JOINT REQUIREMENTS OVERSIGHT COUNCIL

THE JOINT STAFF
WASHINGTON, D.C. 20318-8000

JROCM 173-07
16 July 2007

MEMORANDUM FOR DISTRIBUTION

Subject: Net-Enabled Command Capability Increment One Capability Development Document

1. The Joint Requirements Oversight Council (JROC) approves the Net-Enabled Command Capability (NECC) Increment One Capability Development Document and Extensions, and validates the enclosed key performance parameters and key system attributes. The JROC will maintain approval authority for all key performance parameter changes, delegates capability development document approval authority oversight for changes to key system attributes to the Joint Capabilities Board, and delegates capability development document approval authority for all other non-key performance parameter/non-key system attribute changes to USJFCOM via the Joint Combat Capability Developer organization as outlined in the capability development document. Capability developers will use the NECC Capability Development Document and Extensions as the initial statement of validated capability needs for all phases of development. This program is assigned the Joint Potential Designator of "JROC Interest."

2. USJFCOM, working in concert with the Services and appropriate agencies, will determine program funding requirements for POM 2010 and beyond.

3. Should the Defense Information Systems Agency encounter costs exceeding ten percent of the approved acquisition program baseline or 25 percent of the original program baseline (Program Acquisition Unit Cost/Acquisition Procurement Unit Cost), they shall return to the JROC prior to reprogramming or budgeting additional funding into the program.

4. The JROC recognizes the importance of the NECC program and requests USJFCOM return to the JROC to provide annual program updates.

E. P. GIAMBASTIANI
Admiral, US Navy
Vice Chairman
of the Joint Chiefs of Staff

Enclosure

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Net-Enabled Command Capability (NECC)
Capability Development Document (CDD)
Linked Extension M - United States Marine Corps Annex to NECC CDD

Increment: I

7 June 2007

This document has been approved by J8 for release to
Australia, Canada, and Great Britain

Summary of Interim Changes

Change No.	Date of Change	Date Entered	Description of change/applicable page(s)

OPR for this CDD is USJFCOM. Address changes, questions, etc. to USJFCOM J88 Points of Contact listed on Page ii.

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Further requests for this document should be submitted to:

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Extension M: United States Marine Corps Annex to the NECC CDD

United States Marine Corps (USMC) Annex
to the
Net Enabled Command and Control (NECC)
Capability Development Document (CDD)

Executive Summary

The Marine Corps Annex to the Net-Enabled Command Capability, Capability Development Document (NECC CDD) describes Marine Corps unique Command and Control (C2) capabilities needed to complement the Joint C2 capabilities described in the NECC base document. Joint Requirements Oversight Council Memorandum (JROCM) 167-03, August 2003, directs the Services to update the Global Command and Control System (GCCS)-related C2 requirements documentation for inclusion of capabilities-based needs. This JROCM tasks the Services to ensure applicable requirements documents demonstrate the migration of Service systems capabilities to the Joint capabilities associated with NECC (previously JC2). This Annex, and the NECC base CDD document, define the totality of Marine Corps NECC capabilities required to enable these warfighting concepts.

Strategy 21, 21st Century Marine Corps, Marine Air-Ground Task Force (MAGTF) C2 Vision, and other USMC concept documents identify capabilities desired of an integrated C2 capability from the Joint headquarters to the tactical C2 user. As the premier expeditionary "Total Force in Readiness," the Marine Corps requires a robust C2 capability to execute actions across the range of Joint and Coalition military operations, thereby increasing our strategic agility, operational reach, and tactical flexibility.

In order to identify the Marine Corps unique capability-based needs to instantiate the Marine Air-Ground Task Force (MAGTF C2) Vision, the Marine Corps has to examine the current state of service unique C2 and how it contributes to Marine Corps unique missions. Clear and concise capability-based needs are required to provide guidance for current and future systems-level C2 capability development. This means that the current Marine Corps dependence on the Global Command and Control System-Joint (GCCS-J) to provide the Joint and Global Common Operational Picture (COP) linking to the tactical COP in the Command and Control System Personal Computer (C2PC) is a key current capability that must be present in NECC Increment I, and as C2PC transitions to Joint COP Tactical Workstation (JCTW) in future NECC Increments. Similarly, Marine Corps Intelligence, airspace management, planning, and logistics applications that highly leverage existing GCCS Family of Systems (FoS) current capability are dependent on that GCCS FoS capability being available in the NECC Increment I, or available in their current configurations until integrated into a future NECC increment.

MAGTF C2 also includes various current capabilities that make up the mix of Marine Corps C2 and operational applications for mission critical activities. These overlap the NECC mission space and this annex will identify those for inclusion in NECC Increment I or future increments. MAGTF C2 also envisions new capabilities in response to service unique capability gaps, some of which are addressed in the NECC CDD base document and others which are identified here for NECC inclusion due to Marine Corps, Joint, and Coalition applicability.

The capability-based needs defined in this document are derived from the approved USMC operational concept documents, the Advocate Campaign Plans, the MAGTF C2 Initial Capabilities Document, and the gaps highlighted within, but not addressed by other previously approved documentation. Expeditionary Maneuver Warfare (EMW), Operational Maneuver From The Sea (OMFTS), Sea basing, Distributed Operations (DO), and the need to conduct expeditionary operations give the MAGTF its unique warfighting character.

Revision History

Change No.	Date of Change	Date Entered	Name of person entering change

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1 CAPABILITY DISCUSSION

1.1 General

Marine Air Ground Task Force Command and Control (MAGTF C2) enhances lethality and effectiveness across the range of military operations through better decision making and shared understanding. It is an intuitive and holistic environment of people, processes, and technology that enables network-centric operations throughout the enterprise, and empowers the innate initiative of warfighters at all levels in the context of the commander's intent.

A critical capability necessary for MAGTF C2 is to enable Battlespace Awareness to the entire organization. Battlespace Awareness enables effective decision processes through robust linkages between Command and Control (C2) platforms, sensors, air and ground weapons platforms, and warriors. This capability must extend throughout the Joint area of operations, from the operational to tactical level, in order to achieve the desired effects. This Marine Corps annex to the Net-Enabled Command and Control Capability (NECC), Capability Development Document (CDD) serves a dual-fold purpose: to (1) articulate MAGTF capability-based needs in the NECC mission space for Increment I, and (2) define core capability-based needs supporting a single, integrated, NECC and MAGTF C2 environment for the future (Increment II and beyond).

This Marine Corps Annex to the NECC CDD will address the capability needs unique to the Marine Corps and synchronization with both Joint and Marine Corps concepts, and with NECC capabilities. This annex provides a migration path to reach an ultimately improved NECC capability over time.

