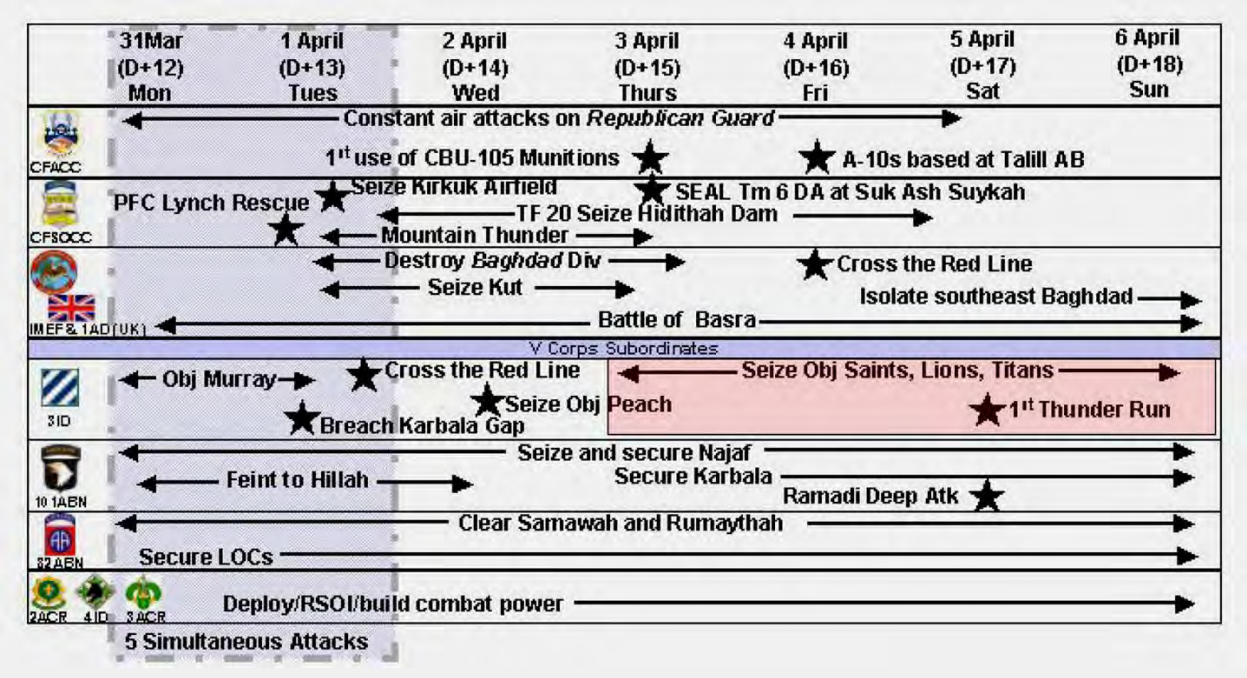


Figure 1: Timeline[1]

[1] Figure 1, Timeline, courtesy of *On Point*.

of Baghdad; units from the Adnan Division, also defending the north and northwest approaches into Baghdad; and a Special Republican Guard battalion along with two brigades of light infantry and about fifteen thousand paramilitary forces defending within Baghdad itself.[2]

FRIENDLY FORCES

On the morning of 3 April, 3 ID's 2nd Brigade Combat Team (BCT) began passing over the Euphrates River through the 1st BCT at Objective PEACH, attacking to seize Objective SAINTS, the intersections of Highways 1 and 8. The 3-7 Cavalry (CAV) followed the 2nd BCT through PEACH and then attacked north to Objective MONTGOMERY, the area that included the intersections of Highways 1 and 10, west of Objective LIONS (Baghdad International Airport), to establish a flank guard position protecting the division's flanks against enemy forces that might counterattack from the west. As 2nd BCT units were passing through 1st BCT at PEACH, MG Blount met with the 1st BCT commander, COL Grimsley, and explained that he wanted the BCT to attack to Objective LIONS, the Baghdad International Airport, later that afternoon.[4] MG Blount understood the importance of maintaining the initiative against the enemy, the strategic and political implications of seizing the airport, a key regime symbol, and the tactical advantages this decisive point offered for consolidating and building combat power with which to launch future forays into Baghdad.

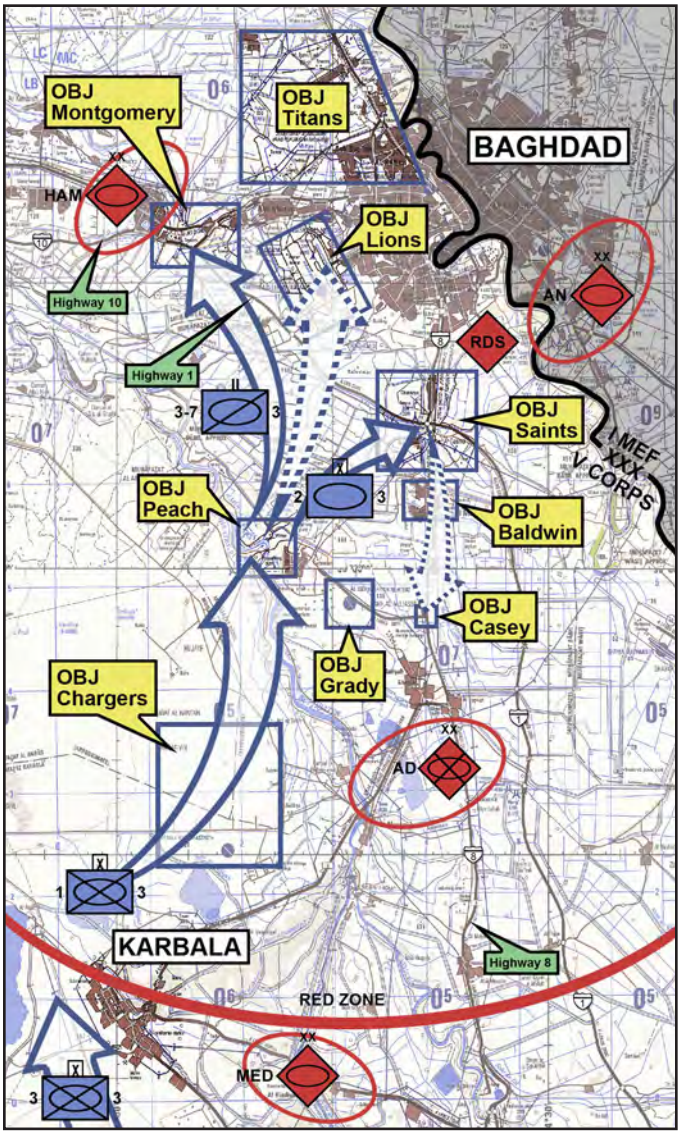


Figure 2: 3 ID Objectives and Enemy Forces Vicinity Baghdad [3]

---

[2] *3rd Infantry Division, Operation Freedom: Third Infantry Division (Mechanized) "Rock of the Marne" after Action Report*, Final Draft, (U.S. Army, 3rd Infantry Division (Mechanized), Ft. Stewart, GA, 2003), Operational Overview, Seizure of BIAP (OBJ LIONS): 03-05 APR 03. Enemy Actions.

[3] Figure 2, 3 ID Objectives and Enemy Forces Vicinity Baghdad, courtesy of *On Point*.

[4] Gregory Fontenot, Colonel, US Army, Retired, E.J. Degen, Lieutenant Colonel, U.S. Army, and David Tohn, Lieutenant Colonel, U.S. Army, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 300-01. MG Blount had talked with LTG Wallace, the V Corps commander, to get his permission to initiate the attack on the airport. LTG Wallace approved.

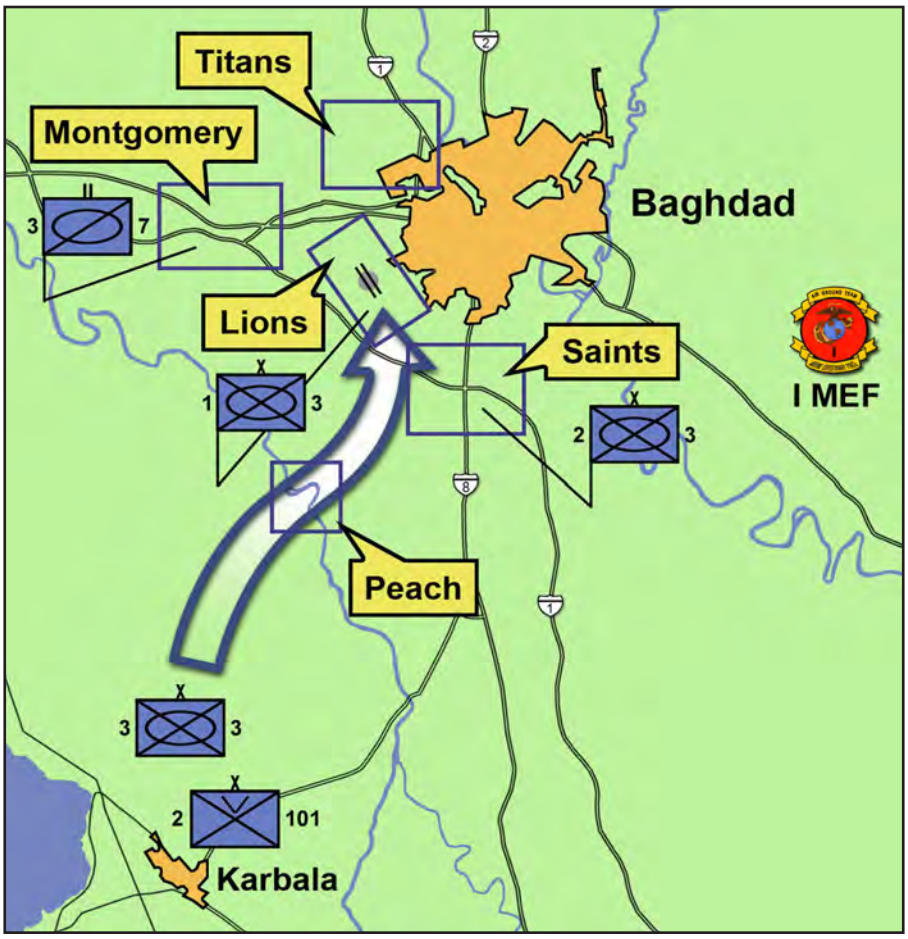


Figure 3: Objectives in the Vicinity of Baghdad [5]

TF 3-15 Infantry (IN) relieved 1st BCT forces at PEACH. Starting around 1520 and, following behind 3-7 CAV, 1st BCT began its movement from PEACH led by TF 3-69 Armor (AR) and its scout platoon conducting reconnaissance of the routes. The 1st BCT moved in column on the narrow dirt roads, with TF 3-69 AR followed by TF 3-7 IN and then TF 2-7 IN.

Combat on 3 April was intense; however, 3 ID's actions resulted in isolating Baghdad from the south and the west. Meanwhile, the 1st Marine Expeditionary Force (1st MEF) was approaching from the southeast. The 2nd BCT's seizure of SAINTS effectively cut off Baghdad from reinforcements from the south. The actions by 2nd BCT in clearing SAINTS and to the south along Highway 8 resulted in the destruction of thirty-three T-72 tanks, two T-62 tanks, nineteen T-55 tanks, twelve MTLB armored vehicles, fifty artillery pieces, six BM-21 rocket launchers, and 127 trucks; an estimated seven hundred Iraqi soldiers were killed.[6]

The 3-7 CAV had established their flank guard and occupied Objective MONTGOMERY by approximately 1800; however, the fighting at the intersections of Highways 1 and 10 was intense during a twenty-four-hour period in which A Troop, with supporting artillery and close air support

[5] Figure 3, Objectives in the Vicinity of Baghdad, courtesy of *On Point*.

[6] Fontenot, Degen, and Tohn, *On Point*, 299.

(CAS), repelled and destroyed a counterattacking Iraqi brigade and numerous paramilitary forces.[7] With their flank secured by the cavalry, TF 3-69 AR moved off the narrow dirt roads and onto Highway 1, moving towards the airport, and 1st BCT initiated rocket fires into LIONS. TF 3-69 AR arrived at the airfield under the cover of darkness, approaching the airport on two routes from the southwest and breaking through the airport outer wall sometime around 2300. After all of its company teams were on the south end of the airfield, TF 3-69 AR then attacked north across the airfield around 0230, destroying three T-72 tanks and meeting light resistance.[8] TF 2-7 IN arrived at the airport around 0500 and established a blocking position along the Highway 8 intersection at the airport's main entrance.

Throughout the war, commanders and staffs at all levels had monitored the movements of forces with the data provided by the blue force tracking (BFT) system transponders that were located on key vehicles throughout the force. Voice communications provided the detail to complete the picture being painted by the blue unit icons. This level of situational awareness across all echelons was unprecedented.

On the same night as the airport was being taken by 1st BCT, a massive amount of Iraqi forces that remained trapped south of Objective SAINTS in the "Al Hillah pocket" made every effort to escape to the east over the Tigris River to Highway 6 to get back to Baghdad. There was only one bridge over the Tigris River available to the trapped Iraqis, as the other bridges had been taken by the advancing U.S. Marine forces. The Iraqi movements were detected by both Predator and Hunter unmanned aerial vehicles (UAVs). V Corps, using the air support operations group in the fires effects coordination center (FECC), directed massive amounts of air onto the moving Iraqi

---

[7] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, Battle of OBJ MONTGOMERY: 03-04 APR 03. A Troop repelled repeated attacks by the Saddam Fedayeen and soldiers through the afternoon and night. Attacks came from the north, east, and west as the Iraqis moved reinforcements forward using every means of transportation available. The Iraqi attackers used motorcycles, cars, trucks, busses, and dump trucks to counterattack the cavalry squadron. That night, A Troop used continuous mortar and artillery fire to suppress and destroy the attacking forces. 3-7 Cavalry killed approximately 500 Iraqi forces and destroyed approximately 40 vehicles. On the morning of 4 April, nine T-72 tanks, three MTLBs, and 50 Iraqi infantry attacked A Troop along the Abu-Ghraib Expressway. In less than five minutes, all twelve vehicles were destroyed by A Troop's direct fires. Following the destruction of this attack, enemy small arms and RPG fires increased to the volume of the previous day. At 1700, A Troop, using seven M1A1 tanks, two Bradleys, and the Troop BFIST, attacked northeast along the Abu-Ghraib Expressway to complete the destruction of 22 T-72 tanks reported by the Air Force. A Troop moved within minimum safe distance for the Air Force and observed for 45 minutes as two F-15s and two Tornados, and artillery fires from the 1-9 Field Artillery conducted multiple strikes on the Iraqi tanks. Following the air strikes, A Troop moved forward to confirm the enemy situation and observed multiple T-72s dug-in on the south side of the expressway, unreported and untouched by the Air Force. Almost simultaneously, the M1s and T-72s began to engage each other at ranges from 800 to 1300 meters. The T-72 main gun rounds all fell short or flew over the attacking Cavalry Troop. Within ten minutes, A Troop destroyed 16 T-72 tanks, multiple ADA and artillery pieces, and killed approximately 100 dismounted soldiers. Enemy contact became light and sporadic throughout the night of 4 April.

[8] Interview with Captain Jared Robbins, Commander, Company C, TF 3-69 Armor. Interview by Ian Mc Dougall, Greg Boehmer, John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired, Personal interview, 16 March 2004. CPT Robbins was the commander of Company C, 3-69 Armor, and during the interview he recounted the events of the movement to and the attack across the airfield and the fights that ensued on the 4th of April. Interview with Major General Buford Blount, Commander, 3rd Infantry Division (Mechanized), conducted by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, on 19 August 2004.

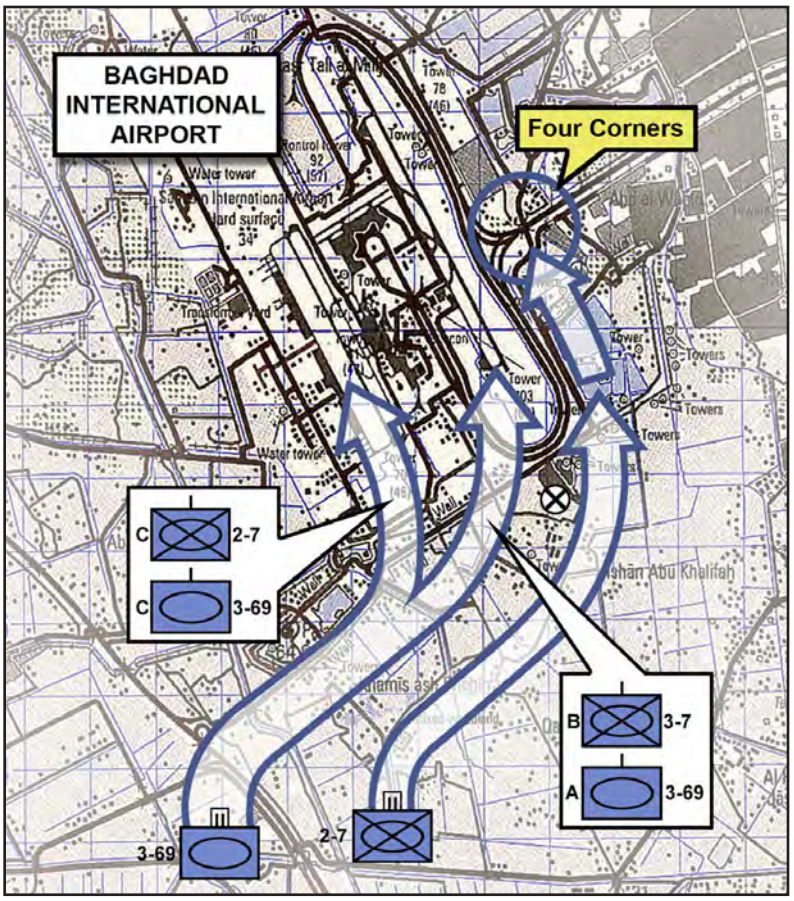


Figure 4: 1st BCT Approach to BIAP (Baghdad International Airport) [9]

forces, destroying much of the force and rendering it combat ineffective—piled and burning west of the bridge.[10]

By the morning of 4 April, V Corps was now commanding and controlling forces in combat stretched over almost six hundred kilometers, from the Kuwaiti border to the outskirts of Baghdad, and integrating newly arriving forces into the corps' operations. The corps' main and rear command posts both remained in Camp Virginia inside Kuwait. The corps' tactical command post was forward in BUSHMASTER, yet the corps commander was able to maintain effective command and control of his forces and his command posts through the use of his 25 kHz channel TACSAT

[9] Figure 4, 1st BCT Approach to BIAP, courtesy of *On Point*.

[10] Five Simultaneous Attacks Group Interview with Steve Hicks, Colonel, U.S. Army, G-3, V Corps; Rob Walter, Lieutenant Colonel, U.S. Army, Deputy G-2, V Corps; and Michael McGee, Lieutenant Colonel, Deputy Commander, 4th Air Support Operations Group, U.S.A.F. Interview by Gary Agron, Colonel, U.S. Army, John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired., Group interview, 21 May 2004. During this group interview with COL Steve Hicks, COL, V Corps G-3, LTC Rob Walter, V Corps Deputy G-2, and LtCol Michael McGee, Deputy Commander 4th ASOG, they provided insight and perspective of the corps' execution of 5 simultaneous attacks and the affects these attacks had in shaping future operations. They specifically highlighted the night of 3-4 April, when the corps' operational fires destroyed the remainder of the Medina Republican Guards Division and other Iraqi forces attempting to escape to the east over the Tigris River. This discussion emphasized the role of the UAV, both Hunter and Predator, in locating the moving targets at night, and then the coordination conducted at the Corps, ACE and FECC, using the ADOCS to bring close air support in to destroy the targets.

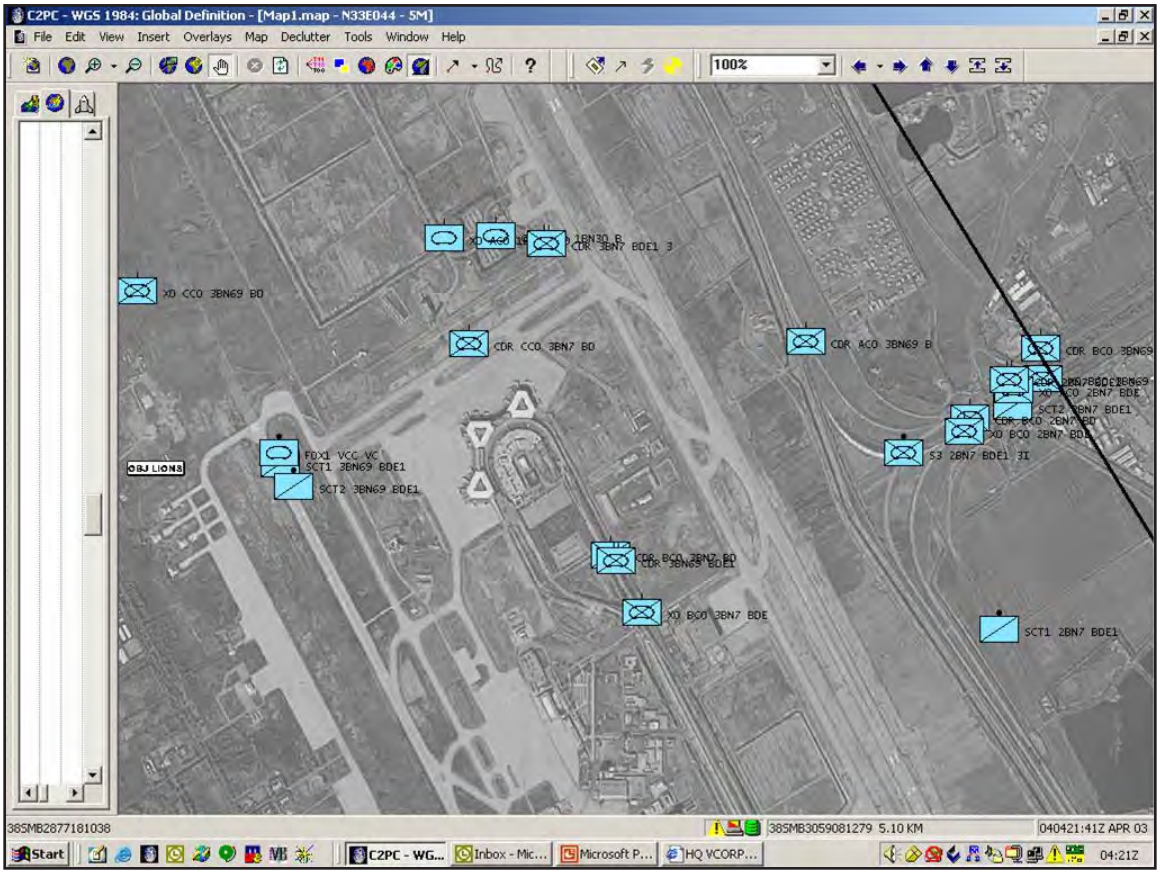


Figure 5: C2PC Screen Shot of 1st BCT Units on BIAP, as seen at Corps Main CP, Camp Virginia

radios. The corps was communicating over these vast distances on a single common command net. Each division also had TACSAT capabilities with a single 25 kHz wideband channel for its command net, which reached down to the brigade level. 3 ID also had two 5 kHz narrow-band channels for its operations and intelligence (O&I) net and its fires net, but these very limited bandwidth channels were of little benefit. With the distances units were spread over this non-contiguous battlefield, the speed that forces were moving, and the threat of paramilitary forces, the Army's standard line-of-sight communications backbone, provided by the mobile subscriber equipment (MSE), was not able to meet the challenge supporting the commanders' needs for battle command on the move. Only when command posts at the brigade and higher levels were at a long halt (longer than six hours), such as during the tactical halt and build-up prior to the attack through the Karbala Gap, was the attempt made to establish an MSE node center with satellite connectivity (prior to the war, the division signal battalion did not have sufficient multi-channel assets to establish these satellite capable nodes, but they had received these assets as augmentation for the war).

The initiative on 4 April clearly rested with V Corps and its forces. The 101st and 82nd Airborne Divisions were completing actions at As Samawah, An Najaf, Al Hillah, and other locations. At the same time, they were also conducting stability and support operations in other locations, and securing the lines of communications up through Karbala. The 3 ID was successfully effecting the isolation of Baghdad from the south and west and had secured the airport as a base from which

to further build combat power. Fighting in Objective MONTGOMERY was continuing as was the cleanup of Iraqi infantry forces on the airfield and the fighting off of counterattacks by Special Republican Guard and paramilitary forces at the airport entrance area. Baghdad would soon be isolated from the southeast by the approaching 1st MEF. What remained to complete the collapse of the regime was to complete the cordon of Baghdad, cutting it off from reinforcements and from escape to the north, and to determine the enemy situation and intent in Baghdad itself.

On the 4th, the decision was made for a brigade from the 101st to replace the 3 ID's 3rd BCT at Karbala. General Franks, the Commander of United States Central Command (USCENTCOM),[11] recounted that he "wanted American tanks in the city the next day…to probe the enemy defenses to see if any cohesive Republican Guard units had escaped into the city after the pounding they'd taken south of Baghdad."[12] LTGs McKiernan and Wallace and MG Blount all agreed, believing that it was important to keep up the pressure on the enemy. The 2nd BCT was given the mission to send a TF on an armored raid, a "Thunder Run," from SAINTS towards Baghdad on Highway 8 and then link up at the airport (LIONS) to check Iraqi reactions. 2nd BCT assigned the mission to TF 1-64 AR, the *Rogues*.

At first light on the 5th, "2nd BCT initiated the attack in to the city on Highway 8 to BIAP [Baghdad International Airport] to determine enemy defensive strength, disposition, and to send a message to the population of Baghdad that the U.S. Army was knocking on the door.…TF 1-64 attacked north on Highway 8 and within ten minutes were engaging tanks in the southern edge of the city."[13] TF 1-64 moved quickly, surprising the Iraqi defenders, many of whom were not in their fighting positions. Fighting was continuous, and the TF used both their direct fire systems and close air support to fight the Iraqis. The fighting was described as "very close-in and there were so many enemy fighters, that at times vehicle TCs [track or tank commanders] were shooting enemy fighters with M-4 carbines and M-9 pistols from their vehicle hatches to keep them from climbing on top of the vehicle."[14] TF 1-64 AR's progress on this first thunder run was observed by the 2nd BCT commander as well as by the 3 ID and V Corps commanders and by commanders and staffs all the way back to the Pentagon as the position of the TF was continuously being supplied by blue force tracking. General Franks recounts sitting in his headquarters in Qatar watching "the icons move up the highway through the sprawling outskirts and into the city….The 3rd ID also had a Hunter UAV tracking the action, so we had a sometimes confused and grainy overhead video feed as well."[15] Based on the information he was receiving from blue force tracking information, MG Blount at one point believed that the trailing company of the task force had been cut off because of a large gap in the blue icons. As it turned out, the company had not been cut off; the second and third companies in the column did not have any

---

[11]U.S. Central Command, headquartered in Tampa, Florida, is the U.S. military unified command with responsibility for most of the Middle East and Central Asia. USCENTCOM was in command of all joint military operations during OIF.

[12] Tommy Franks, *American Soldier*, 1st ed. (New York: Regan Books, 2004), 517 General Franks recounts that the term "Thunder Run" was derived from reconnaissance-in-force operations of the same name that he had seen near the Y Bridge in Vietnam in 1968. A Thunder Run was a unit of armor of mechanized infantry moving at high speed through a built-up area like a city. The purpose was either to catch the enemy off guard or overwhelm him with force.

[13] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, 2 BCT Conducts Raid to Clear Highway 8 Inside Baghdad: 5 April 03.

[14] Ibid., Operational Overview, 2 BCT Conducts Raid to Clear Highway 8 Inside Baghdad: 5 April 03.

[15] Franks, *American Soldier*, 518.

operable BFT system transponders.[17] About three hours after it initiated the raid, TF 1-64 AR linked up with TF 2-7 IN at the airport. "The results of the attack were over 2000 enemy fighters killed, one tank, one BMP, 30 trucks, several ADA systems [destroyed]. Every vehicle in TF 1-64 AR had scars from the fight, and one M1A1 had to be abandoned in the city."[18]

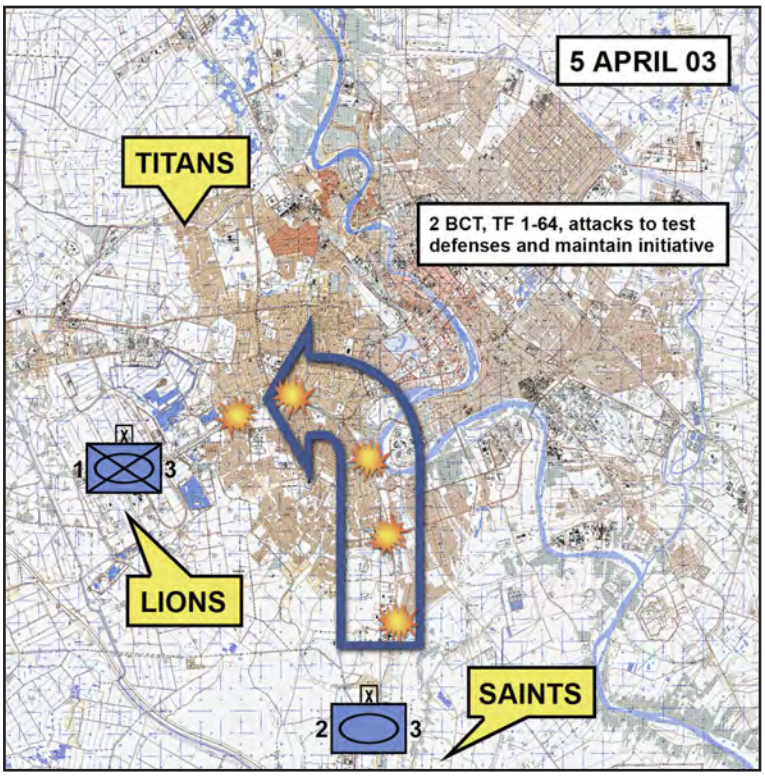


Figure 6: First Thunder Run [16]

As the first thunder run was kicking off, COL Dan Allyn's 3rd BCT of the 3 ID received the order to seize Objective TITANS, a series of road intersections located along Highway 1 northwest of Baghdad, the next day. The 3rd BCT had two battalion task forces, TF 1-30 IN and TF 2-69 AR, which had been fighting paramilitary forces in the vicinity of Karbala, protecting the division and corps units as they passed through the Karbala Gap. On 5 April, the 2nd Brigade of the 101st assumed responsibility for the Karbala area, and 3rd BCT moved north to prepare for the attack.[19] COL Allyn was to regain control of TF 1-15 IN and 1-10 Field Artillery (FA), both of which were with 2nd BCT at SAINTS, for the seizure of TITANS. That evening, 3rd BCT was able to communicate with TF 1-15 IN and 1-10 FA in SAINTS only through the use of the FBCB2-BFT. COL Allyn recalled,

> As my brigade began planning and disseminating the plan for our attack on the 6th of April to secure the northwest approaches to Baghdad and basically seal Baghdad from the

[16] Figure 6: First Thunder Run, and Figure 7: Second Thunder Run, on page 123, courtesy of *On Point*.

[17] Interview with Major Mike Donovan, TF 1-64 Armor, S-3, conducted by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, on 5 May 2004. During the interview, Major Donovan, recounted that after the war he watched a Discovery Channel program documenting the Thunder Runs and the fall of Baghdad. During this program there was an interview with MG Blount, the commander 3 ID, in which MG Blount stated that Company C of TF 1-64 had been cut off from the rest of the battalion task force column and had to fight to rejoin the column. Major Donovan states that he was in the middle of the column and could always see the trail of the task force column and that at no time was a unit cut off from the column. Donovan states that the picture portrayed via the blue force tracking was in this case a false picture because the BFT systems in the second company in the column were inoperable and the engineer company, which was the third company in the column, never had any BFT systems installed. Therefore, it appeared on the FBCB2 and C2PC screens and other common operational picture displays fed by blue force tracking that there was a large gap between the lead company in the column and the trail company when no such gap existed.

[18] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, 2 BCT Conducts Raid to Clear Highway 8 Inside Baghdad: 05 APR 03. The abandoned tank was destroyed by USAF close air support aircraft firing two Maverick missiles later that night to prevent the Iraqis from capturing the M1A1.

[19] Fontenot, Degen, and Tohn, *On Point*, 312.

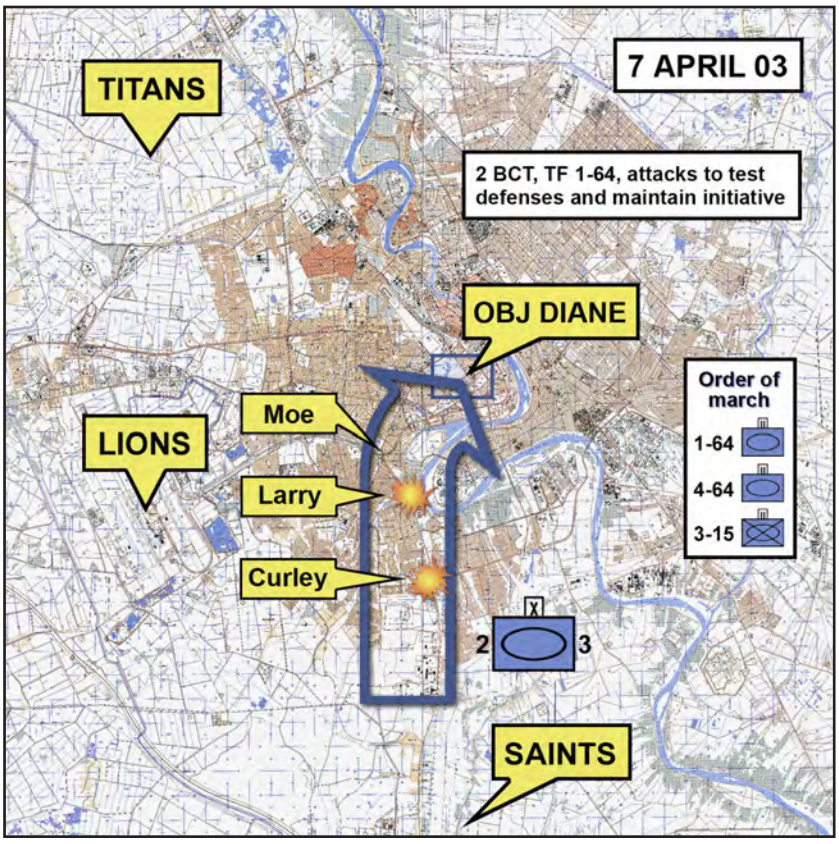


Figure 7: Second Thunder Run

> north and northwest. We at that point in time were a two battalion maneuver force with one artillery battalion, and I was to regain operational control of TF 1-15 IN and 1-10 FA as we began the movement toward Baghdad. So these battalions were both working for other brigades at this point in the fight. I was able to send them an e-mail with an attached operational graphic of the plan of attack on the night of the 5th, set up an enroute link-up point with the commanders of both my artillery battalion and 1-15 IN, conduct a hood-side commander's backbrief and face-to-face discussion of my intent to accompany those graphics, which they had received over night. Literally in the span of thirty minutes, we were able to continue to march, continue the attack.[20]

The 3rd BCT began its 110 kilometer movement to TITANS early on 6 April, crossing the Euphrates River at PEACH towards SAINTS. Just after dawn, COL Allyn met with the commanders of TF 1-15 IN and 1-10 FA in SAINTS. Led by its brigade reconnaissance troop (D Troop, 10th Cavalry), the 3rd BCT proceeded northwest towards MONTGOMERY, passing through 3-7 CAV with TF 2-69 AR in the lead followed by 1-10 FA, the BCT assault command post and engineers, TF 1-30 IN, and TF 1-15 IN. After passing through MONTGOMERY, the 3rd BCT became involved in a "ten-hour running battle to complete the isolation of Baghdad in the 3 ID zone."[21] The 3rd BCT fought

[20] Interview with Colonel Daniel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized), conducted by John B. Tisserand III, Colonel, U.S. Army, Retired, on 10 Nov 2004.

[21] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, Attack to Seize OBJ TITANS: 06 APR 03.