1.1.1 Uniqueness

Consistent with the Title 10 responsibilities of the Marine Corps, the Marine Corps faces unique opportunities today and in the future. Future concepts for the Marine Corps will be developed around the following five Operating Concepts:

(1) Forward Presence, Security Cooperation, and Counterterrorism

(2) Crisis Response

(3) Forcible Entry

(4) Prolonged Operations

(5) Countering Irregular Threats

Operational Maneuver from the Sea (OMFTS), Sea basing, and Distributed Operations (DO) are considered Supporting Concepts to these five Operating Concepts. The traditional naval character of the Marine Corps to conduct amphibious operations and secure advanced naval

bases demonstrates an alignment to the Navy that has long been a hallmark of the Marine Corps. This relationship as a part of the FORCENET concept identifies a tight linkage between the Marine Corps and the Navy that presents unique C2 relationships and requirements that must be included in the Joint C2 capability.

Likewise, the ability for the Marine Corps to conduct land operations, either independently or as part of a Joint land force, must also be taken into consideration in the development of C2 capabilities. Sustained operations ashore independent of a Sea base will require C2 solutions that include the capabilities defined by the Army's Sustained Land Operations (SLO) and present in their NECC CDD Army annex.

The Marine Corps must also be mindful that a significant component of the MAGTF is the air component which must be interoperable with both Naval and Air Force C2 capabilities. The operating concepts of the Marine Corps, coupled with the absolute requirement for interoperability with the Army, Navy, and Air Force presents unique challenges and opportunities for the Marine Corps in the area of C2.

Although, there are many "Joint" capability gaps, they are adequately covered in the base NECC CDD. The Marine Corps has its own unique set of circumstances, Title 10 responsibilities, and operational challenges. Because of this, it requires some unique C2 and information technology capabilities that are defined in the Marine Corps MAGTF C2 concept.

1.1.2 Migration

MAGTF C2 Vision and other USMC concept documents identify the capabilities desired of an integrated C2 capability from the Joint headquarters to the tactical C2 user. As the premier expeditionary "Total Force in Readiness," the Marine Corps requires a robust C2 capability to execute actions across the range of Joint and Coalition military operations, thereby increasing our strategic agility, operational reach, and tactical flexibility.

To identify Marine Corps capabilities needed to instantiate the MAGTF C2 Vision, the Marine Corps has to examine its current state of C2 and how it contributes to Joint and Marine Corps unique missions. This means that the current Marine Corps dependence on the Global Command and Control System-Joint (GCCS-J) to provide the Joint and Global Common Operational Picture (COP) link to the tactical COP in the Command and Control System Personal Computer (C2PC) is a key current capability that must be present in NECC Increment I, and as C2PC transitions to Joint COP Tactical Workstation (JCTW) in future NECC Increments. Similarly, Marine Corps Intelligence, airspace management, planning, and logistics applications that highly leverage existing GCCS Family of Systems (FoS) current capability are dependent on that GCCS

FoS capability being available in the NECC Increment I, or available in their current configurations until integrated into a future NECC increment.

MAGTF C2 also includes, in its systems of systems concept, various current systems that make up the mix of Marine Corps C2 and operational applications for mission critical activities. MAGTF C2 also envisions new capabilities in response to service unique capability gaps, which are identified here for NECC inclusion due to Joint and Coalition applicability.

This annex emphasizes key current capabilities and future Joint MAGTF C2 capabilities (see Appendix A) within the context of NECC Increment I and beyond. However, the entire NECC program and all increments must also be addressed in broad terms to articulate an understandable plan for achieving a successful migration and end state. The Marine Corps, like each Service, must develop its own migration plan which seeks to capitalize on current capabilities, commercial off the shelf (COTS) and government off the shelf (GOTS) solutions, and its own unique tactical and operational migration challenges.

This migration works in both directions. NECC must be open to including MAGTF C2 capabilities currently operable as NECC itself matures in order to:

- Enhance interoperability and Joint effectiveness by providing Marine Corps applications to other users of NECC
- Move capability to NECC from current systems as the post NECC Increment I migration progresses.

This annex presents a snapshot of this migration and is shown in Figure 1. The migration plan will change over time based on numerous variables such as demands of operational tempo, changing funding conditions, and technical development maturity.

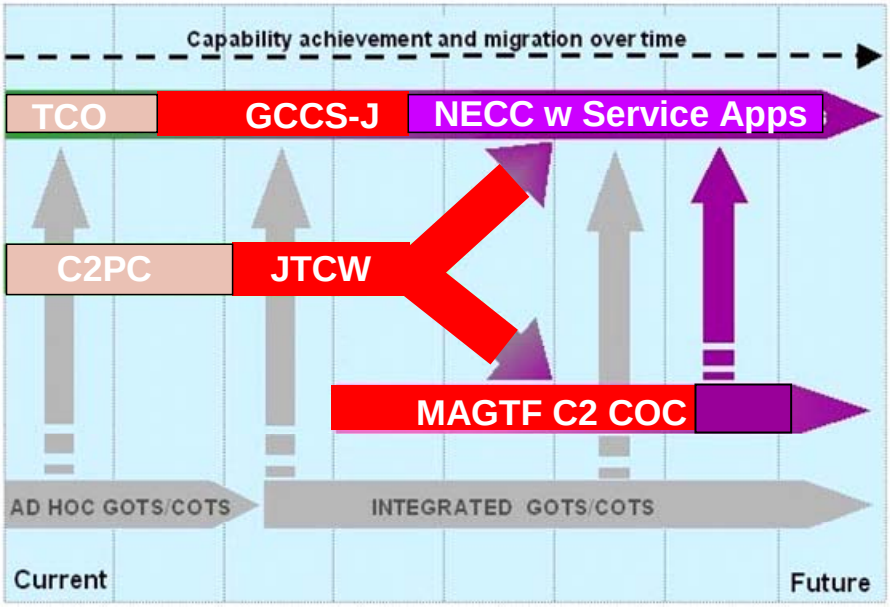

Figure 1: Migration to NECC and Joint COP Tactical Workstation (JCTW)

1.1.3 Assumptions

In developing the Marine Corps C2 capabilities required for NECC, and in ascertaining the suitability of Joint C2 capabilities in the NECC CDD, the following key assumptions are made with respect to the analysis performed to develop this document:

- That the NECC capabilities described in the NECC CDD for Increment I will be available as described.
- That the NECC capabilities described in the NECC CDD for Increment I that replace GCCS FoS currently fielded capability will result in no loss of the GCCS FoS C2 capability currently leveraged by the Marine Corps.
- That the implementation of NECC may precipitate a fundamental change in the manner and method with which Marine Corps Expeditionary C2 is conducted. The change is due to the paradigm shift from a systems-centric construct to an information-centric C2 environment. This shift is included in the type and nature of capabilities required from NECC.
- That the *Expeditionary Maneuver Warfare (EMW) Capabilities List (ECL), MAGTF C2 Vision, MAGTF Combat Operations Center (COC) C2 Applications and Systems Initial Capabilities Document (ICD),* and respective *Advocate Campaign Plans* provide a baseline for Marine Corps requirement analysis and development with respect to the NECC Capability.
- That Commanders will normally exercise command, control, and coordination from the Sea base in support of EMW and OMFTS. The MAGTF commander will be able to

exercise command from a small, highly mobile forward command post, leaving the majority of staff afloat, if operationally necessary or desired.

- That a single, integrated, "blue-green" staff will support the commander. This staff consolidation and streamlining of current Navy and Marine Corps staff functions will enhance unity of effort and increase the tempo of operations.
- That the C2 of Expeditionary Forces will be conducted from afloat, en-route, or ashore, as commanders deem appropriate.
- That pre-positioned assets or a "fly-in echelon" will provide the additional resources required to support C2 of Expeditionary Forces during sustained operations ashore.
- That Commanders will access and leverage the full range of high bandwidth terrestrial and space-based data/information communications capabilities when available. Commanders will also be provided appropriate NECC services when bandwidth-disadvantaged, including IP-based Quality of Service (QoS), IP Security (IPsec), and Virtual Private Network (VPN) capabilities in order to prioritize mission critical C2 data for bandwidth control and conservation.
- That Expeditionary Forces will be provided essential NECC services in a bandwidth limited environment to support C2 capability to the tactical (individual Forward Observer/ Recon unit) level. Services will be accomplished by implementing QoS, IPsec, VPNs, caching, and local replication in the deployed architecture as required and in response to the tactical situation.

1.1.4 Required Unique Marine Corps Capabilities

The EMW Capabilities List and Campaign Plans from the Advocates will provide the baseline for expeditionary capabilities required within the NECC mission space. The ECL groups capabilities within five enhancement areas:

- Joint/Multinational Enabling
- Strategic Agility
- Operational Reach
- Tactical Flexibility
- Support and Sustainment

MAGTF C2 supports EMW, Sea basing, OMFTS, DO, and other MAGTF operations, by enhancing the commander's ability to:

- Maintain continuous global situational and battlespace awareness [All];

- Fully integrate USMC expeditionary capabilities within, or as the baseline for, a larger Joint, Multi-national, or Coalition force in order to efficiently and effectively lead, enable, or participate in the execution of multiple, concurrent, and dissimilar missions [Joint/Multinational Enabling];
- Provide the capability to rapidly transition Expeditionary Forces from a pre-crisis state to full operational capability in a distant theater within a minimum amount of time [Strategic Agility];
- Deploy, employ, sustain, and maintain positive C2 of assigned Expeditionary Forces across the range of roles and missions inherent to MAGTF operations in order to project relevant, effective combat power across the breadth and depth of the battle-space [Operational Reach];
- Conduct seamless expeditionary operations in order to execute Service missions and enable Naval, Joint, Multi-national, and Coalition operations [Tactical Flexibility];
- Enable the collection, correlation, display, assimilation, and dissemination of common, ubiquitous, highly relevant information fully employing and leveraging an agile supporting establishment [Support and Sustainment].

Marine Corps C2 unique capabilities to support the above warfighting capabilities are detailed in Appendix A of this document.

1.1.5 Capability Gaps

In future operations, the MAGTF will depend upon a degree of Joint interdependence that exceeds the integration or deconfliction exhibited during previous operations. The Marine Corps, as a component of Joint Forces, will accomplish operational and tactical missions at higher tempos over longer periods of time, and while distributed across much larger operational areas. Existing C2 systems do not support this tempo, force distribution, or notion of interdependence. They focus on vertical information exchanges and do not adequately address horizontal information flows between Joint Force components. Lack of Joint interoperability between stovepipe C2 systems prevents rapid, seamless, and collaborative exchange of information. Current systems do not adequately provide the continuous levels of situational awareness (SA) required to execute future operational concepts in accordance with the Joint Vision.

Joint forces and the MAGTAF will execute military operations using a commander centric approach enabled by better net-centric capabilities. They will deploy the minimum amount of staff required to plan, prepare and execute branches, sequels and transitions from the base plan. Mission organized staffs will integrate the commander's information needs focused on commander's intent, guidance, and running estimate. Staff functions will be distributed across the organization. A key will be the ability to engage in the Joint arena, and to function effectively

within the labyrinth of interdependencies that will exist including formal alliances like NATO, and be able to facilitate "coalitions of the willing," as needed.

The MAGTF requires an integrated capability that is seamless, scalable, modular, and relevant across the full range of military operations from Major Combat Operations (MCO), to irregular warfare, to humanitarian assistance. It is oriented around our MAGTF C2 vision, nested with the FORCEnet Functional Concept, is agnostic of the limited perspectives imposed by ground, air, or logistics "formations", and will enable JTF capabilities from the Sea base while being essentially transparent to the commander. Our desired MAGTF C2 capability, layered with required capabilities from the applicable Army LANDWARNET concept, reflects a concept of what is required of NECC in the Land and Littoral battlespace.

2.0 ANALYSIS SUMMARY

See paragraph 2.0, NECC CDD for complete list of supporting analysis.

3.0 MARINE CORPS CONCEPT OF OPERATIONS SUMMARY

3.1 General

The Marine Corps performs the same general C2 functions and process as articulated in Paragraph 3, Concept of Operations (CONOPS) Summary in the NECC base document.

The uniqueness of Marine Corps C2 is found in its roles assigned by Title 10 law and in the specific C2 demands of littoral and expeditionary operations.

3.2 The Marine Corps's Statutory Obligations (Title 10)

Under its Constitutional responsibility to raise and support armies, Congress establishes statutory obligations governing the roles and responsibilities of the Marine Corps. These are contained in Title 10 of the United States Code.

The Marine Corps "shall be so organized as to include not less than three combat divisions and three air wings, and such other land combat, aviation, and other services as may be organic therein. The Marine Corps shall be organized, trained, and equipped to provide fleet marine forces of combined arms, together with supporting air components, for service with the fleet in the seizure or defense of advanced naval bases and for the conduct of such land operations as may be essential to the prosecution of a naval campaign. In addition, the Marine Corps shall provide detachments and organizations for service on armed vessels of the Navy, shall provide security detachments for the protection of naval property at naval stations and bases, and shall perform such other duties as the President may direct. However, these additional duties may not

detract from or interfere with the operations for which the Marine Corps is primarily organized." (See 10 U.S.C. 5063(a))

3.3 The Marine Corps MAGTF C2 Vision

The Marine Corps MAGTF C2 vision expresses how the Marine Corps intends to meet the challenges of C2 in executing its mission.