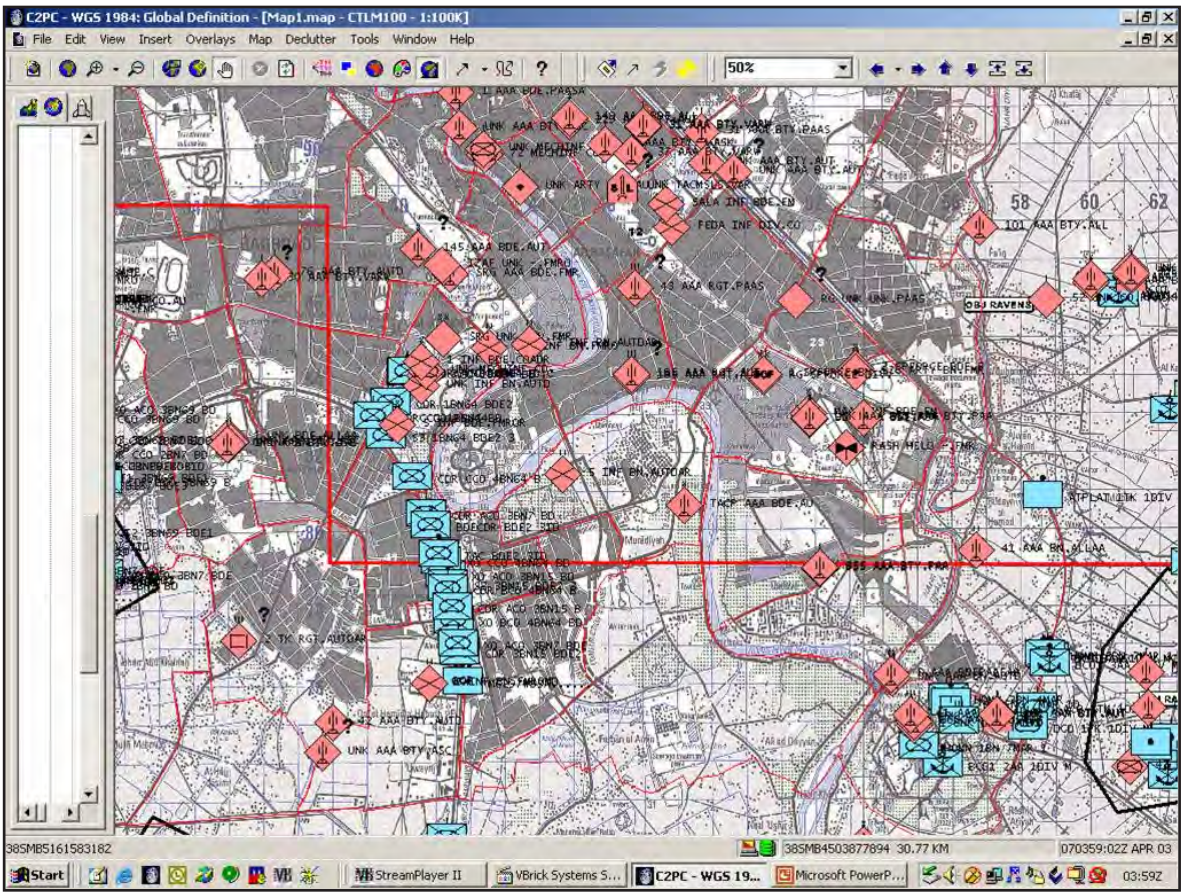


Figure 8: C2PC Screen Shot of the 7 April Thunder Run

its way through elements of the Special Republican Guards, the Hammurabi Republican Guard Division, and possibly Corps Artillery.[22] By sunset on 6 April, the 3rd BCT had secured TITANS and a bridge southeast of TITANS, stopping traffic crossing the Tigris River from the east side of Baghdad. Throughout this rapid and arduous fight, COL Allyn was able to maintain awareness of his forces' actions by his own movements and observations around the battlespace, by his communications with his task force commanders over FM radios, and by accurate unit position depictions provided via his FBCB2-BFT. His communications with the division commander and assistant division commander via his TACSAT radio provided them with the information they needed to gain an understanding of the situation presented by their common operational picture (COP) displays fed by the blue force trackers.

LTGs McKiernan and Wallace and MG Blount "were pleased with the first thunder run's success. While it was a significant and ferocious engagement, the Iraqi response…was not the sophisticated, integrated urban defense that they had feared. Moreover, the attack had clearly taken the Iraqis by surprise, confirming that the coalition firmly held the initiative."[23] With Baghdad now isolated, they decided to maintain the initiative and strike into the heart of Baghdad on 7 April with a BCT. This strike would also let the Iraqi people in Baghdad, as well as the world press, know that the

[22] Ibid.

[23] Fontenot, Degen, and Tohn, *On Point*, 347.

Americans were there despite the propaganda being put out by the Iraqi Minister of Information, Mohammed Saeed Al-Sahaf, a.k.a. "Baghdad Bob."

Intelligence reports indicated the Iraqis were building hasty roadblocks at major intersections and using anything they could for obstacles. They had even placed antitank mines across Highway 8 but had made no effort to conceal them. On 6 April, MG Blount assigned 2nd BCT the mission of conducting a limited-objective attack, another thunder run, back into Baghdad. Both MG Blount and COL Perkins, the 2nd BCT commander, understood that "Wallace's, as well as McKiernan's, ultimate purpose was to render the regime 'irrelevant,' causing it to collapse and thus free Iraq from the dictatorship."[24] The scheme of maneuver called for 2nd BCT, using three task forces, to attack to and seize the regime district. TF 3-15 IN was to secure the Highway 8 lines of communications (LOCs) into the city, allowing for the resupply of forces in the city. It would seize three major cloverleaf intersections along the highway, designated Objectives CURLEY, LARRY, and MOE, with its company teams and use them as strong points from which to protect the LOCs. TF 1-64 AR would lead the attack and seize Objective DIANE (the Tomb of the Unknowns area), and TF 4-64 AR would follow to seize two of Saddam's palaces along the Tigris River.[25] The 1st and 3rd BCTs would conduct supporting attacks in other parts of the city to continue to overwhelm the enemy with fighting from several different directions.[26]

Just after 0530 on 7 April, the 2nd BCT *Spartans* began moving out of objective SPARTANS on the second thunder run. The fighting up Highway 8 was furious, as enemy defenders swarmed from around buildings, fought from prepared positions under highway overpasses, used highway drainage ditches to hide and fire at the column of vehicles, used BMPs and tanks hiding in alleyways, and used numerous technical vehicles to attack against the 2nd BCT's oncoming tanks, Bradleys, and M113 armored personnel carriers. Never stopping, 2nd BCT's lead two TFs fought on through the enemy defenses and TF 3-15 IN's company teams began securing their objectives along the highway.

> LTG Wallace and MG Blount sat in their separate command posts watching 2nd BCT's electronic blue icons roll into Baghdad. As the BCT tanks cleared the second intermediate underpass, COL Perkins decided to push on to the city center. LTG Wallace recalled "I first knew they were going all the way in when I watched the blue icons turn and head downtown. Blount and I talked, and he told me that Perkins was going downtown. Later I was watching Dave Perkins walking around in the palace on CNN."[27]

By 0726, TF 1-64 AR was in the center of the city, and COL Perkins wanted to maintain their presence there and run operations out of the regime district.[28] Using his TACSAT radio to communicate from the center of Baghdad, "Perkins radioed to Blount that downtown, with its open boulevards and parks, offered excellent defensive terrain. He requested permission to stay. Without hesitation, Blount agreed, but only if resupply convoys could reach Perkins before dark."[29]

---

[24] Ibid., 348.

[25] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, 2 BCT Seizes the Regime District: 07 APR 03. See also, Fontenot, Degen, and Tohn, On Point, 350.

[26] 3 ID, *Operation Iraqi Freedom After Action Report*, Operational Overview, 2 BCT Seizes the Regime District: 07 APR 03.

[27] Fontenot, Degen, and Tohn, *On Point*, 349.

[28] 3 ID, *Operation Iraqi Freedom After Action Report*, 2 BCT Seizes the Regime District: 07 APR 03.

[29] Williamson Murray and Major General Robert H. Scales Jr., US Army Retired, The Iraq War (Cambridge: The Belknap Press of Harvard University Press, 2003), 213.

The fighting was intense across the BCT, but especially so for TF 3-15 IN as its separate company teams were fighting off determined enemy counter attacks threatening the LOCs. By mid-morning, MG Blount had ordered 1st BCT to attach TF 2-7 IN to 2nd BCT to reinforce TF 3-15 IN, which was maintaining Highway 8, the vital LOC for the resupply of the forces downtown. Despite the heavy fighting in the city center, as well as along the LOC, and the hazards of resupplying the force via convoy, the 2nd BCT remained downtown.

> On that day [7 April] Perkins made a single decision that arguably shortened the siege by weeks, if not months—he chose to stay downtown. Equally important, McKiernan, Wallace, and Blount trusted his judgment and underwrote the risks that he took. While the fighting continued in earnest for another few days and insurgents fight on today, the second thunder run broke the regime's back, and any remaining political or military leaders of rank disappeared in a flash of self-preservation.[30]

Fighting along the LOC and in the city center was intense the remainder of the day, throughout the night, and into the next day. Also on the evening and night of 7 April, the 3rd BCT became involved in repulsing a major combined-arms counterattack, as the Iraqis tried to recapture the bridges over the Tigris River and reopen Highway 1 to the north. The fighting "raged around the perimeter of Objective TITANS for the next two days. Colonel Allyn expected to link up with the Marines from the 1st Marine Division within twelve to fifteen hours, but the Marines had to do an assault crossing of the river to enter Baghdad and thus did not arrive until 9 April. This allowed the Iraqis east of the Tigris River to concentrate their attacks against *Hammer* Brigade in Objective TITANS."[31]

The 3rd BCT's last major attack began "early in the morning of 10 April. TF 2-69 AR attacked down the west side of the Tigris River along Highway 1 all the way to downtown Baghdad, linking up with Colonel Perkins' *Spartans*. Sanderson's [LTC Sanderson, commander of TF 2-69 AR] attack, supported by an elaborate set of preparatory fires, rolled over weak and disorganized resistance. TF 1-30 IN followed in support of TF 2-69 AR and cleared out the last pockets of Iraqi resistance. With this attack V Corps completed its part of the attack to seize and control Baghdad."[32]

TECHNOLOGY DESCRIPTION

Force XXI Battle Command Brigade and Below – Blue Force Tracker (FBCB2-BFT)

The BFT was one of the most widely praised command and control (C2) systems of the maneuver phase of Operation Iraqi Freedom (OIF). It provided unprecedented situational awareness from the lowest tactical level to the highest strategic level. It was rapidly produced and thinly fielded, with some units receiving the equipment literally days prior to the start of combat operations.

The Force XXI Battle Command Brigade and Below (FBCB2) is a digital command and control (C2) system consisting of both hardware and software integrated into platforms primarily at brigade and below. The system provides an automated network enabled C2 system facilitating the flow of battle command tactical mission requirements. It interfaces with Army and Joint C2 and other sensor systems on the battlefield, resulting in vertical and horizontal information integration. This shared COP displays near-real-time information which contributes to situational awareness,

---

[30] Fontenot, Degen, and Tohn, On Point, 336.

[31] Ibid., 377.

[32] Ibid.

provides graphics and overlays, and allows the exchange of C2 messages. The FBCB2 now comes in two variants. The standard FBCB2 using the enhanced positioning location and reporting system (EPLRS) is a terrestrial based system and was developed as part of the Army Battle Command System (ABCS) development process. The FBCB2 fielded for Operation Enduring Freedom (OEF) and OIF was the FBCB2-BFT, a satellite based version of the FBCB2-EPLRS, which was rapidly developed and procured outside of the standard development and procurement process.

OEF/OIF BFT Fielding

Over 1200 BFT/FBCB2 installs completed in 6 countries and over 20 states covering OIF Joint and Coalition Ground and Aviation Platforms

UNITS	BFT PACKAGES		TOTALS
	GROUND	AVIATION	
JTF 180	176	41	217
V CORPS	29	8	37
3D ID	150	6	156
1ST MEF	200	0	200
101ST AAD	68	88	156
1ST AD	153	15	168
3D ACR	47	10	57
4TH ID	43	0	43
UK	47	0	47
75TH FA	18	0	18
173D ABN	90	0	90
TOTAL	1,021	168	1,189

Figure 9: Blue force Tracker Fielding [33]

The standard FBCB2-EPLRS is a digital C2 system for brigade and below application that is part of the Army's digitized force known as ABCS. The FBCB2-EPLRS was developed during the mid-1990s and was fielded and concept proven with the 4th Infantry Division and 1st Cavalry Division at Ft. Hood, Texas as the first divisions in a digitized force. The FBCB2-EPLRS is a terrestrial radio based line-of-sight system that relies on a dense population of systems in order to maintain connectivity for network integrity and maintenance of the COP. The line-of-sight requirement is a limitation for a widely dispersed force. The EPLRS based system is communications accredited (hardware encrypted) for both unclassified and secret information processing and can interface into the ABCS. It provides the user a wide set of tools which includes: navigational and map tools; self location provided through the precision lightweight GPS receiver (PLGR) equipment; digital terrain elevation data; point-to-point and circular terrain analysis tools; reports tools; text messaging; and other tools.

The FBCB2-BFT which was fielded for OEF and OIF escaped the terrestrial line-of-sight limitations associated with the FBCB2-EPLRS. The BFT version with its L-band transceiver satellite link provided over-the-horizon capabilities and thereby reduced the need for a dense population of closely associated systems to maintain network integrity. Because of bandwidth limitations BFT did not have the complete set of tools as provided by EPLRS; however, BFT provides many of the same capabilities. BFT provided the same map and navigational tools, GPS, digital terrain elevation data, terrain analysis tools, and a limited text messaging and e-mail capability. The BFT was not ABCS interoperable because it lacked the hardware encrypted secure communications accreditation but relied on digital encryption with a one-way entry into Global

[33] James Conatser, Captain, U.S. Army and Thane St.Clair, Captain, U.S. Army, "Blue Force Tracking—Combat Proven," *ARMOR*, September-October 2003.

Figure 10: FBCB2-BFT Installations

Command and Control System–Army (GCCS-A). This one-entry allowed for populating the COP and dissemination of the blue picture across the classified GCCS network. All FBCB2-BFT equipped platforms within the network also received the locations of all other BFT systems within the network. There was a capability to separate out organizations from the widely disseminated display and this was used for special operations forces locations. The generated COP was a near-real-time picture of the blue forces. The BFT update rate was every five minutes or a movement of 800 meters for ground vehicles and every minute or 2300 meters for air.[34]

Both FBCB2-EPLARS and FBCB2-BFT can be locally or remotely challenged and destroyed if compromised by erasing the computer hard drive.

Tactical Satellite Radio – TACSAT

The AN/PSC 5 "Spitfire" single-channel tactical satellite (S/C TACSAT) radio was the single most lauded radio of the war. "Singular best and most reliable form of communication for the Corps. Saved lives and kept the CG [commanding general] informed and command enabled 24/7."[35] "The wide band single channel TACSAT won the war for us. This was the only reliable means of long range communications and my primary situational awareness tool."[36]

---

[34] Ibid.

[35] V Corps "The Road to 'Victory!' in Operation Iraqi Freedom" briefing. Quote from Communications Lessons Learned.

[36] This was a comment provided on a survey of officers and their OIF experiences. The survey was conducted by the U.S. Army War College during the summer of 2004. The comment is representative of other survey comments and interview comments provided by senior officers.

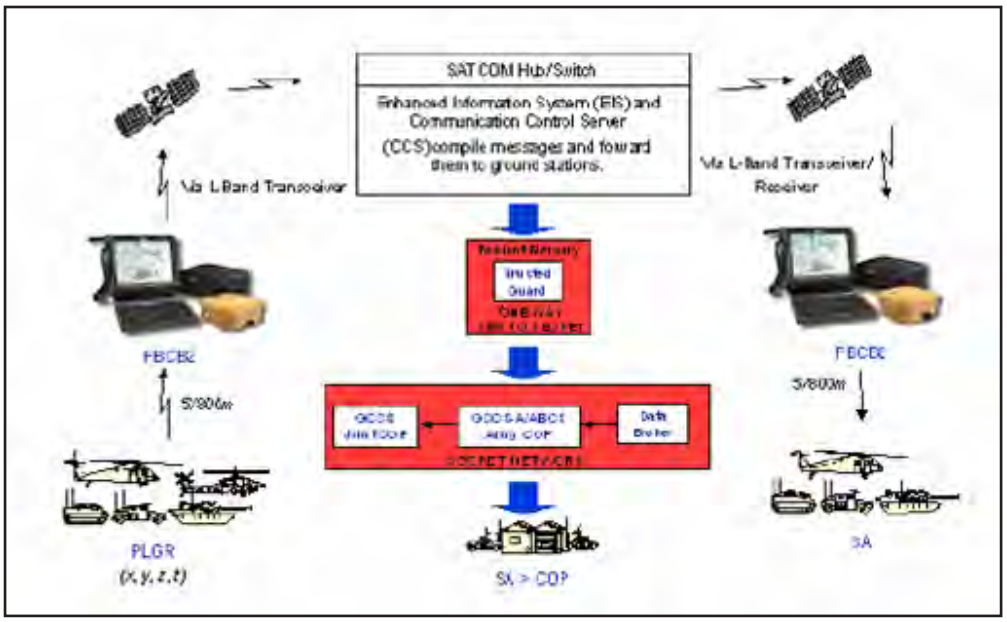


Figure 11: FBCB2-BFT Network During OIF

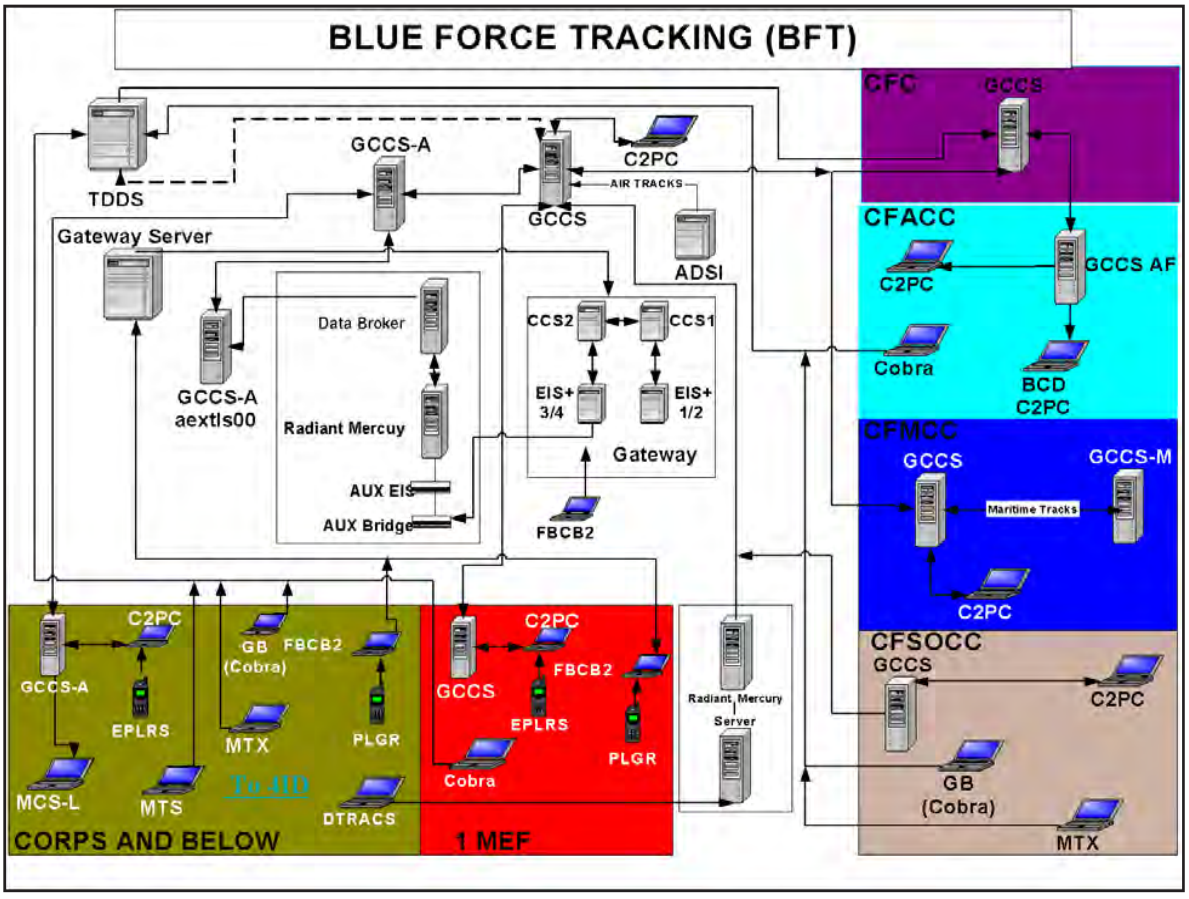


Figure 12: OIF BFT Architecture and the Joint Common Operational Picture

The single-channel tactical satellite (S/C TACSAT) radio mission is to provide tactical communications such as in-route contingency communications, in-theater communications, intelligence broadcast, and combat net radio range extension.