- MAGTF C2 is the **strategy** by which the Marine Corps will implement the FORCEnet Functional Concept and is the functional and conceptual equivalent to the other Service net-centric concepts of LandWarNet (Army) and C2 Constellation (Air Force). The Marine Corps will be fully engaged with the development of the Joint NECC concept in order to ensure that Marine Corps requirements are fully considered and to also ensure that Marine Corps programs align to this concept. The Marine Corps will engage in the development of C2 concepts with the other Services, on a service-to-service basis, in order to ensure interoperability between Services below the level that will be accomplished by NECC.
- MAGTF C2 is a **system of systems**, net-centric approach to C2 that is seamless between the traditional C2 domains: Strategic, Operational, and Tactical.

MAGTF C2 enhances lethality and effectiveness across the range of military operations through better decision making and shared understanding. It is an intuitive and holistic environment of people, processes, and technology that enables network-centric operations throughout the enterprise. MAGTF C2 empowers the innate initiative of warfighters at all levels in the context of the commander's intent.

As the premier expeditionary "Total Force in Readiness," the Marine Corps requires a robust C2 capability to execute actions across the range of Joint and Coalition military operations, thereby increasing our strategic agility, operational reach, and tactical flexibility.

Joint Publication 1-02, "DOD Dictionary of Military and Associated Terms" defines C2 as "the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission". From a Marine Corps perspective, C2 consists of the means and methods by which a commander recognizes what needs to be done in any given situation, and then sees to it that appropriate actions are taken (Marine Corps Doctrine Publication 6 (MCDP 6). Further, the foundations of MAGTF C2 are rooted in our warrior ethos and our warfighting philosophy of maneuver warfare.

As we pursue C2 solutions, the term "command" will refer to all of the functionality that supports the commander's contribution to the planning phase and his decision-making processes from pre-deployment planning to execution and redeployment. Regarding "control," these solutions envision a process that captures feedback – the continuous flow of information about the unfolding situation returning to the commander, in all planning, execution, and specified/implied reporting functionality and imbeds it within our philosophy of command. Marine leaders will use C2 systems to issue broad mission intent, and then exert "control" through improved situational awareness and shared understanding. That is, a shared appreciation of the situation will be supported by common information, enabling rapid collaborative maneuver, engagement and support.

The fog of war can never be eliminated, nor will we ever achieve perfect clarity or total "knowledge superiority." Therefore, the aim of C2 is to empower Marine leaders at every level to make more effective decisions despite this uncertainty by focusing resources upon a mission and enabling the creativity and initiative of subordinates.

Effective, timely, decision-making is the primary objective of any future C2 system. MAGTF structure assures unity of command and facilitates the full integration of air, ground and logistics operations in support of the commander's overall mission. Future C2 capability must evolve to a comprehensive approach to C2 that will enable any commander across the globe to leverage and focus not only MAGTF capabilities, but all elements of Marine Corps, Naval, Joint, national, and multinational power. Future C2 systems must enable decentralized decision-making that promotes exploiting fleeting battlefield opportunities. The Marine Corps approach to C2 must enhance understanding of the commander's intent, emphasize initiative of small units, and provide relevant displays that promote understanding throughout the MAGTF.

The basic elements of command and control are people, information, C2 systems, and the supporting infrastructures enabling information exchange. MAGTF C2 supporting OMFTS will be sea-based; will reduce the footprint of required infrastructure ashore; will be independent of transmission systems or paths; and will be inherently collaborative across all echelons of command. Figure 2 graphically depicts the range and depth of MAGTF C2.

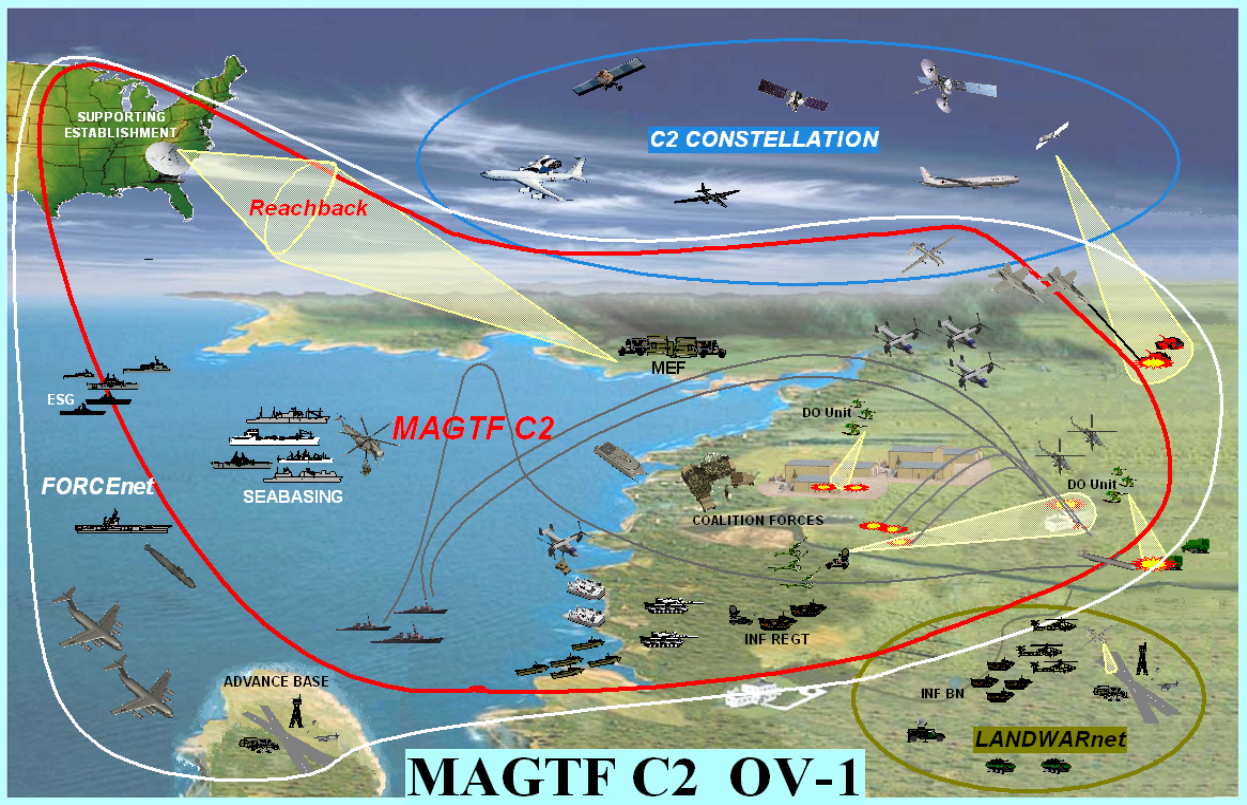

Figure 2: MAGTF C2 Operational View

3.3.1 Sea basing

Typically, the MAGTF command element and major subordinate command elements are located in and exercise command and control from the Sea base. This does not preclude the MAGTF commander or subordinate commanders from transitioning C2 ashore as the situation dictates. A single, integrated "blue-green" staff that operates at key nodes from the Sea base will support the MAGTF commander. In a Sea-based scenario, the MAGTF Command Element, GCE, LCE, and ACE headquarters operate aboard amphibious ships, while the CSS headquarters operates aboard the MPF (F) ships. This C2 arrangement does not preclude various combinations of command structure aboard different vessels.