Figure 13: Tactical Satellite Radio and Antenna

Single-channel satellite communications provides reliable worldwide communications, it is highly transportable in both man-pack and vehicular configurations, and it provides the "Warfighters Net" capability for corps and division.

The requirement for wideband, 25 kHz, S/C TACSAT at divisional and below levels was not widely acknowledged before the war, and tactical commanders played limited roles in the pre-war apportionment conferences. High Frequency, Demand Assigned Multiple Access (DAMA) and narrow band 5 kHz channels were completely ineffective as C2 nets, and 25 kHz UHF channels with low look-up angles were failures. It was difficult to keep antennas aligned with the low look-up angle satellites while on the move, and the system suffered from greater topographic interference. The number of available military communications satellites that supported maximum look-up angles was limited over the CENTCOM area of responsibility. To support C2 on the move, such satellites need to be positioned almost directly overhead.

For the period of this study, V Corps and its units had only five assigned wideband 25 kHz channels to C2 what had clearly become non-contiguous formations broadly dispersed across areas that far exceeded the range capabilities of the fielded FM radios. V Corps and 3 ID each used their assigned 25 kHz TACSAT channels to establish corps and division command nets. A large percentage of the available TACSAT wideband channels were allocated to special operations forces (SOF) operating in Western Iraq. These SOF units, according to MG Dennis Moran, the CENTCOM J-6, were assigned the task of finding and destroying weapons of mass destruction in order to minimize the possibility of Israeli incurrence into the war following any possible Iraqi strike against Israel.[37] This however, significantly reduced wideband channel availability for the conventional forces executing rapid and dispersed operations.

ORGANIZATION STRUCTURE

The basic organization used in this battle story is that of the Brigade Combat Team (BCT). The doctrinal construct for the BCT is described in Army Field Manual (FM) 3-90.3, the Mounted Brigade Combat Team. This FM is limited in its distribution to U.S. Government agencies and their contractors.[38]

> BCTs are task-organized commands optimized for fighting offensive and defensive operations, in a major theater of war (MTW), as part of a division, corps, or joint task force (JTF) operations

---

[37] Interview of Major General Dennis Moran, Former CENTCOM J-6 During Operation Iraqi Freedom, Mar-Jul 2003, conducted by David Cammons and Dennis Murphy, Videotaped on 12 Dec 2005.

[38] The following descripiton of a BCT and its subordinate units is taken from Field Manual 3-90.3. The Mounted Brigade Combat Team, (Washington, D.C.: Headquarters, Department of the Army, 2001), 2-1.

capable of conducting full-spectrum operations. The brigade organization includes its organic headquarters and headquarters company (HHC) and reconnaissance troop, its assigned mechanized infantry and tank battalions, its habitually attached divisional assets (artillery battalion, engineer battalion, forward support battalion [FSB], air defense artillery [ADA] battery, military intelligence [MI] company, signal support, and military police [MP] platoon), and any other divisional or corps assets required to complete its assigned mission.

BCTs are task organized and, in turn task organize their subordinate units, to reap the benefits of combined arms operations. Combined arms operations use the synchronized or simultaneous application of several arms—infantry, armor, artillery, engineers, air defense, and aviation—to achieve an effect on the enemy that is greater than if each arm was used against the enemy in sequence.

The 3 ID's BCTs were typical of the BCT described in the doctrinal FM. The organizations within a BCT as described in Chapter 2 of FM 3-90.3.

The brigade HHC provides the staff and support functions to assist the brigade commander in the C2 of the brigade. It provides the capability to field a command group, tactical command post (TAC CP), a main CP, and a rear CP. Its primary purpose is to plan future

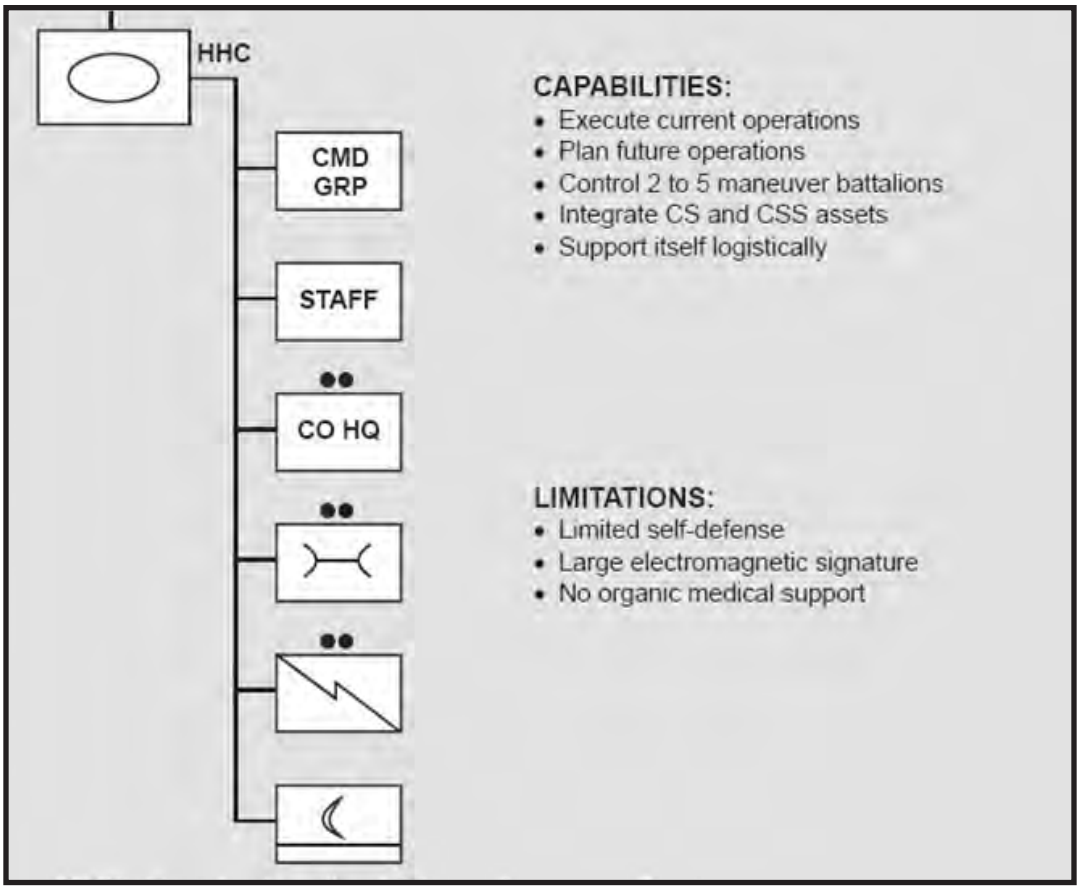


Figure 14: Brigade Headquarters and Headquarters Company

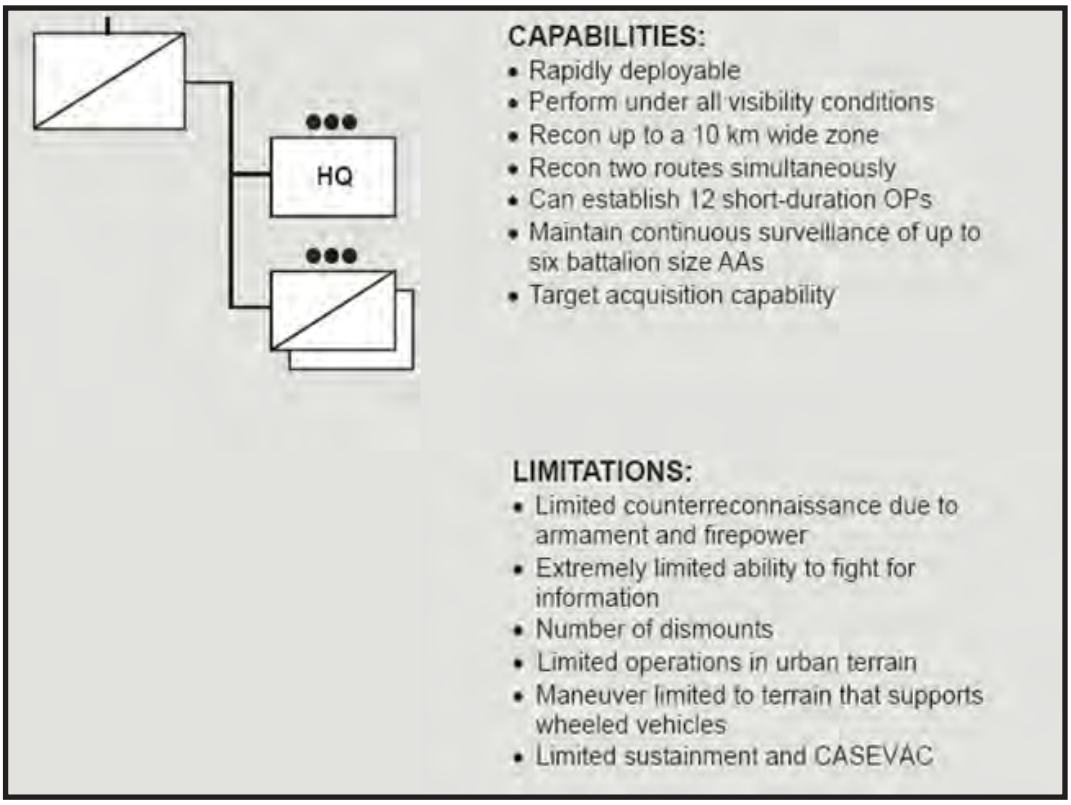


Figure 15: Brigade Reconnaissance Troop

operations, control current operations, and synchronize the efforts of its subordinate units. The brigade is capable of controlling two to five maneuver battalions and supporting CS and CSS units. The HHC is organized to provide its own logistical and administrative support.

The brigade reconnaissance troop (BRT) provides the brigade with an organic reconnaissance capability and a limited ability to conduct security operations for the brigade. Augmented with the artillery battalion's Striker platoon [COLTs], the troop can execute targeting missions as well. The reconnaissance troop executes portions of the brigade ISR [intelligence, surveillance, and reconnaissance] plan to gather information requirements based on the commanders critical information requirements (CCIR), to facilitate the commander's timely and effective decision making.

Armor battalions use firepower, maneuver, and shock effect to close with and destroy the enemy and take away his will to continue the battle. They provide long-range precision antitank (AT) fires, and are optimized for extended range engagements in open terrain. The armor battalion can break through enemy defenses, exploit the success of an attack by striking deep into the enemy's rear areas, and pursue defeated enemy forces. Armored units can also defeat enemy armored and mechanized attacks and launch counterattacks as part of the defense. The battalions' armored protection and mine-clearing systems give it significant breaching capabilities. The Force XXI battalions are limited to a command group, main CP, and combat trains command post (CTCP). The battalion staff fields a

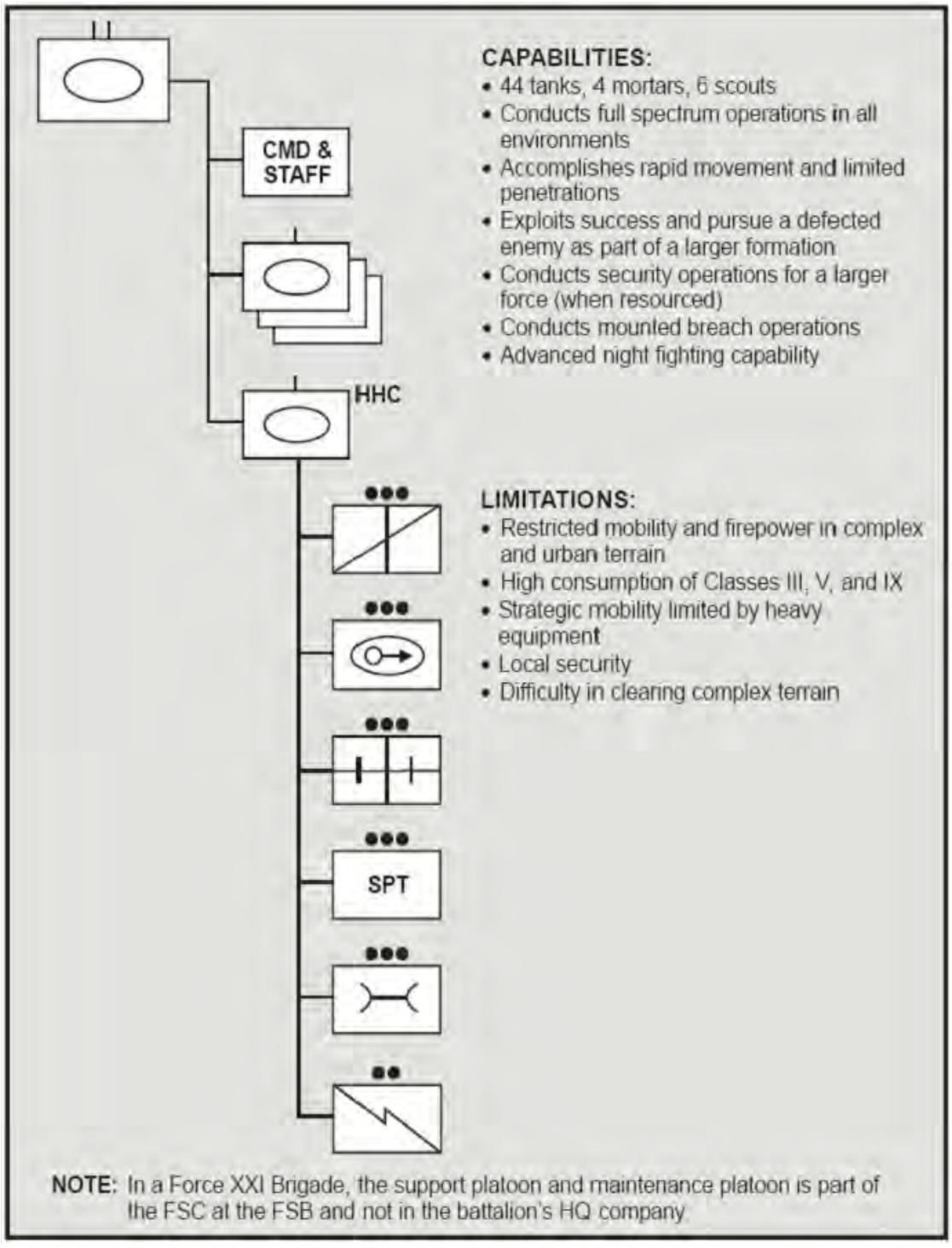


Figure 16: Tank Battalion

command group, main CP, combat trains CP, and rear CP. It is capable of controlling current operations and has a limited ability to plan future operations. The battalion conducts reconnaissance and security missions with its scout platoon. Battalion mortars provide organic fire support and smoke capability. The Force XXI battalions' organic CSS

assets only provide medical and field feeding support. Maintenance, ammunition, and fuel are supplied by the FSC supporting these battalions. The FSC's organic CSS structure provides medical, maintenance, ammunition, fuel, and field feeding support. An armor brigade is normally assigned two armor battalions, while a mechanized infantry brigade has one.

Mechanized infantry battalions close with the enemy by means of fire and maneuver to destroy or capture him or to repel his assault by fire, close combat, and counterattack. They provide the primary anti-infantry and short-range AT ability to the brigade. They are optimized for medium- and short-range engagements in compartmentalized and complex terrain. Mechanized units can assault and reduce enemy defenses, exploit the success of an attack, and pursue defeated enemy forces. Mechanized battalions can defeat enemy mechanized and infantry attacks and launch counterattacks as part of the defense. The battalions' infantry squads add the ability to conduct patrols, execute infiltrations, conduct covert breaches, and operate in urban terrain. The battalion staff fields a command group, main CP, combat trains CP. It is capable of controlling current operations and has a limited ability to plan future operations. The battalion conducts reconnaissance and security missions with its scout platoon. Battalion mortars provide organic fire support and smoke capability. Its organic CSS structure provides medical, maintenance, ammunition, fuel, and field feeding support. A mechanized infantry brigade is normally assigned two mechanized battalions while an armor brigade has one.

TASK ORGANIZING MOUNTED BRIGADE COMBAT TEAM

To maximize advantages and minimize limitations, commanders may cross attach tank and mechanized infantry companies and platoons to create combined arms task forces and company teams. These combined arms formations provide the formidable mix of lethality, mobility, and survivability required to execute decisive operations. Scarcity of resources may cause some battalions or companies to fight in a pure configuration. Commanders must be careful to assign pure armor or mechanized formations missions that are within their capabilities. On the other hand, some commanders may be task organized with more of another branch's assets than their own (a tank company commander with one armor and two mechanized platoons for example). This requires commanders to have technical and tactical experience in employing forces of his basic branch as well as those of his counterpart. In addition, commanders must ensure appropriate element of CSS and combat health service (CHS) are cross attached to maintain an adequate level of support.