Command posts of units conducting OMFTS must posses the mobility to keep pace with the increased operational tempo of the maneuver forces. Traditional "leap frog" displacement of sprawling command posts is time consuming and can potentially create operational pauses during DO. Command posts must enable commanders and staffs to function while stationary or on-the-move. Command posts within the surface and vertical assault elements start operating immediately upon launch. Graphic display devices mounted in the surface assault craft develop and maintain the COP by automatically updating their location and passing that information in the form of track data within the surface assault force to higher headquarters. Separate graphic displays provide the commander and surface assault craft commanders the ability to visually

display the heading and respective lanes while displaying depictions of adjacent surface assault craft during the movement from the launch area to the beach. While in the transit area, surface assault craft receive voice and data intelligence, reconnaissance, and fire support information that allows the battalion staffs to prepare intelligence products and to command, control, and coordinate supporting fires. At the craft initial points, between the transit and approach areas, surface assault craft commanders may decide or be given orders from the appropriate commander to shift approach lanes as the situation unfolds. New littoral penetration points and heading updates are passed to the appropriate troop commander displays automatically. Similar changes can be issued when the leading element of the surface assault craft enters the attack penetration area.

3.3.2 Distributed Operations

Distributed Operations (DO) describes an operating approach that will create an advantage over an adversary through the deliberate use of separation and coordinated, interdependent, tactical actions enabled by increased access to C2 functional support, as well as by enhanced combat capabilities at the small-unit level. The essence of this concept lies in the capacity for coordinated action by dispersed units, throughout the breadth and depth of the battlespace, ordered and connected within an operational design focused on a common aim.

A robust and resilient C2 network will enable this operating approach. This network will include over-the-horizon, on-the-move, and beyond-line-of-sight communications assets that connect commanders to distributed units, and provide connectivity throughout the force, to include, where applicable, the sea-based elements of that force. The network will provide commanders the ability to coordinate the actions of widely separated small units. Further, it will enable separated small units to "self organize" by carrying out mutually supporting tactical actions, in accordance with commander's intent. Most importantly, C2 will be designed to optimize and exploit the advantages of distributed decision making by empowered small unit leaders, with "command and feedback" characterizing the distributed operations environment. DO is nonlinear—with operations taking place over large distances with widely dispersed forces. Infrastructure supporting MAGTF C2 must keep pace with the fastest moving elements of the MAGTF, while providing a dynamic and ubiquitous C2 network from the Sea base to maneuver forces ashore.

3.3.3 Collaborative C2

The MAGTF and its major subordinate element (MSE) commanders and their staffs will be dispersed across the Sea base. C2 capabilities must support long-distance distributed, near real time collaboration. Higher headquarters, special and general staffs, and supporting agencies may not be located within the Sea base, or even in theater, necessitating robust reach-back capabilities. Collaborative capabilities must allow C2 nodes within the Sea base to access regional or CONUS-based resources. Collaborative capabilities must link decision-makers,

warriors, information, and supporting resources seamlessly with the NECC Collaborative Information Environment (CIE) enabling effective MAGTF operations.

Emerging NECC capabilities should enable these mandated functions. As a minimum, NECC capabilities must facilitate USMC development of these Service unique and shared functions (see Collaboration capabilities in Appendix A)

3.4 The Environment of Sustained Land Operations

In the realm of Sustained Land Operations (SLO), there are significant differences between the C2 needs to support SLO and those air, sea, and short duration, littoral C2 needs of more dynamic operations and warfare. The development of new information-based C2 enabling tools must accommodate the specific needs of this unique Army and Marine Corps partnership and environment. A highly mobile force like the Marine Corps can perform SLO operations as evidenced in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) however, we also have other unique characteristics. Lessons-learned from OIF and OEF show that the SLO mission can be shared by the Marine Corps and the Army in a sustained conflict. In this SLO partnership with the Army, the following key capabilities are paramount:

- SLO requires mobile headquarters/command posts that can more rapidly setup, teardown, and operate on the move. This requires energy efficient, "plug and play" capability that minimizes user requirement for setup, teardown, differences between static and mobile operations, and reduced logistical load.
- SLO operates primarily in a mobile, wireless environment during operations and is most often a low bandwidth, disadvantaged user though generally connected. This emphasizes the criticality of bandwidth expansion and dynamically tailorable allocation, applications designed for low bandwidth users, criticality of effective data strategies, dynamic radio routing capabilities, criticality of sufficient mobile communication capabilities, and other factors that facilitate continuous connectivity.
- SLO frequently and dynamically changes task organization during both planning and execution of operations (e.g., criticality of unique identification of data, dynamic internet protocol addressing, efficient/remote database initialization).

4.0 THREAT SUMMARY

See Extension E, NECC CDD for Threat Assessment.

5.0 PROGRAM SUMMARY

Program strategy with relationship to Marine Corps programs and delivery considerations are detailed in the following subsections.

5.1 Overall Program Strategy To Reach Full Capability

Marine Corps C2 depends on applications and functionality that currently reside in the GCCS FoS and other Common Operating Environment (COE) associated systems. These systems perform the basic application functionality across the warfighting functions, as defined in the MAGTF C2 vision. Specifically:

- For overall COP functions: GCCS-J, GCCS-M, Tactical Combat Operations System (TCO) and C2PC system
- For Airspace management and planning: Marine Corps CAC2S, Theater Battle Management Core System (TBMCS)
- For Fires control: Advanced Field Artillery Tactical Data System (AFATDS)
- For Chemical, Biological, Radiological, Nuclear, or high-yield Explosive (CBRNE) defense/prediction: Joint Warning and Reporting Network (JWARN)
- For Logistics services: Global Combat Support System-Marine Corps (GCSS-MC), Common Logistics Command and Control System (CLC2S)
- For Intelligence services: Intelligence Analysis System (IAS)

These current systems will migrate to NECC services over a transition period to provide a MAGTF C2 full capability. These Marine Corps application services within NECC will be an integral part of Joint C2. They will eliminate stove-piped systems and will be interoperable at all Marine Corps levels of command and with Joint Interagency and Multinational (JIM) forces. Marine Corps applications within NECC will be designed to integrate capabilities that ensure the Marine Corps will be effective in all areas of Joint Operations, and perform all the operational activities envisioned by the MAGTF C2 strategy.