HABITUALLY ATTACHED OR SUPPORTING UNITS

FIELD ARTILLERY (FA) BATTALION

A heavy brigade has a habitual direct support (DS) FA battalion from the divisional artillery brigade. The FA battalion neutralizes, suppresses, or destroys the enemy using cannon fires and integrates lethal and non-lethal fires into combined arms operations. FA units contribute to attacking the enemy throughout the depth of his formations and to suppression of enemy air defense (SEAD) systems to facilitate ground and air operations. As mobile as the maneuver force it supports, FA provides continuous fires in support of the commander's

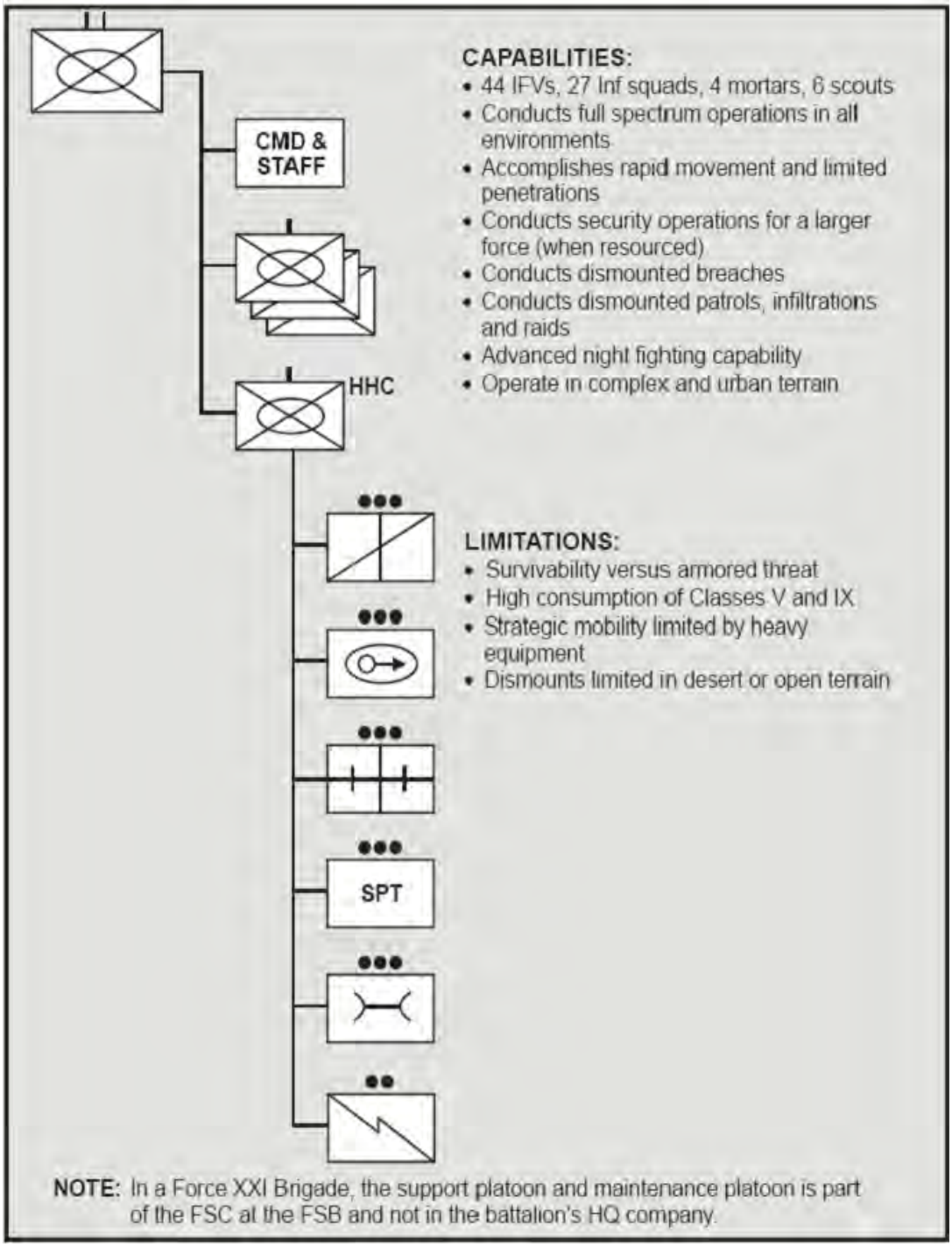


Figure 17: Mechanized Infantry Battalion

scheme of maneuver. The battalion provides specialized fires such as smoke, precision-guided munitions, and scatterable mines to assist the commander in shaping the battlefield. The battalion's Striker platoon [COLTs] provides long-range targeting and laser designation capability and normally conduct operations as part of the BRT. The FA battalion's staff provides C2 of its own batteries and exercises overall control of the fire support system for

the brigade. It also provides fire support elements (FSE) to the maneuver battalions, and fire support teams (FIST) and forward observers (FO) to the companies.

COMBAT ENGINEER BATTALION

Combat engineer battalions provide mobility, countermobility, survivability, and geospatial engineering support to the combined arms team. In offensive operations, engineers normally concentrate their efforts in supporting maneuver by breaching and crossing obstacles, assisting in the assault of fortified positions, and emplacing obstacles to protect the flanks of friendly attacking forces. In the defense, engineers reinforce the terrain to anchor the defense in critical areas, to maximize the effects of defenders' fires, to provide maximum protection to friendly fighting positions, and to facilitate the movement of counterattack forces. In all types of operations, engineers advise the maneuver commander on the effective use of terrain. When available, engineers task organize their terrain teams from division or corps terrain teams and assign a team to the brigade CP. Engineers are capable of fighting as infantry when required. The combat engineer battalion's companies normally have a habitual relationship with one of the brigade's maneuver battalions. Each company combines Sapper platoons and assault and obstacle platoons to provide the capability to breach enemy obstacles, cross wet and dry gaps, dig fighting positions, and to emplace tactical and situational obstacles. The battalion may have specially organized and trained engineer reconnaissance teams that can provide expertise to either the BRT or the task force scout platoons. The engineer battalion's main CP normally collocates with the brigade main CP, while the engineer company usually provides a cell to the task force CP.

AIR DEFENSE ARTILLERY BATTERY

The ADA battery protects the force by providing forward area air defense (FAAD) protection for maneuver units conducting tactical combat operations. The battery is linked into its parent unit's early warning net and provides information on the enemy air order of battle to the brigade S2. The battery's two linebacker platoons are typically attached to the brigade's lead maneuver task forces to provide DS, while the Avenger battery remains in general support (GS) under brigade control.

FORWARD SUPPORT BATTALION

The FSB sustains the brigade's ability to fight battles and engagements by manning and arming tactical units, fixing and fueling their equipment, moving soldiers, equipment, and supplies, and sustaining soldiers and their systems. The FSB commander and his staff work with the brigade and supported battalions to thoroughly integrate the concept of logistical support with the concept of operations during tactical planning. Whether the FSB is organized to support units with organic CSS assets and/or supporting FSCs to the maneuver battalions, the FSB's functions remain similar. The FSB provides organizational and DS maintenance, recovery, salvage, and repair parts supply. The medical company provides Echelon I and II medical care for the supported brigade and attached units. The medical company provides area medical support and ground ambulance evacuation from supported units to the BSA. The Echelon II medical treatment facility (brigade clearing station) provides advanced trauma management, sick call services, operational dental care,

x-ray and laboratory services, patient holding (up to 40 patients awaiting evacuation or return-to-duty), Class VII resupply, mental health, and preventive medicine services. The FSB also receives and issues Classes I, II, III(P), IV, VII, and IX. It receives, stores, and issues Class III (B), and transloads Classes IV/V from divisional or corps assets. The FSB normally operates a base or base cluster with the trains of its supported units in the brigade rear area. The FSB main CP collocates with the brigade rear CP.

MILITARY INTELLIGENCE COMPANY

The MI company provides timely, relevant, accurate, and synchronized intelligence support to the brigade. The company provides the brigade an analysis support team that collocates with the brigade main CP and assists the S2 in automated intelligence processing, analysis, and dissemination and provides access to the intelligence products of higher echelons. The counterintelligence (CI) team works in the brigade rear area to prevent subversion, sabotage, and terrorism. The interrogation team operates from the division enemy prisoners of war (EPW) collection point and seeks to gain information from captured personnel that will meet the commander's intelligence requirements. The company's GSR [Ground Surveillance Radar] assist in executing portions of the brigade ISR plan and are normally attached to the BRT or to task force scouts.

PREVIOUS PROCESS AND/OR TACTICS, TECHNIQUES AND PROCEDURES USED

Doctrine for ground maneuver forces had not changed in the years since Desert Storm, and although there had been changes in the communications fielded to the tactical formations at brigade and below, they remained line-of-sight systems. The old VRC-12 FM series radios had been replaced by SINCGARS FM radios with EPLRS. The mobile subscriber equipment (MSE)[39] that provided cellular-telephone-like capabilities was also widely fielded and resident in units from battalion level and above. TACSAT radios were fielded at the brigade level but rarely used in training because of bandwidth limitations and the reliance on MSE for most training situations. Components of the ABCS had also been fielded, such as the maneuver control system (MCS), the all-source analysis system-light (ASAS-L), and the combat service support control system (CSSCS), but all of these systems relied upon the MSE as the communications backbone for the data they required to function.

Division and brigade exercise of battle command was through the use of these line-of-sight communications systems. Most written orders and graphics were distributed using the MSE backbone structure.[40] Maneuver and fires were controlled using FM communications. Operations

[39] The Mobile Subscriber Equipment (MSE) forms a network that covers an area occupied by unit subscribers. A typical grid is made up of four to six centralized node centers that make up the hub or backbone of the network. Throughout the maneuver area, subscribers connect to local call switching centers by radio or wire. These switches or extension nodes provide access to the network by connecting to the node centers. The MSE system provides communications in an area of up to 15,000 square miles. The system is digital, secure, highly flexible, and contains features that deal with link outages, traffic overload, and rapid movement of users. The MSE system provides both voice and data communications on an automatic basis using a technique called flood search routing. The system supports both mobile and wire subscribers with the means to exchange communications, data, intelligence, and other information in a dynamic tactical environment. The Tactical Packet Network (TPN) portion of MSE is a packet switching network that is overlaid on the circuit switching network of MSE. Along with providing data communications, the TPN provides data interoperability with adjacent systems, including commercial networks.

[40] Because MSE nodes require selective site locations to maximize subscriber connectivity and node-to-node connectivity to provide the depth of service, MSE is a system suited more for the defense than offense.

and intelligence reports, logistical support requests, and other administrative data were all passed up using the MSE backbone. Intelligence products produced at higher levels were disseminated via the MSE backbone. Therefore, the tactical ground formations doctrine and pre-OIF command, control, communications, and computers and intelligence (C4I) systems had very little advantage over the forces that fought during Desert Storm in terms of maintaining connectivity during rapidly advancing, long-range maneuver and among widely dispersed formations.

IMPACTS OF TECHNOLOGY ON PROCESSES, ORGANIZATION, AND PEOPLE

During Desert Storm in 1991, the newly developed and widely used global positioning system of satellites and its lightweight, highly portable receivers provided U.S. and coalition forces with tremendous ability to navigate across vast expanses of desert at night and in bad weather, greatly increased the ability to accurately engage targets with artillery fires, and was a critical force multiplier. Communications and situational awareness were another story. "The SINCGARS [only 1050 were fielded to the two corps and their divisions] lacked the range and reliability needed to provide the long range communication that the Corps needed. VII Corps had only a few tactical satellite (TACSAT) communications receivers and these could not be used in moving vehicles."[41] The lack of long-range communications during Desert Storm frequently left the VII Corps commander unable to communicate with his division commanders and with his higher headquarters. The corps' written orders and graphics were hand delivered to the division command posts. The VII Corps commander's communications were bad, as his units were strung out over Kuwait and Iraq, and his awareness of forces and their awareness of each other were tenuous at best. At one point the 1st Infantry Division was advancing into the path of the oncoming 3rd Armored Division.[42] The need for improved tactical communications was a critical lesson learned from Desert Storm.

During OIF, two of the major obstacles encountered by the commanders during Desert Storm were largely overcome. First, connectivity via the TACSAT allowed commanders from corps through BCT level to position themselves in this widely dispersed non-contiguous battlespace where they best had a sense of the battle and still had the communications necessary for effective battle command. Second, situational awareness of combat formations was omnipresent to the commanders via the data transmitted via the BFT network.

These two systems allowed V Corps and its forces to fight more widely dispersed with greater synchronization and with less risk of fratricide between combat formations than was possible during Desert Storm.

---

[41] Anthony H. Cordesman and Abraham R. Wagner, *The Lessons of Modern War* (Boulder, Colo. and London: Westview Press; Mansell Pub., 1990), 624.

[42] John T. Ryan, Major, U.S. Army, "Battle Command in the Storm: Lieutenant General Franks and VII Corps" (United States Army Command and General Staff College, 1998). Major Ryan footnoted in his monograph that, based upon General Franks' [then LTG Fredrick M, Franks, the VII Corps commander] recollection of events as annotated in "Into the Storm" the change in direction occurred for 3d Brigade at the 33 Easting. After interviewing General Franks, Major Ryan theorizes that once the 1st Infantry Division commander believed that his forces were well forward of the 3rd Armored Division, he was clear to angle his division's direction of attack to the northeast—taking the most direct route to the division objective. Major Ryan also points out there was frequent lack of communications from VII Corps to its divisions as C2 was being exercised over FM nets, which resulted in a lack of awareness as to where all of its combat formations were located at any given point in time.

TECHNOLOGY AS AN ENABLER

"Command occurs at the location of the commander."[43] Army doctrine states that command must be forward for commanders to see their soldiers and for the soldiers to see their commanders. TACSAT and BFT enabled commanders to be anywhere in the battlespace and still have the communications and situational awareness for effective battle command.[44] TACSAT and BFT enabled battle command on the move. The corps, division, and BCT commanders were no longer tethered to their command posts to have access to information. They no longer had to move from one static command post to the next in order to obtain the information necessary for effective battle command.

TACSAT and BFT enabled commanders to communicate across the breath and depth of the battlespace and "see" where their forces were. The range and clarity of communications provided by the wideband S/C TACSAT and the situational awareness of combat formations provided by BFT enabled the corps and division commanders, and even BCT commanders, to have a better understanding of the entire battlespace than was possible for the VII Corps commander during Desert Storm.

The BFT enabled situational awareness of maneuver forces, but TACSAT enabled situational understanding; the voice communications completed the picture being painted by the blue icons. The icons only represented locations, while the voice communications added the level of meaning whereby understanding and knowledge were gained. LTG Wallace commented that the information that was most critical to him for battlespace awareness was the verbal reports he received from his commanders, augmented by his C2PC (fed by BFT data). The verbal reports provided him the commanders' feel of the situation and their assessment of what their units could accomplish; this was more art than science.[45]

TACSAT command nets enabled the corps and division commanders to clearly communicate their intent to their subordinate commanders and staffs. The command net provided a "fishbowl" where authorized users interacted with each other while others, authorized to listen, but not to talk, could monitor the interactions and thus gain a higher level of situational understanding. This fishbowl provided for a wider dissemination of the commander's intent, prompting the preparation or initiation of actions within that intent.[46]

---

[43] *Field Manual 4-0 (FM 100-10) Combat Service Support*, (Washington, D.C.: Department of the Army, 2003), 4-25.

[44] *Field Manual 3-0 Operations*, (Washington, D.C.: Headquarters, Department of the Army, 2001). para. 5-4. "Effective battle command demands decisions that are both timely and more effective than those of the enemy. Success often depends on superior information that enables superior decisions. Effective decision making combines judgment with information as an element of combat power: it requires knowing if to decide, when to decide, and what to decide. It requires commanders to judge information quality. It also requires identifying important information and focusing subordinates and the staff on it. These are tactical, operational, and strategic judgments. Commanders anticipate and understand the activities that follow decisions, knowing that once executed, some commitments are irretrievable."

[45] Interview with Lieutenant General William S. Wallace, Commander, V Corps, conducted by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired, on 28 April 2004.

[46] FM 3-0, para. 5-61: "Commanders express their vision as the commander's intent. The staff and subordinates measure the plans and orders that transform thought to action against it. The commander's intent is a clear, concise statement of what the force must do and the conditions the force must meet to succeed with respect to the enemy, terrain, and the desired end state. Commanders make their own independent, and sometimes intuitive, assessment of how they intend to win. The final expression of intent comes from commanders personally." Para. 5-62: "Intent, coupled with mission, directs subordinates toward mission accomplishment in the absence of orders. When significant opportunities appear, subordinates use the commander's intent to orient their efforts. Intent includes the conditions that forces meet to achieve the end state."

TACSAT and BFT enabled boldness by the division and corps commanders. Clausewitz postulates, "the higher up the chain of command, the greater is the need for boldness to be supported by a reflective mind, so that boldness does not degenerate into purposeless bursts of blind passion. Command becomes progressively less a matter of personal sacrifice and increasingly concerned for the safety of others and for the common purpose."[47] Armed with the information flow provided by the TACSAT and BFT, Generals Wallace and Blount were able to "read the situation" as 2nd BCT conducted the second thunder run. The shared situational awareness provided by the information flow and confidence in their subordinate leaders and their equipment encouraged their boldness in underwriting the request by the COL Perkins to remain in Baghdad, a bold move that expedited the fall of the regime.

TACSAT enabled COL Perkins, 2nd BCT commander, to maintain communications with his division commander from downtown Baghdad, something he would not have been able to do with FM communications.

BFT enabled the maneuver COP. All who had access to the COP displays, whether on FBCB2, C2PC, MCS, or whatever other type of display, were now able to see where the ground maneuver forces were located across the battlespace.

The BFT allowed COP-enabled commanders to view the execution of their orders.

BFT enabled maneuver commanders, down to the company level, with greater knowledge of their battlespace regarding other friendly maneuver forces. This awareness reduced chance encounters between units, reducing the potential for fratricide.

BFT enabled commanders like COL Allyn, the 3rd BCT commander, to transmit written orders and operational graphics using FBCB2-BFT to battalions that were otherwise beyond line-of-sight communications' capabilities. This was a capability that simply did not exist before the BFT.

Both TACSAT and BFT enabled quicker decision making by commanders.

NETWORK CENTRIC INSIGHTS

From a net-centric view point, this story yields at least the following seven insights:

1. BFT significantly improved the quality of information. The transmission and wide dissemination of near-real-time friendly maneuver force locations through the BFT network populated the COP that was used at multiple levels of command, from company tactical level through the high strategic levels.
2. TACSAT communications provided the means for information sharing that resulted in increased relevant shared situational awareness and collaboration, netting a higher quality of information. The corps' daily updates and commanders' briefings, as well as the flow of information throughout the day, kept everyone on the net aware of the situation and of the corps commander's intent. This awareness also increased the level of collaboration between staff groups and staffs at different levels.
3. The increased level of relevant shared situational awareness provided by the TACSAT and BFT allowed for rapid situational understanding and enabled subordinate commanders to

[47] Carl von Clausewitz, Michael Eliot Howard, and Peter Paret, *On War* (Princeton, N.J.: Princeton University Press, 1984), 190.

use their initiative, operating within the commander's intent, while executing missions and exploiting opportunities when presented, thus self-synchronizing.

4. The increased level of situational understanding allowed for rapid decision making. For example, during his interview, LTG Wallace recalled that he frequently monitored the TACSAT command nets of his divisions and therefore was aware of many of the communications between the division commanders and their BCT commanders. LTG Wallace recalled that this gave him a high level of situational understanding and allowed him to anticipate requests from the division commanders, thus allowing him to begin thinking over the decisions he may need to make.[48]
5. The increased situational understanding and knowledge that allowed commanders to make good decisions faster resulted in increased mission effectiveness.
6. The increased levels of shared situational awareness and collaboration provided via BFT and TACSAT enhanced unity of command.[49]
7. The networked advantage enjoyed by V Corps and 3 ID during OIF far exceeded the capabilities of the forces that operated in this same environment during Desert Storm. Units fought more dispersed, moved faster, had significantly fewer fratricides, and achieved levels of synchronization and joint fires integration only imagined during Desert Storm.

---

[48] Interview with Lieutenant General Wallace.

[49] FM 3-0, para. 4-44. "Developing the full combat power of a force requires unity of command. Unity of command means that a single commander directs and coordinates the actions of all forces toward a common objective. Cooperation may produce coordination, but giving a single commander the required authority unifies action."