The overall MAGTF C2 strategy is to provide incremental capabilities supporting emerging Joint concepts and the Marine Corps's operational concepts, based on DOTMLPF change, technology advancements, funding, performance, and/or schedule constraints. Marine Corps application services within NECC will not reach full capability in Increment I. The current systems, which include these high value applications, will use evolutionary acquisition techniques to develop and field key Marine Corps C2 capabilities throughout the entire transition to NECC. There are currently three planned increments to NECC, and Marine Corps applications will adhere to those planned increments.

The first increment employs the lessons learned from OIF, OEF, the global war on terror, and from the Marine Corps's MAGTF C2 concept development to accelerate the Marine Corps's merging of C2 capabilities with Joint C2 in a top-down approach. This increment begins development of Marine Corps C2 applications for NECC that succeed GCCS FoS: TCO, GCCS-

J, and TBMCS. It replaces and extends the capabilities provided by the GCCS (Block IV) FoS by adding capabilities that use the Network Centric Enterprise Services (NCES), and includes additional capabilities for Marine Corps units by including C2PC/JCTW applications developed for the Marine Corps. It incorporates network and net services initiatives ongoing at the DOD level.

This increment opens to the Marine Corps the benefit of Army, Air Force, and Navy applications migrated to the NECC. At the tactical level, it interoperates seamlessly with the Marine Corps MAGTF C2 capability, and the first increment of the JCTW as C2PC is retired. It seeks to fund and field improvements to Situational Awareness (SA), blue force tracking, planning, communications and data transport, greater access to satellite bandwidth, and increased capability for training and operations. This increment will also incorporate architectural and design criteria to facilitate (in future Increments II/III) incorporation of MAGTF C2 capabilities and JCTW.

MAGTF C2 entails a truly interoperable Marine Corps C2 capability that is seamless, scalable, modular, and relevant across the full range of military operations from Major Theater War, to irregular operations, to humanitarian assistance operations. It is a capabilities-based approach for developing Marine Corps C2 that will be expeditionary in nature; will be fully capable in an austere forcible entry environment; and will enable JTF capabilities from the sea-base while being essentially transparent to the commander. Overall, MAGTF C2 provides the strategy needed to synchronize C2 requirements generation and acquisition in the force development process. In Increment II and III, NECC will incorporate C2 spirals of MAGTF C2. MAGTF C2 will incorporate the continuous improvements to Marine Corps applications within NECC and improvements to network environment and services, to include provisions for bandwidth constrained tactical units, in increments II and III. The MAGTF C2 migration is displayed below in Figure 3.

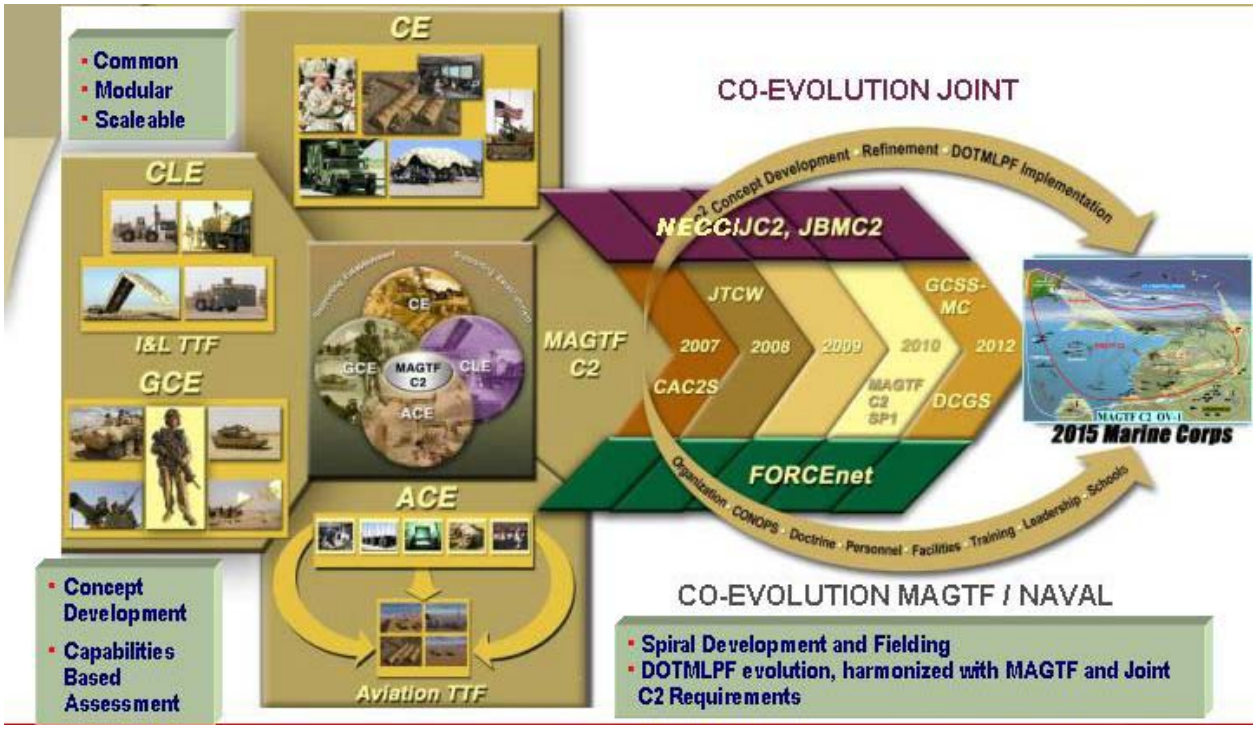

Figure 3: MAGTF C2 Migration

5.2 Specific "As-Is" Marine Corps Capability

Below are some specific "As-Is" key components of MAGTF C2, their Programs of Record, and their capabilities that are essential to be transitioned into the NECC.

5.2.1 Common Operational Picture (COP)

5.2.1.1 Tactical Combat Operations System (TCO)

TCO is the principal tool within the MAGTF for situational awareness through distribution of the COP from GCCS-J to/from the Common Tactical Picture of C2PC. TCO leverages GCCS-J and key attributes include: automated message processing, mission planning, development and dissemination of operational orders and overlays, display of current friendly and enemy situations, display of tactical control measures, and interface with local and wide area networks. TCO capability will be transitioned into the NECC Increment I.

5.2.1.2 Command and Control Personal Computer (C2PC)

The C2PC is a Windows-based client software application designed for MAGTF tactical data systems. When connected to a network, C2PC exchanges position tactical track data with the TCO/GCCS-J Technical Data Base (TDB) service, providing a complete geographically based situational awareness capability, including the capability to display the GCCS COP data. C2PC is designated as the JCTW, and the Marine Corps is the Executive Agent for the evolving JCTW

capability. As a key component of MAGTF C2, C2PC/JCTW must be seamlessly integrated into NECC from Increment I, as NECC replaces its dependent systems: TCO and GCCS.