Prudens
Futuri

References

UNIT AFTER-ACTION REPORTS & EXECUTIVE SUMMARIES

3rd Corps Support Command, U.S. Army. *3rd Corps Support Command in Operation Iraqi Freedom* 3rd Corps Support Command website, 2006 [cited June 14 2006]. Available from http//www.3coscom.army.mil/main/iraqi_freedom.asp.

V Corps Artillery. U.S. Army*. Clearance of Fires in OIF.* Heidelberg, GE, V Corps Artillery, APO AE 09081, 2004.

3rd Infantry Division (Mechanized), U.S. Army. *Operation Iraqi Freedom Third Infantry Division (Mechanized) 'Rock of the Marne' After Action Report,* (Final Draft)*.* 3rd Infantry Division (Mechanized), United States Army, Ft. Stewart, GA, 2003.

United States Joint Forces Command (JFCOM). *Joint Lessons Learned, Operation Iraqi Freedom Major Combat Operations* (Coordinating Draft). Norfolk, VA Headquarters, 2004.

ARTICLES

Cavoli, Christina, and Fritzgerald McNair. "Sensing Beyond the Visible, Combat Enabling Technologies Increase Warfighter Safety in Iraq." *Defense AT&L*, September-October (2005) 33-36.

Charlton, John W. "Digital Battle Command, Baptism by Fire." *Army Communicator* 28, no. 4 (2003) 30-35.

Conatser, James, Captain, U.S. Army, and Thane St.Clair, Captain, U.S. Army. "Blue Force Tracking - Combat Proven." *ARMOR*, September-October (2003) 20-23.

Flowers, Robert B., LTG, U.S. Army. "Supporting the Warfighters and Reconstruction Efforts." *Army* 54, no. 10 (2004) 185-90.

Kirkpatrick, Charles E. "Joint Fires as They Were Meant to Be, V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom." In *The Land Warfare Papers*. Arlington, Virginia The Association of the United States Army, Institute of Land Warfare, 2004.

Petrillo, Robert W., Lieutenant Colonel, and Daniel Carpenter, Major. "Movement Control on a Nonlinear Battlefield." *Army Logistician* 35, no. 5 (2003) 14-19.

Semonite, Todd T., Colonel, U.S. Army, and Russ LaChance, Major, U.S. Army. "Transforming the 130th Engineer Brigade...One Step at a Time." *Engineer* 31, PB 5-01-2 (2001) 52-54.

Stawowczyk, Edward J. "A Combat Multiplier in Iraq, The Long Range Advanced Scout Surveillance System." *ARMOR*, March-April (2004) 39-41.

Tapp, Kelly M. "MTS Is Revolutionizing Logistics on the Move." *Army Logistician* 36, no. 3 (2004) 15-17.

BOOKS

Alberts, David S., John Garstka, and Frederick P. Stein. *Network Centric Warfare, Developing and Leveraging Information Superiority*. 2nd Edition (Revised) ed, *Ccrp Publication Series*. Washington, DC National Defense University Press, 1999.

Alberts, David S., and Richard E. Hayes. *Power to the Edge, Command, Control in the Information Age*, *Information Age Transformation Series*. Washington, DC CCRP Publication Series, 2003.

Clausewitz, Carl von. *On War*. Translated by Michael Eliot Howard and Peter Paret. Princeton, N.J. Princeton University Press, 1984.

Cordesman, Anthony H. *The "Instant Lessons" of the Iraq War, Main Report (8th Working Draft 14 May 2003)*. Draft ed. Washington, D.C. Center for Strategic and International Studies,1800 K Street N.W.,Washington, D.C. 20006, 2003.

———. *The Iraq War Strategy, Tactics, and Military Lessons*. Westport, Conn. Praeger, 2003.

———. *The War after the War Strategic Lessons of Iraq and Afghanistan*, *Significant Issues Series ; V. 26, No. 4*. Washington, D.C. CSIS Press, Center for Strategic and International Studies, 2004.

Cordesman, Anthony H., and Abraham R. Wagner. *The Lessons of Modern War*. Boulder, Colo. and London Westview Press; Mansell Pub., 1990.

Fontenot, Gregory, Colonel, US Army, Retired, E.J. Degen, Lieutenant Colonel, US Army, and David Tohn, Lieutenant Colonel, US Army. *On Point, The United States Army in Operation Iraqi Freedom*. Fort Leavenworth, Kansas Combat Studies Institute Press, 2004.

Franks, Tommy. *American Soldier*. 1st ed. New York Regan Books, 2004.

Liddell Hart, B. H. *Strategy*. Second revised ed. New York Frederick A. Praeger, Inc., Publications, 1968.

Murray, Williamson, and Major General Robert H. Scales Jr., US Army Retired. *The Iraq War*. Cambridge The Belknap Press of Harvard University Press, 2003.

Robbins, Marc L., and Eric Peltz. *Sustainment of Army Forces in Operation Iraqi Freedom, End to End Distribution*. Santa Monica, CA RAND, 2006.

Peltz, Eric, John M. Halliday, Marc L. Robbins, and Kenneth J. Girardini. *Sustainment of Army Forces in Operation Iraqi Freedom, Battlefield Logistics and Effects on Operations*. Santa Monica, CA RAND, 2005.

GOVERNMENT REPORTS

Joint Chiefs of Staff. *The National Military Strategy of the United States of America, A Strategy for Today, a Vision for Tomorrow*, 2004. Available from access online version http//purl.access.gpo.gov/GPO/LPS59035.

U.S. Department of Defense. *Military Transformation. A Strategic Approach*. Washington D.C. Director, Force Transformation, Office of the Secretary of Defense, 2003.

U.S. Department of Defense. *The National Defense Strategy of the United States of America*. Washington, D.C., 2005.

U.S. Department of Defense. *Network Centric Warfare, Department of Defense Report to Congress.* Washington, D.C., Office of Force Transformation, 2001.

U.S. Department of Defense. *Transformation Planning Guidance*, 2003. Available from access online version http//purl.access.gpo.gov/GPO/LPS29618.

MILITARY PUBLICATIONS

Chairman of the Joint Chiefs of Staff Manual 3500.04C, Universal Joint Task List. Washington, D.C. Joint Chiefs of Staff, 2002.

Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms. Washington, D.C. Joint Chiefs of Staff, 2001 (As amended through 20 Mar 2006).

Joint Publication 3-0, Doctrine for Joint Operations. Washington, D.C. Joint Chiefs of Staff, 2001.

Joint Publication 5-0 (Revision Final Coordination), Joint Operation Planning. Washington, D.C. Joint Chiefs of Staff, 2006.

Joint Vision 2020. Washington, D.C. Joint Chiefs of Staff, 2000.

Field Manual 3-0 Operations. Washington, D.C. Headquarters, Department of the Army, 2001.

Field Manual 3-90 Tactics. Washington, D.C. Headquarters, Department of the Army, 2001.

Field Manual 3-90.2 The Tank and Mechanized Infantry Battalion Task Force. Washington, D.C. Headquarters, Department of the Army, 2003.

Field Manual 3-90.3 The Mounted Brigade Combat Team. Washington, D.C. Headquarters, Department of the Army, 2001.

Field Manual 4-0 (Fm 100-10) Combat Service Support. Washington, D.C. Department of the Army, 2003.

Field Manual 6-0 Mission Command Command and Control of Army Forces. Washington, D.C. Headquarters, Department of the Army, 2003.

Field Manual 22-100 Movement Control. Washington, D.C. Headquarters, Department of the Army, 1999.

Field Manual 55-10 Army Leadership. Washington, D.C. Headquarters, Department of the Army, 1999.

Field Manual 71-123 Tactics and Techniques for Combined Arms Heavy Forces Armored Brigade, Battalion/Task Force, and Company Team. Washington, D.C. Headquarters, Department of the Army, 1992.

Field Manual 90-13 / MCWP 3-17.1 River-Crossing Operations. Washington, D.C. Headquarters, Department of the Army and Commandant, US Marine Corps, 1998.

Field Manual 100-10-1 Theater Distribution. Washington, D.C. Headquarters, Department of the Army, 1999.

Field Manual 100-15 Corps Operations. Washington, DC Headquarters, Department of the Army, 1996.

"TRADOC Pam 525-70 Battlefield Visualization Concept." Headquarters, United States Army Training and Doctrine Command, Fort Monroe, VA 23651-5000, 1995.

MONOGRAPHS

Ryan, John T., Major, U.S. Army. "Battle Command in the Storm, Lieutenant General Franks and VII Corps." United States Army Command and General Staff College, 1998.

MacCagnan, Victor, Jr., Lieutenant Colonel, U.S. Army. "Logistics Transformation - Restarting a Stalled Process." v, 37. Carlisle Barracks, PA Strategic Studies Institute, 2005.

INTERVIEWS

Note: all interviews will be stored in the holdings of the Army Heritage Education Center, Carlisle, PA. Interviews are listed in order of rank and last name.

Interview with Lieutenant General William Scott Wallace, Commander, V Corps. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 28 April 2004.

Interview with Major General Buford Blount, Commander, 3rd Infantry Division (Mechanized). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 19 August 2004.

Interview of Major General Dennis Moran, Former CENTCOM J-6 During Operation Iraqi Freedom, Mar-Jul 2003. Interview by David Cammons and Dennis Murphy. Videotaped interview, 12 Dec 2005.

Interview with Major General Walter Wojdakowski, Deputy Commanding General, V Corps, During Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 14 September 2004.

Interview with Brigadier General Charles W. Fletcher Jr., Commander, 3rd Corps Support Command (COSCOM) During Operation Iraqi Freedom, Mar- May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 20 August 2004.

Interview with Brigadier General Daniel A. Hahn, Chief of Staff, V Corps, During Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 29 Sep 2004.

Interview with Colonel Daniel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired. Personal interview with COL Allyn, Daniel, 10 Nov 2004.

Summarized Interview of Colonel Allyn, Commander, 3rd Brigade Combat Team, 3rd Infantry Division (Mechanized), Interview by Colonel Cherry. May 13 2003. Summary provided by the Center for Army Lessons Learned, Ft. Leavenworth, Kansas.

Summarized Interview of Colonel Steve Boltz, V Corps, G-2. Interview by Lieutenant Colonel David Tohn., May 8, 2003. Summary provided by the Center for Army Lessons Learned, Ft. Leavenworth, Kansas.

Interview with Colonel Fred Carter, Assistant Chief of Staff, Logistics (G-4), V Corps, During Operation Iraqi Freedom, Mar-May 2003. Interview Conducted by John B. Tisserand III Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 18 May 2004.

Interview with Colonel John W. Charlton, Former Commander of Task Force 1-15 Infantry, 3rd Infantry Division (Mechanized) During Operation Iraqi Freedom 1 (Maneuver Phase). Interview by John B. Tisserand III, Colonel, U.S. Army, Retired. Videotaped interview, May 9 2006.

Interview with Colonel John Paul Gardner, Commander, 7th Corps Support Group, 3rd Corps Support Command, During Operation Iraqi Freedom, Mar-May 2003. Interview Conducted by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 18 May 2004.

Interview with Colonel William Grimsley, Commander, 1st Brigade Combat Team, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall from Pa Consulting, Greg Boehmer from Pa Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 17 March 2004.

Interview with Colonel Theodore J. Janosko, Commander, V Corps Artillery, During Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 19 May 2004.

Interview with Lieutenant Colonel William T. Gillespie Jr., Division Material Management Officer, Division Support Command, 3rd Infantry Division (Mechanized), Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 6 May 2004.

Interview with Lieutenant Colonel Ernest Marcone, Commander, Task Force 3-69 Armor, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall from Pa Consulting, Greg Boehmer from Pa Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 16 Mar 2004.

Interview with Lieutenant Colonel Mike McGee, Deputy Commander, 4th Air Support Operations Group (ASOG), Supporting V Corps, During Operation Iraqi Freedom, Mar-May 2003. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 17 May 2004.

Interview with Lieutenant Colonel Mike Presnell, Commander, 10th Engineer Battalion. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 5 May 2004.

Interview with Major Mike Donovan, Task Force 1-64 Armor, S-3. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 5 May 2004.

Interview with Major Garth Horne, Battalion Operations Staff Officer (S-3), 11th Engineer Battalion, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall from Pa Consulting, Greg Boehmer from Pa Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 17 March 2004.

Interview with Major Ricky J. Nussio, Task Force 1-64 Armor, Executive Officer. Interview by John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 4 May 2004.

Interview with Captain Todd Kelly, Commander, Company C, 2-7 Infantry, Task Force 3-69 Armor, 3rd Infantry Division (Mechanized), During Operation Iraqi Freedom, Mar-May 2003. Interview by Ian McDougall from Pa Consulting, Greg Boehmer from Pa Consulting, John B. Tisserand III, Colonel, U.S. Army, Retired and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 16 March 2004.

Interview with Captain Jared Robbins, Commander, Company C, Task Force 3-69 Armor. Interview by Ian McDougall, Greg Boehmer, John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired. Videotaped interview, 16 March 2004.

Five Simultaneous Attacks Group Interview with Steve Hicks, Colonel, U.S. Army, G-3, V Corps; Rob Walter, Lieutenant Colonel, U.S. Army, Deputy G-2, V Corps; and Michael McGee, Lieutenant Colonel, Deputy Commander, 4th Air Support Operations Group, USAF. Interview by Gary Agron, Colonel, U.S. Army, John B. Tisserand III, Colonel, U.S. Army, Retired, and Duane E. Williams, Colonel, U.S. Army, Retired. Group interview, 21 May 2004.

OTHER

Hunter RQ-5A / MQ-5B/C Tactical Unmanned Aerial Vehicle, USA/Israel, Army-technology.com, 2006 SPG Media Limited a subsidiary of SPG Media Group PLC, 2006 [cited March 22 2006]. Available from http//www.army-technology.com/projects/hunter/.


Prudens
Futuri

Appendix A
Glossary

A2C2	Army Airspace Command and Control
ABCS	Army Battle Command System
ABL	Ammunition Basic Load
ACE	Analysis and Control Element
ACO	Airspace Control Order
ACP	Assault Command Post
ACR	Airspace Coordination Request
AD	Armor Division
ADC-M	Assistant Division Commander–Maneuver
ADE	Air Defense Element
ADOCS	Automated Deep Operations Coordination System
AFATDS	Advanced Field Artillery Tactical Data System
AHR	Attack Helicopter Regiment
AI	Air Interdiction
ALO	Air Liaison Officer
AMDWS	Air and Missile Defense Work Station
AR	Armor
ASARS	Advanced Synthetic Aperture Radar System
ASAS	All-Source Analysis System
ASAS-L	All-Source Analysis System-Light
ASOC	Air Support Operations Center
ASOG	Air Support Operations Group
ASR	Alternate Supply Route; or, Ammunition Supply Rate
ATACMS	Army Tactical Missile System
ATARS	Advanced Tactical Aerial Reconnaissance System

ATO	Air Tasking Order
BCD	Battlefield Coordination Detachment
BCT	Brigade Combat Team
BCTP	Battle Command Training Program
BDA	Battle Damage Assessment
BDE	Brigade
BFT	Blue Force Tracker
BG	Brigadier General (1 star)
BIAP	Baghdad International Airport
BMP	Soviet-era design tracked armored infantry fighting vehicle (multiple variants)
BN	Battalion
BOS	Battlefield Operating System
BRDM	Soviet-era design wheeled reconnaissance vehicle (multiple variants)
BRT	Brigade Reconnaissance Troop
BTR	Soviet-era design wheeled armored infantry carrier (multiple variants)
C2	Command and Control
C2PC	Command and Control Personal Computer
C2V	Command and Control Vehicle
C4	Command, Control, Communication, and Computers
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CAOC	Combined Air Operations Center
CAS	Close Air Support
CBRNE	Chemical, Biological, Radiological, Nuclear, and high-yield Explosives
CCDR	Combatant Commander
CCS	Command and Control Station
CENTCOM	United States Central Command, also shown as USCENTCOM

CFACC	Combined Forces Air Component Command
CF-COP	Counterfire Common Operational Picture
CFLCC	Combined Forces Land Component Command
CGS	Common Ground Sensor; or, Commercial Gateway Segment
CJCS	Chairman, Joint Chiefs of Staff
C-Main	Corps Main Command Post
CO	Company; or Commanding Officer
COA	Course Of Action
COL	Colonel
COLT	Combat Observation Lasing Team
COMINT	Communications Intelligence
CONUS	Continental United States
COP	Common Operational Picture
COSCOM	Corps Support Command
CP	Command Post; or, Checkpoint
CPT	Captain
C-Rear	Corps Rear Command Post
CS	Control Station
CSAR	Combat Search And Rescue
CSG	Corps Support Group
CSL	Center For Strategic Leadership
CSS	Combat Service Support
CSSCS	Combat Service Support Control System
C-TAC	Corps Tactical Command Post
DARPA	Defense Research Projects Agency
DFSCOORD	Deputy Fire Support Coordinator
DISCOM	Division Support Command
DISN	Defense Information Systems Network

DIVARTY	Division Artillery
DMA	Defense Mapping Agency
D-Main	Division Main Command Post
DOCC	Deep Operations Coordination Cell
DOTMLPF	Doctrine, Organization, Training, Materiel, Leader and Education, Personnel, and Facilities
D-Rear	Division Rear Command Post
D-TAC	Division Tactical Command Post
DTED	Digital Terrain Elevation Data
DTLOMS	Doctrine, Training, Leader Development, Organization, Materiel, and Soldiers
DTRACS	Defense Tracking, Reporting and Control System
DTSS	Digital Topographical Support System
EA	Engagement Area
ELINT	Electronic Intelligence
EPLRS	Enhanced Position Location Reporting System
EPW	Enemy Prisoner of War
ERDC	U.S. Army Engineer Research and Development Center
EW	Electronic Warfare
FBCB2	Force XXI Battle Command Brigade and Below
FECC	Fires Effects Coordination Center
FLB	Forward Logistics Base
FLIR	Forward Looking Infrared
FM	Field Manual; or, Frequency Modulated
FRAGO	Fragmentary Order
FSCL	Fire Support Coordination Line
FSCOORD	Fire Support Coordinator
FSE	Fire Support Element

FSO	Fire Support Officer
G-1	Assistant Chief Of Staff, Personnel
G-2	Assistant Chief Of Staff, Intelligence
G-3	Assistant Chief Of Staff, Operations and Plans
G-4	Assistant Chief Of Staff, Logistics
G-5	Assistant Chief Of Staff, Civil Affairs
G-6	Assistant Chief Of Staff, Command, Control, Communications, and Computer Operations
G-7	Assistant Chief Of Staff, Information Operations
GBS	Global Broadcasting System
GCS	Ground Control Station
GCCS	Global Command and Control System
GCCS-A	Global Command and Control System-Army
GIG	Global Information Grid
GPS	Global Positioning System
HHC	Headquarters and Headquarters Company
HMMWV	High-Mobility Multipurpose Wheeled Vehicle
HPTL	High Payoff Target List
HQ	Headquarters
HUMINT	Human Intelligence
IAEA	International Atomic Energy Authority
ID	Infantry Division
IFF	Identification, Friend or Foe
IMCT	Individual Mobile Communications Terminal
IMINT	Imagery Intelligence
IN	Infantry
INFOSYS	Information Systems
IO	Information Operations