5.2.2 Airspace Management and Planning

5.2.2.1 Common Aviation Command and Control System (CAC2S)

The Common Aviation Command and Control System (CAC2S) provides capabilities enabling the MAGTF to coordinate C2 airspace operations for execution by decentralized units. It is a critical element of MAGTF C2 and must be integrated with the NECC. CAC2S integrates the planning functionality of the Tactical Air Command Center (TACC) into a single, comprehensive system that increases interoperability and reduces critical data latency. CAC2S is a common, modular, and scalable set of hardware and software that replaces the current C2 suites resident in the Marine Air Command and Control System (MACCS). The CAC2S will combine the functionality of the five separate C2 systems into one integrated operational system.

5.2.2.2 Theater Battle Management Core System (TBMCS)

The Theater Battle Management Core System (TBMCS) is an Air Force led program that provides Joint and Service Combat Air Forces with automated C2 systems to plan and execute theater-level air campaigns. The mission of TBMCS at the operational level is to provide the Joint or Combined Forces Air Component Commander (JFACC/CFACC) with the automated tools necessary to effectively and efficiently plan, monitor, and execute the air campaign. NECC will increase Joint 3rd dimensional SA to TBMCS with the infusion of non-sensor generated (self-reporting position) inputs of low-level Marine Corps assets not readily acquired by other Joint sensor assets. This includes planning and issuing the Air Tasking Order (ATO) and Air Control Order (ACO) that ensure the Theater Commander's intent is supported through the application of airpower using the latest intelligence. The TBMCS capabilities also ensure that theater-wide air operations are de-conflicted between Joint and coalition forces.

5.2.3 Fires Control

5.2.3.1 Advanced Field Artillery Tactical Data. System (AFATDS)

AFATDS is the battlefield management and decision support system for the Joint Force Commander. AFATDS provides automation for all 27 Fire Support tasks from firing platoon through Echelon Above Corps. It provides the maneuver commander the maximum utilization of the assets available on the expanding battlefield. Its capabilities include:

- Provides Tactical Support Capability & Technical Fire Control.

- Provides C2 for Range of Weapons From Mortars, Cannons, Missiles to Air Support and Naval Surface Fires.
- Integrates USA, USMC, AF and USN Target Acquisition, Weapon Platforms Across Battlespace
- Interoperates with NATO/Coalition force.

AFTDS is a key component of the MAGTF C2 capability.

5.2.4 Chemical, Biological, Radiological, Nuclear, and high-yield Explosive (CBRNE)

5.2.4.1 Joint Warning and Reporting Network (JWARN)

The Joint Warning and Reporting Network (JWARN) will provide Joint Forces with an integrated comprehensive analysis and response capability to minimize the effects of hostile CBRNE attacks or accident/incidents, environmental hazards, or hazards from Toxic Industrial Material (TIM). The system will consist of hardware, software, and connectivity with C2 systems and remote detectors/sensors. JWARN will be compatible and integrated with Joint/Service C2 systems, the Defense Medical Surveillance System (DMSS) and networks/broadcasts. JWARN will transition to an NECC capability.

5.2.5 Logistics Services

5.2.5.1 Global Combat Support System - Marine Corps (GCSS-MC)

The GCSS-MC provides integration and interoperability between combat support functions and C2 to support the operational needs of the warfighter. Using the Defense Information Infrastructure (DII) and Common Operating Environment (COE), as well as the shared data environment, it ensures rapid integration of combat support applications, providing a seamless flow of operational and sustaining base information to Marine Corps applications for NECC.

GCSS-MC provides accurate and near-real-time total asset visibility vital to the deployment, employment, sustainment, reconstitution, and redeployment of Marine Corps and Joint combat assets or resources. The GCSS-MC capabilities include the COP, the GCSS portal with basic Internet web services that include the Global Transportation Network (GTN), and Joint Decision Support Tools (JDST).

In conjunction with GCSS-MC, the Marine Corps is developing and fielding the Common Logistics Command and Control System (CLC2S). CLC2S provides the MAGTF with automated logistics planning and execution tools that will complement and be interoperable with current and emerging MAGTF, naval, and joint C2 processes and systems. CLC2S will not be a

separate C2 capability, but will be the logistics/combat service support component of the overarching MAGTF C2 capability and provide input to the MAGTF's common operating picture via logistic injectors to C2PC/JCTW. GCSS-MC will become an integral part of the NECC GCSS capability.

5.2.6 Intelligence Services

5.2.6.1 Intelligence Analysis System Family of Systems (IAS FoS)

The IAS FoS is the Marine Corps implementation of the Defense Information Systems Agency (DISA) Global Command and Control System (GCCS) providing situational awareness through the Common Operational Picture (COP) and national/theater-based Integrated Imagery and Intelligence (I3) capabilities. As such, the IAS FoS provides the point-of-presence for the Marine Corps' intelligence systems supporting the strategic objectives identified in the Department of Defense (DOD) Intelligence, Surveillance and Reconnaissance (ISR) Roadmap and required in joint/coalition net-centric warfare. The primary capabilities provided by the IAS FoS are COP, Common Intelligence Picture (CIP), Intelligence Planning, Intelligence Processing and Fusion, Intelligence Analysis and Production, Intelligence Reporting, Indications and Warning, Collaboration and Interoperability. The IAS FoS is the all-source analysis system and receives and fuses information and intelligence data from all MAGTF intelligence systems and is the key interface to Joint systems.

5.2.6.2 Distributed Common Ground/Surface System – Marine Corps (DCGS-MC)

Distributed Common Ground Surface/System (DCGS) is a Joint effort to bridge significant interoperability gaps in national, theater, and service Intelligence, Surveillance and Reconnaissance (ISR) systems by providing Net-Centric enterprise architectures. The DOD effort comprised largely of data standardization across all agencies and services, Joint Capabilities Integration Development System (JCIDS) requirements development and alignment, specific and dynamic fiscal and acquisition policies, and major system development efforts. DCGS-MC will provide a standardized architecture to all USMC tactical ISR systems and provide a data management framework, standardized data exchange and common ISR visualization through Net-Centric tenets. All USMC tactical ISR systems and C2 ground systems that consume Intel data will benefit through the ability to access and utilize ISR data without constraints normally seen with stove-piped systems. The system provides a data management framework for current and legacy systems through standardized data exchange. This capability enables the operational commander to easily view Intelligence support to operations through a single visual interface. The system will also enable intelligence systems support to other combat systems through standardized data exchange.

5.3 Marine Corps Applications and NECC Increments

Increment I (FY08/09).

The migration of GCCS-J, GCCS-M, TBMCS, and TCO applications and functionality to NECC will initiate realization of the capabilities identified in this CDD for Increment I. These capabilities will evolve into a single, integrated and seamless C2 and battlespace awareness system from the Joint Task Force (JTF) down to Marine Corps tactical units in future Increments II/III. Each subsequent increment will provide additional capabilities, greater integration and commonality within the Marine Corps and between the Marine Corps and other Services until full MAGTF C2 capability is achieved.