ISR	Intelligence, Surveillance, and Reconnaissance
ITM	Intra-air Targets Manager
JCOP	Joint Common Operational Picture
JDAM	Joint Direct Attack Munition
JDLM	Joint Deployment and Logistics Model
JFC	Joint Force Commander
JFCOM	Joint Forces Command, also shown as USJFCOM
JSTARS	Joint Surveillance, Target Attack Radar System
JTIDS	Joint Tactical Information Distribution System
JTSTM	Joint Time Sensitive Targets Manager
LAN	Local Area Network
LCOP	Logistics Common Operational Picture
LNO	Liaison Officer
LOC	Line Of Communication
LOS	Line Of Sight
LRAS3	Long Range Advanced Scout Surveillance System
LRS	Long Range Surveillance
LSA	Logistics Support Area
LTC	Lieutenant Colonel
LTG	Lieutenant General (3 star)
MAJ	Major
MANSCEN	U.S. Army Maneuver Support Center
MASINT	Measurement And Signature Intelligence
MCC	Movement Control Center
MCRP	Marine Corps Reference Publication
MCS	Maneuver Control System
MCS-L	Maneuver Control System-Light
MCT	Movement Control Team

MEF	Marine Expeditionary Force
MG	Major General (2 star)
MLRS	Multiple Launch Rocket System
MMC	Materiel Management Center
MOSP	Multi-mission Optronic Sensor Payload
MOUT	Military Operations on Urbanized Terrain
MSE	Mobile Subscriber Equipment
MSR	Main Supply Route
MTS	Movement Tracking System
NCO CF	Network Centric Operations Conceptual Framework
NCW	Network Centric Warfare
NEW	Network Enabled Warfare
NMC	Network Management Center
NSL	No Strike List
NTC	National Training Center
OBJ	Objective
OFT	Office of Force Transformation
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OODA	Observe-Orient-Decide-Act
OP	Observation Post
O&I	Operations and Intelligence
OPLAN	Operations Plan
OPORD	Operations Order
OPSEC	Operational Security
OPTEMPO	Operational Tempo
OSD	Office of the Secretary of Defense

PAA	Position Area for Artillery
PGM	Precision-Guided Munitions
PL	Phase Line
PLGR	Precise Lightweight Global Positioning System Receiver
PLT	Platoon
PSYOP	Psychological Operations
RCC	Rescue Coordination Center
RF	Radio Frequency
ROE	Rules Of Engagement
RPG	Rocket Propelled Grenade
RSO&I	Reception, Staging, Onward Movement, and Integration (FM 1-02)
RSOI	Reception, Staging, Onward Movement, and Integration (JP 1-02)
RTL	Restricted Targets List
S-1	Personnel Staff Officer
S-2	Intelligence Staff Officer
S-3	Operations Staff Officer
S-4	Logistics Staff Officer
S-5	Civil-Military Operations Officer
S-6	Command, Control, Communications and Computer Operations (C4OPS) Officer
S-7	Information Operations Officer
SADARM	Sense And Destroy Armor Munition
SAR	Search And Rescue
SAR/MTI	Synthetic Aperture/Moving Target Indicator
SATCOM	Satellite Communications
SCAR	Strike Coordination And Reconnaissance
SIGINT	Signals Intelligence
SINCGARS	Single Channel Air-Ground Radio System

SJA	Staff Judge Advocate
SLGR	Small, Lightweight Ground Receiver (GPS)
SOCOORD	Special Operations Coordinator
SOF	Special Operations Forces
SOP	Standing Operating Procedure; or, Standard Operating Procedure
STAMIS	Standard Army Management Information Systems
STRATCOM	United States Strategic Command, also shown as USSTRATCOM
TACP	Tactical Air Control Party
TACSAT	Tactical Satellite
TAIS	Tactical Airspace Integration System
TBMCS	Theater Battle Management Core System
TCE	TeleEngineering Communications Equipment
TEOC	TeleEngineering Operations Center
TF	Task Force
TLAM	Tomahawk Land Attack Missile
TOC	Tactical Operations Center
TRADOC	United States Army Training and Doctrine Command
TSC	Theater Support Command
TST	Time Sensitive Target
TTP	Tactics, Techniques, and Procedures
UAV	Unmanned Aerial Vehicle
UBL	Unit Basic Load
UHF	Ultra High Frequency
UN	United Nations
UNSCOM	United Nations Special Commission
UNSCR	United Nations Security Council Resolution
USAF	United States Air Force
USAWC	United States Army War College

USCENTCOM	United States Central Command
USEUCOM	United States European Command
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
VHF	Very High Frequency
VTC	Video Teleconference
WARNO	Warning Order
WMD	Weapon(s) of Mass Destruction
XO	Executive Officer (normally, the second in command of a Company, Battalion, or Brigade)

Appendix B
Volume I Findings and Observations

The findings and observations from Volume I, Operations, of the study are listed below. The seventeen findings are presented with supporting rationale and data in the main body of Volume I. The observations (18–24) are based on the assessment team's insights and may be worthy of further research.

1. New information systems, sensors, and extended connectivity enhanced the combat effectiveness of U.S. V Corps and the 3 Infantry Division (Mechanized).
2. Increased connectivity and the flow of information at brigade-level and above provided an "untethered" ability to command regardless of location: "Battle Command on the Move."
3. Information systems are not a substitute for leadership; they help good leaders make better decisions "quicker."
4. The new information environment enhanced the execution and effects of joint precision fires and maneuver.
5. Increased information and situational awareness allowed more positive management of the battlespace.
6. Interaction and/or correlation of information sources are required to gain situational understanding: "Battlefield Visualization."
7. Voice communications were the primary means of gaining situational understanding and ensuring unity of command and effort at all levels.
8. Increased situational awareness had a significant positive impact on risk taking.
9. Increased situational awareness reduced fratricide.
10. Information systems and the "richness" they provided changed the way upper echelon staffs functioned.
11. Even a limited fielding of information/connectivity systems provided value added, but only when the limited systems were leveraged.
12. Training, exercises, and rehearsals with information systems are vital for commanders, staffs, operators, and organizations.
13. Organizing the command post is key to exploiting information.
14. The intelligence picture of the enemy was poorer than was expected.
15. The networks, as they exist, are stovepiped by function.

16. There is a connectivity gap below brigade level; therefore, information is not reaching the lowest levels.
17. Bandwidth must be treated as a high demand, low density "class of supply" requiring command attention.
18. Knowledge, training, experience, and functional perspective are essential elements of how information is used.
19. There is not sufficient information to adequately define and/or qualify "robust" in terms of what constitutes a robustly networked force.
20. Situational awareness does not reduce the need for coordination to optimize synchronization.
21. Clearly defined responsibility and authority are still imperatives for decision-making and accountability in the combat environment.
22. NCW neither reduces nor replaces the need for survivable land combat systems and well led forces.
23. Networking does not replace the need for planning, exercises, or rehearsals.
24. Information systems increase the need for reliable stable power sources and greater connectivity (bandwidth).

Appendix C
Tenets of Network Centric Warfare

Network Centric Warfare (NCW) presents a powerful warfighting concept based on the networking of diverse and geographically separated military capabilities that enable warfighters to leverage available relevant information to maximize mission effectiveness. There are four tenets of NCW:

- A robustly networked force improves information sharing.
- Information sharing enhances the quality of information and shared situational awareness.
- Shared situational awareness enables collaboration and self-synchronization; and enhances sustainability and speed of command.
- These, in turn, dramatically increase mission effectiveness.

The core of the NCW concept is that a force operating with these tenets will have increased combat power by better synchronizing effects in the battlespace, achieving greater speed of command, and increasing lethality, survivability, and responsiveness.

The goals of NCW are to transform military to a configuration that creates the most effective force: one that is faster (operates at a higher operational tempo); relies on fewer more dispersed forces; reduces fratricides while at the same time reducing the constraints placed on weapons; enables forces to anticipate (proactive versus reactive forces); and integrates new technologies into the network to produce an information and speed advantage over prospective opponents.


Prudens
Futuri

Appendix D
Peer Reviewer

The peer review process involved a series of reviews by three independent peer reviewers. This was planned and incorporated into the study from the outset. The peer reviewer used for this study was Major General Dennis C. Moran, Vice Director for Command, Control, Communications, and Computer Systems (J6). The insights and comments provided by the Major General Moran were invaluable.

Major General Dennis C. Moran, a graduate of the University of Notre Dame, was commissioned from the Reserve Officer Training Corps and entered the U.S. Army Signal Corps in July 1976. Upon completion of the Signal Officer Basic Course, Airborne and Ranger Schools, he served as a platoon leader in the 426th Signal Battalion, 35th Signal Group. He went on to command HHC, 426th Signal Battalion from January to December of 1979.

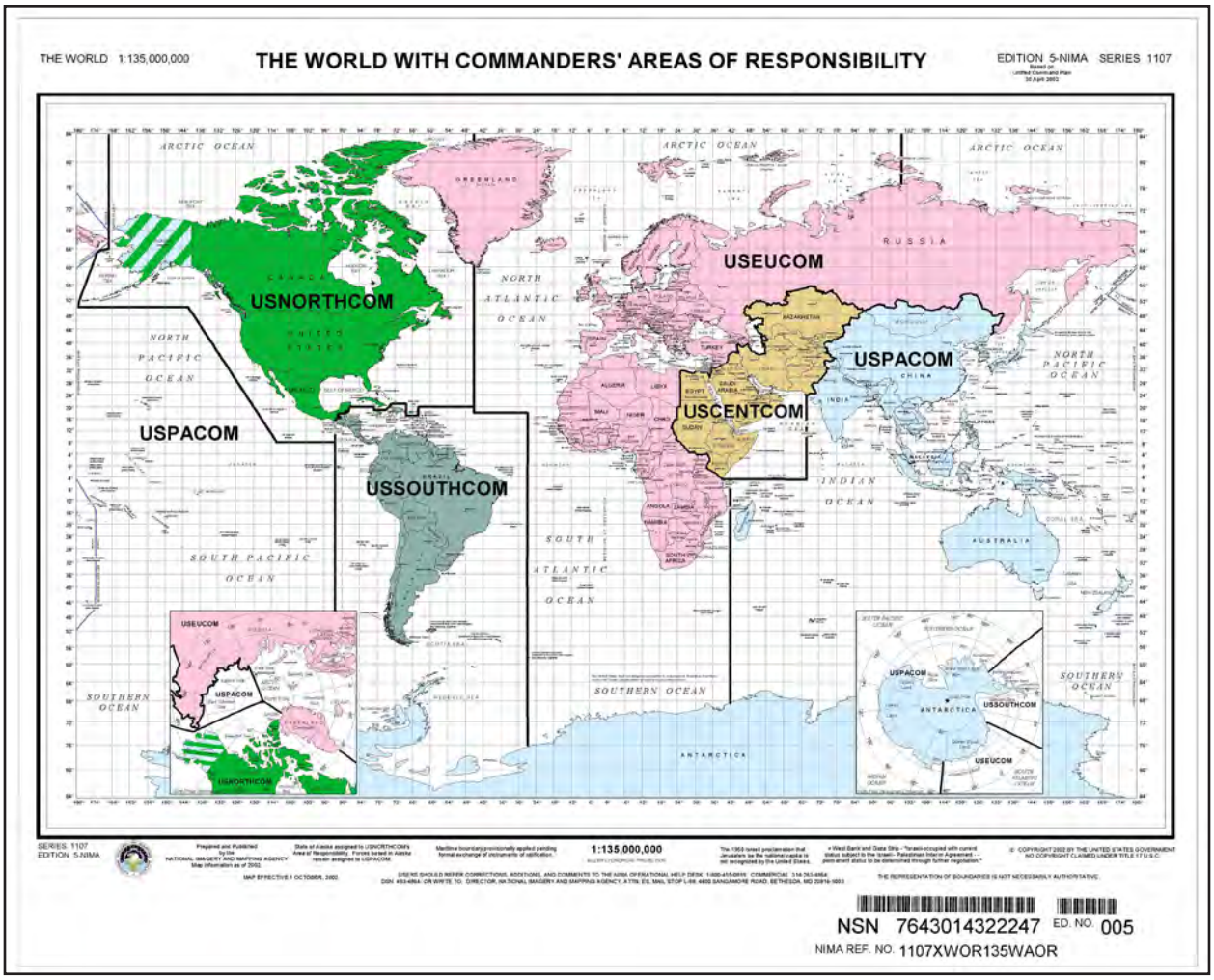
After attending the Signal Officer Advance Course and the USAF Telecommunications Staff Officers Course in Biloxi, Mississippi, he was assigned to the 123d Signal Battalion, 3rd Infantry Division in Wuerzburger, Germany. He then served as the Assistant S-2/3 and, eventually, as the S-2/3. In December 1983, he returned to Fort Gordon and served as a project officer in the Directorate of Combat Developments. He became the Chief of Transmission Systems Branch, working such projects as Tactical Satellite, SINCGARS, Improved High Frequency Radio, and the family of Digital Group Multiplexer equipment.

Major General Moran graduated from the Command and General Staff College in 1987. He was then assigned to SHAPE Headquarters in Mons, Belgium and served as the Executive Officer to the Deputy Controller, NATO Integrated Communications Systems Central Operating Authority. In 1990, Major General Moran was reassigned to the 93d Signal Brigade in Stuttgart, Germany and served as the Executive Officer, 51st Signal Battalion. He served in that post during Operation Desert Shield/Storm. He then went on to command the 97th Signal Battalion in Mannheim, Germany and as the Deputy Brigade Commander, 22d Signal Brigade, V Corps in Darmstadt, Germany. In June 1996, he graduated from the U.S. Army War College in Carlisle Barracks, Pennsylvania.

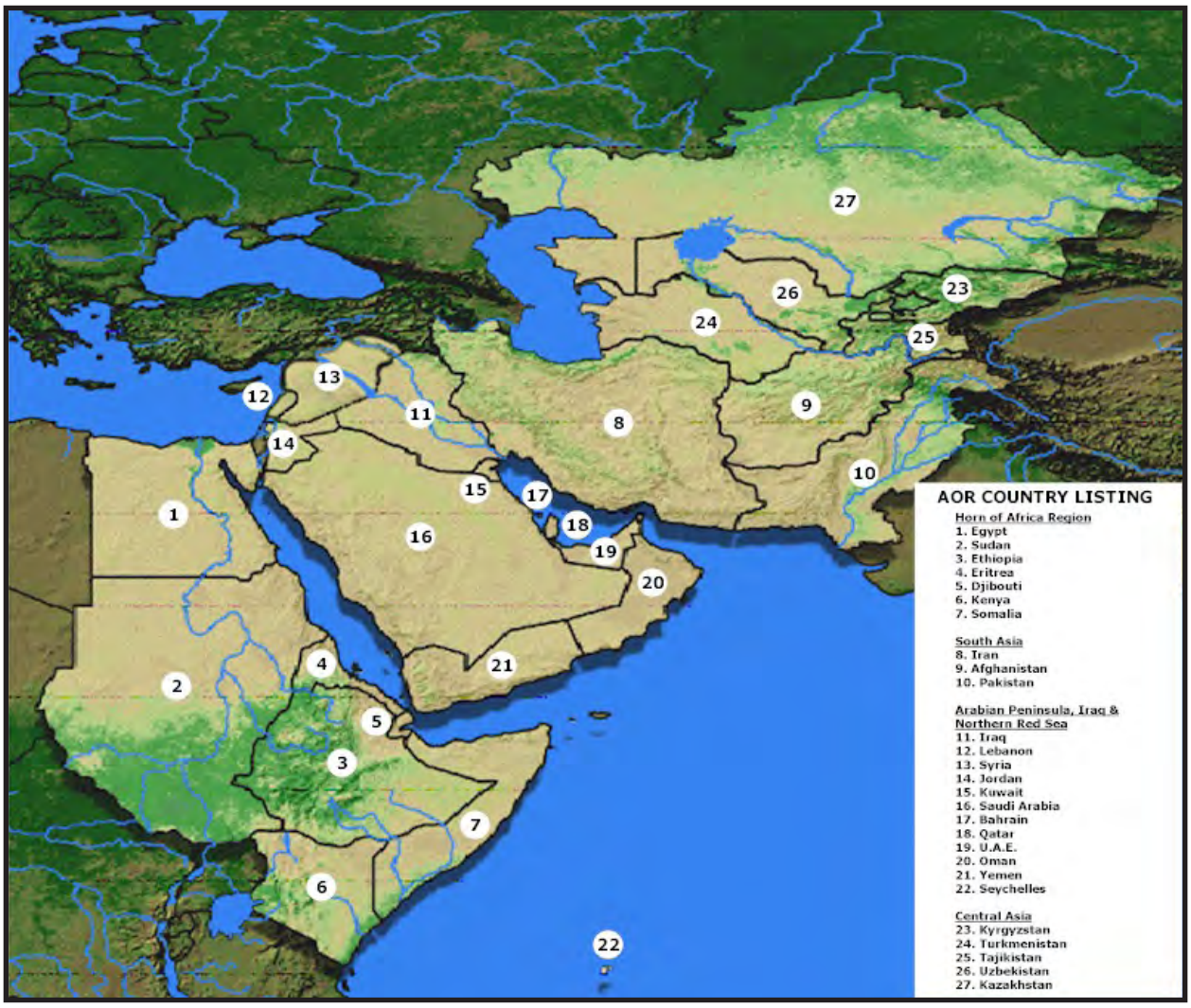
Major General Moran commanded the 3rd Signal Brigade at Fort Hood, Texas from June 1996 until June 1998. Upon completing command, he was assigned to the Defense Information Systems Agency. He then went on to command the White House Communications Agency from February 1999 until March 2000. He was then reassigned to the Defense Information Systems Agency as a Special Assistant to the Director. From June 2000 to June 2003, he served as the Director of Command and Control, Communications and Computer Systems at the United States Central Command during Operation Enduring Freedom and Operation Iraqi Freedom. He then moved to Washington D.C. in June 2004 to become the Director of Information Operations, Networks and Space for the Army Chief Information Officer/G-6. He assumed his current duties as the Vice Director for Command, Control, Communications, and Computer Systems (J6), The Joint Staff, in June 2005.

Major General Moran's awards include the Defense Superior Service Medal (w/Oak Leaf Cluster), the Legion of Merit, the Bronze Star, the Defense Meritorious Service Medal (w/oak leaf cluster) and the Army's Meritorious Service Medal (w/two oak leaf clusters). He has also earned the Presidential Service Badge.

Appendix E
Maps

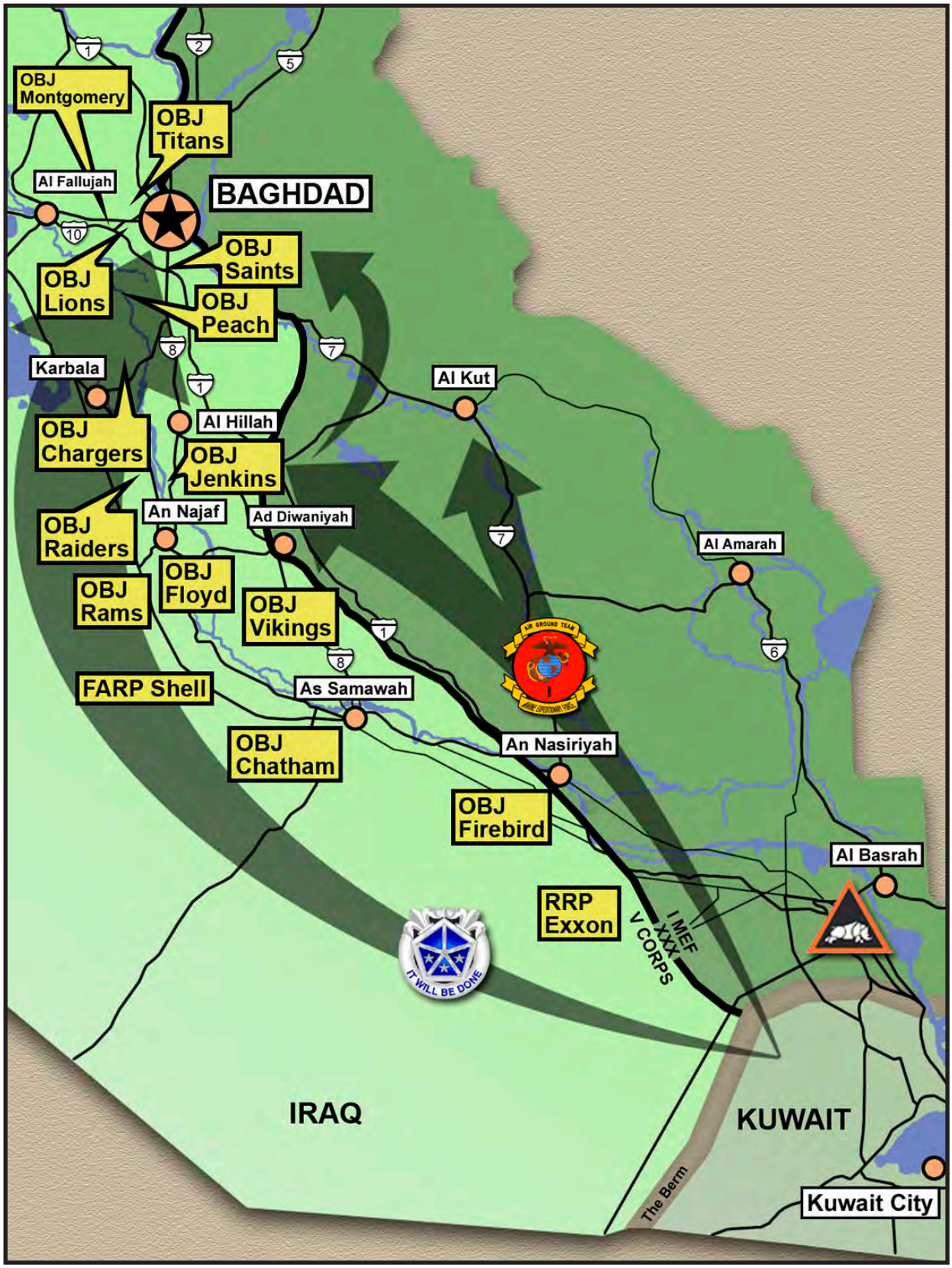


Unified Command Plan map outlining the geographic combatant command areas of responsibilities

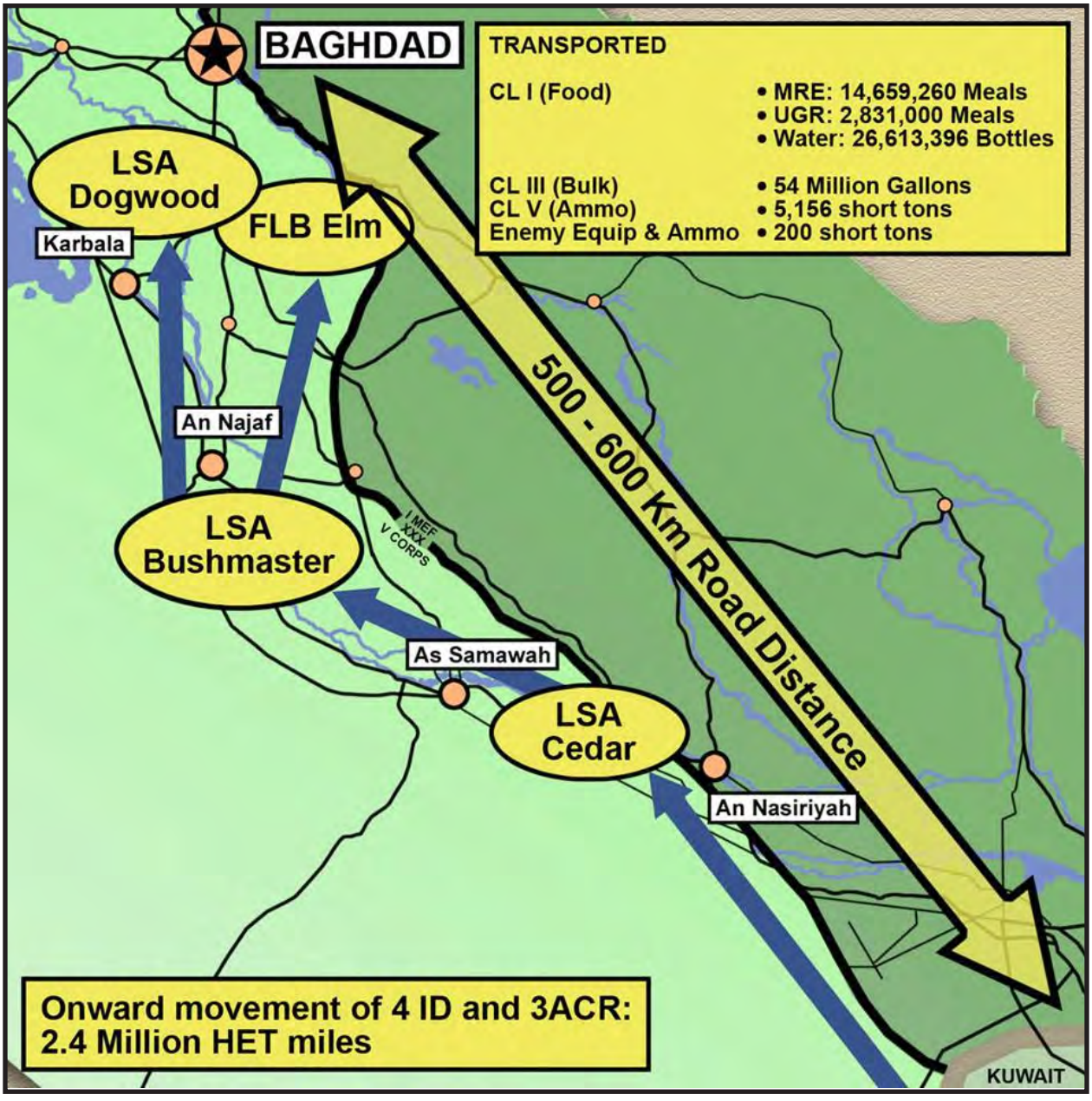


United States Central Command Area of Responsibility

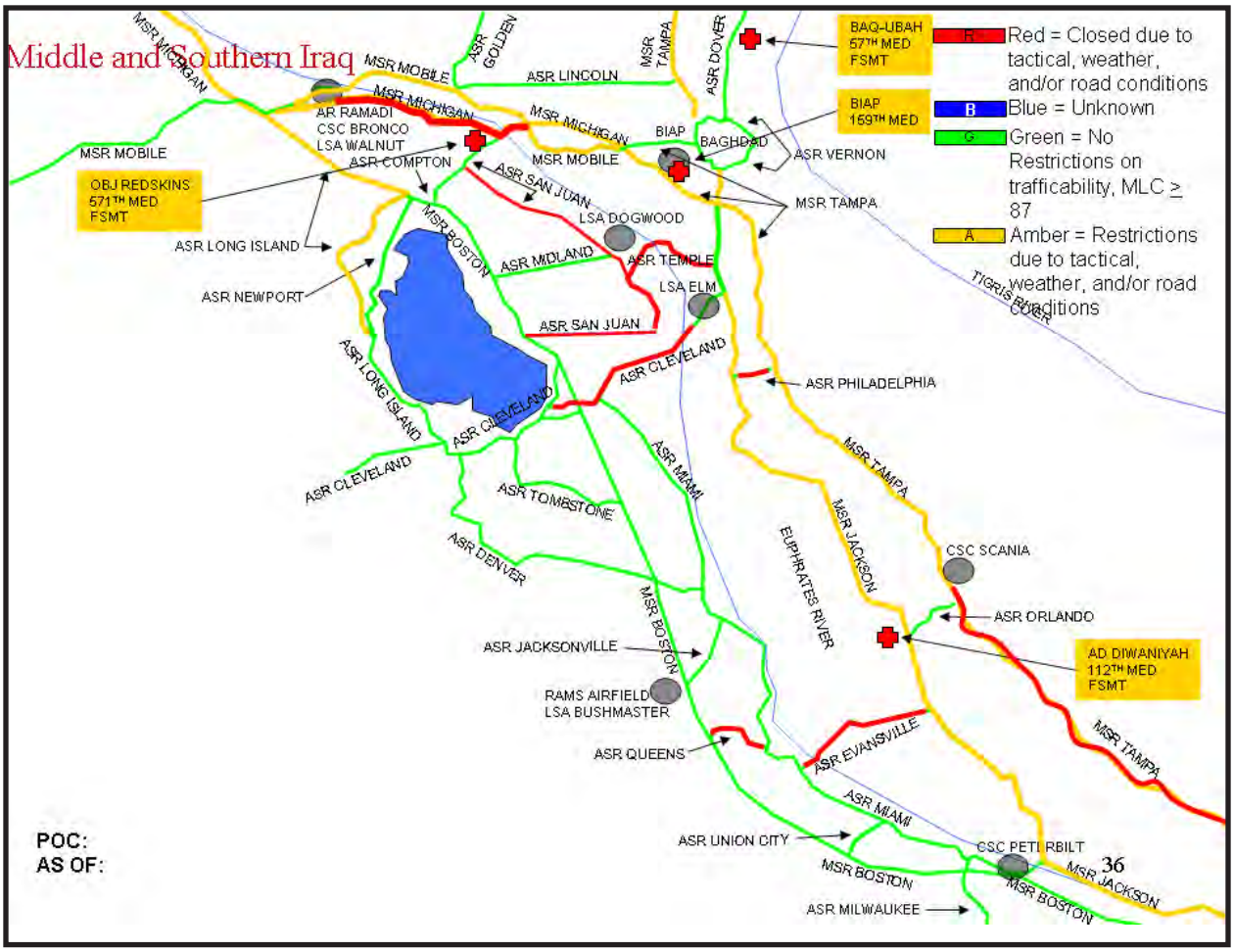
Map of Iraq depicting major urban areas and airfields



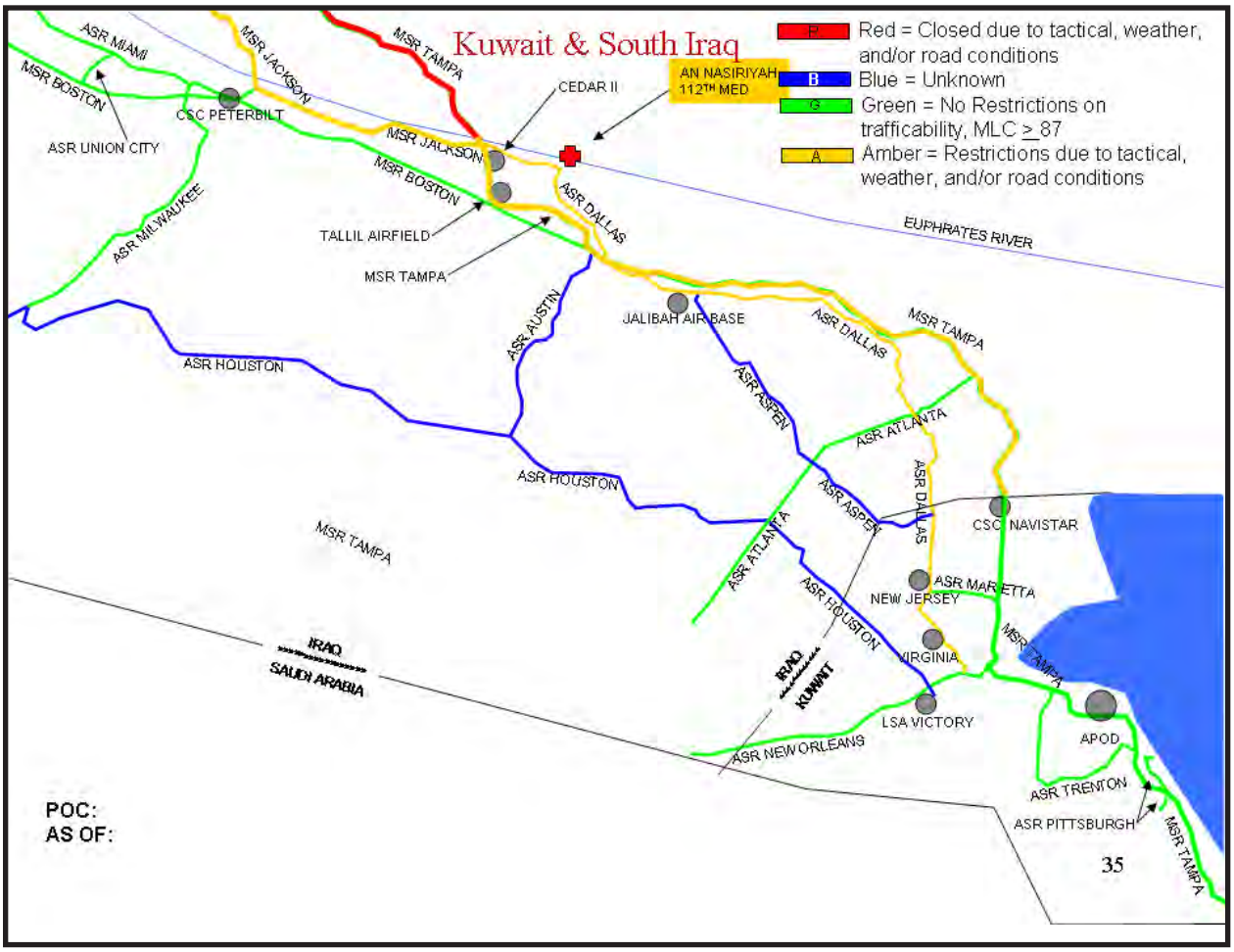
Map of V Corps and 3 ID objectives provided courtesy of *On Point*



V Corps Logistic Support Areas, map provided courtesy of *On Point*



Supply Routes in Middle and Southern Iraq



Supply Routes in Southern Iraq


Prudens
Futuri

Appendix F
The Levels of War

The strategic level of war is divided into national strategic, what Liddell Hart refers to as grand strategy,[1] and theater strategic. The national strategic level involves national policy development and national government to government interactions. It is national policy that establishes the national objectives in these government-to-government interactions. From these national objectives the government establishes the strategies, the ways of achieving the objectives, using all elements of national power.[2] U.S. national policies and strategies, like the National Security Strategy, drive the development of the military's supporting plans and procurements as the military means of achieving the objectives should other means fail. As Clausewitz is so often quoted, "War is merely the continuation of policy by other means."[3] The key military players in national strategy are the Secretary of Defense (SecDef), the Chairman of the Joint Chiefs of Staff (CJCS), the Service Chiefs, and the combatant commanders (CCDRs). The five geographic combatant commanders play important roles in national security policy formulation with regards to their areas of responsibility (AOR).

Joint Publication 1-02 defines theater strategy as "The art and science of developing integrated strategic concepts and courses of action directed toward securing the objectives of national and alliance or coalition security policy and strategy by the use of force, threatened use of force, or operations not involving the use of force within a theater." Theater strategy is predominantly the realm of the respective geographic CCDRs. The CCDRs plan at the national and theater-strategic levels of war through participation in the development of National Military Strategy (national strategic level) and the development of theater estimates, strategies, and plans (theater strategic level). The CCDRs normally participate in strategic discussions with the President, SecDef, the CJCS, and with multinational partners. The resultant effect is that the CCDR's theater strategy is the regional military strategy, derived from policy that provides a framework for conducting operations. This theater strategy guides joint operation planning at the operational level, linking the operational and tactical employment of forces to strategic objectives. From these plans evolve the operational objectives that must be accomplished by subordinate commanders.[4]

The operational level of war is defined as

> The level of war at which campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theaters or other operational areas. Activities at this level link tactics and strategy by establishing operational objectives

[1] B. H. Liddell Hart, *Strategy*, Second revised ed. (New York: Frederick A. Praeger, Inc., Publications, 1968), 335-36. The term 'grand strategy' serves to bring out the sense of 'policy in execution.' The role of grand strategy is to coordinate and direct all the resources of a nation, or band of nations, towards the attainment of the political object of the war—the goal defined by fundamental policy.

[2] The elements of national power are diplomatic/political, informational, military, and economic.

[3] Carl von Clausewitz, *On War*, trans. Michael Eliot Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1984), 87.

[4] *Joint Publication 5-0 (Revision Final Coordination): Joint Operation Planning*, (Washington, D.C.: Joint Chiefs of Staff, 2006), I-9.

> needed to accomplish the strategic objectives, sequencing events to achieve the operational objectives, initiating actions, and applying resources to bring about and sustain these events. These activities imply a broader dimension of time or space than do tactics; they ensure the logistic and administrative support of tactical forces, and they provide the means by which tactical successes are exploited to achieve strategic objectives.[5]

The tactical level of war involves the employment of units in combat and is where battles[6] and engagements[7] are planned and executed by tactical units. "Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives."[8] It is important to understand that the context and focus of tactical actions are derived from the strategic and operational levels.

---

[5] *Joint Publication 1-02: Department of Defense Dictionary of Military and Associated Terms*, (Washington, D.C.: Joint Chiefs of Staff, 2001 [As amended through 20 Mar 2006]).

[6] *FM 3-90*, 1-2. A battle consists of a set or related engagements that last longer and involve larger forces than an engagement. Battles can affect the course of the campaign or major operation. A battle occurs when a division, corps, or army commander fights for one or more significant objectives. Battles are usually operationally significant, if not operationally decisive.

[7] Ibid. An engagement is a small, tactical conflict between opposing maneuver forces, usually conducted at brigade level and below. An engagement normally lasts only a short time - minutes, hours, or a day. It can result from one side's deliberate offensive movement against an opponent or from a chance encounter between two opponents, such as a meeting engagement. An engagement can be a stand-alone event or one of several related engagements comprising a battle.

[8] Ibid.


Prudens
Futuri