The incorporation of architectural and design constructs to facilitate a seamless information flow to/from Marine Corps (and Joint) higher echelons and "edge users" within Marine Corps tactical units will be provided in this increment.

Increment II/III (FY10/11-12/13)

Increment II and III will continue development of an inherently Joint C2 capability and the fielding of advanced C2 service-based NECC applications. MAGTF C2 capabilities will be integrated with and developed as NECC services. JCTW will be included in the NECC as the tactical COP capability.

5.4 Increment Delivery Considerations

Investment/ Fielding/Interoperability. Investment realities will constrain the Marine Corps's ability to transition all desired applications to NECC over a period of a number of years. It is therefore imperative that Marine Corps applications for NECC incorporate a prioritization strategy in their transition to NECC, with an "as is" operable capability in each application, as well as a "to be" NECC capability that subsumes the current application as the NECC Increment becomes operational. In any scenario there can be no loss of identified critical functionality to Marines in the field as provided today by the GCCS FoS. This application/system transition process, by Increment of NECC will be outlined and documented in a Marine Corps update to this annex, with a capability transition roadmap for that NECC increment activity. This roadmap will include at the minimum:

- Specific, Application-level capability to be transferred from specific Marine Corps current systems to NECC
- All known Doctrine, Organizations, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) issues, actions, and activities germane to the transfer of capability to NECC.

- An alternate means of providing that capability to the Marine Corps until such time the NECC solution is fully operational and stable.

Technical - Network Maturity. The emergence of advanced network centric technologies is critical to the development of NECC and Marine Corps applications within NECC. These NCES technologies directly impact the development of the NECC/Marine Corps applications and the development of key supporting systems. Critical NCES extensions, to support "edge users" in the real-time and near-real-time domains, are also key factors, since capabilities that are currently under development need to be integrated with the NCES program. Coordination of application functionality along with consensus on data modeling, strategy and global force structure strategy will be key factors in future NECC Increment development and deployment.

Technical - Communications and Sensor Maturity. Key communications technology areas include transport (e.g. air/ground on-the-move communications, self-organizing networks, broadband power amplifiers, etc), antennas (e.g. body-borne, vehicle conformal (narrowband), phased array (wideband), multi-band (e.g., 2MHz–2GHz)) and security/information protection (e.g. intrusion detection/response, malicious code detection, and computer data security (CDS)). Critical supporting ISR technologies include intelligent/neural agents, electronic mapping, high resolution sensors, embedded smart processors, multi-function sensor suites, foliage/ground penetration radar, high speed wide area search and multi-target tracking, long range target identification capability, Intelligence analytical tools incorporating: high-level fusion and affordable target acquisition sensor suites for unmanned ground and air vehicles, man portable and crew served systems.

Technical - Software Development and Code. The challenge of developing one overarching C2 capability that includes all of the required mission software applications and capability packages needed by Joint and Marine Corps forces is daunting. Developing applications to operate in a bandwidth efficient way for a primarily wireless warfighting environment is even more challenging and requires a level of standardization and development cooperation. Intelligent decision aids and fusion engines of sufficient sophistication do not yet exist. Success in this area will determine the effectiveness of C2 in a mobile, dispersed and bandwidth limited environment.

Other Systems. Other developmental systems/organizations that will impact Marine Corps applications for NECC include: MAGTF C2, JCTW, Army Future Combat Systems (FCS), Distributed Common Ground System (DCGS), Deployable Joint Command and Control System (DJC2), Network Centric Enterprise Services (NCES), Joint Tactical Radio System (JTRS), Warfighter Information Network Tactical (WIN-T) and the various programs to increase satellite access and bandwidth capabilities.

6.0 SYSTEM CAPABILITIES REQUIRED FOR THE CURRENT INCREMENT

Marine Corps applications within NECC will interoperate in all environments with JIM systems, existing Marine Corps systems, Marine Corps systems already under development, and new capabilities to be developed to meet the future needs of the Joint forces and Marine Corps.

7.0 GCCS FAMILY OF SYSTEM (FOS) SYNCHRONIZATION

As current Marine Corps operations heavily utilize the GCCS FoS and depend on those COE based systems functionality for our current operational architecture, synchronization of NECC capability with current GCCS FoS capability must be continued during NECC development and fielding. Current GCCS FoS system capabilities must be maintained until seamlessly replaced by NECC services with no loss of functionality.

7.1 Other Marine Corps Complementary Net-Centric Programs

These are Net-Centric, Joint and other Service programs that integrated with NECC will provide C2 harmonization, fully integrated reach back, enterprise services, and information transport as per the C2 and Net-Centric Operating Environment (NCOE) Joint Integrating Concepts (JIC). These programs have key interest for the Marine Corps, and are highlighted below.

7.1.1 Future Combat Systems (FCS) Family of Systems (FoS)

The Army FCS FoS is comprised of a family of advanced, networked air- and ground-based maneuver, maneuver support, and sustainment systems that will include manned and unmanned platforms. The FCS FoS is networked via a battle command architecture that includes networked communications, network operations, sensors, battle command systems, distributed analysis, and manned and unmanned reconnaissance and surveillance capabilities to enable levels of SA and synchronized operations heretofore unachievable. The FCS FoS will operate as a system of systems that will network with current capabilities and those being developed to meet the needs of the Army brigade. The network will enable improved ISR, battle command, real time (RT) sensor-shooter linkages, sustainment, and increased synergy between echelons and within small units. The Marine Corps will utilize key capabilities from FCS, and will integrate with FCS in the Joint area of operations.

7.1.2 Net-Centric Enterprise Services (NCES)

The Joint NCES will provide a common set of information capabilities for the Global Information Grid (GIG) to assess, collect, process, store, disseminate, and manage information on demand to warfighters, policy makers, and support personnel. The NCES enables interoperability across systems. The NCES will support the entire DOD and Intelligence community, conventional/nuclear warfighter, warfighter support, and business units. NCES will

provide core enterprise services such as enterprise system management, messaging, mediation, security, user assistance, discovery, collaboration, and information storage. NCES will also support community of interest capabilities such as C2, Intelligence, Weapon Systems, Logistics, Personnel, and Finance. NCES will provide all of these services to Marine Corps applications for NECC.

7.1.3 Joint Tactical Radio System (JTRS)

The JTRS will combine the functionality of numerous single function radios among the services into a single, Joint-interoperable family of radios. It will attain JIM interoperability and performance requirements. The JTRS provides tactical radio sets that may include routers, switches, and other networking components/functions integral to the set and configured to meet the diversity of host platforms. It satisfies requirements common to the three domains that coincide with operational missions and environments: Airborne, Maritime/Fixed, and Ground. The radio sets will be software-reprogrammable, multi-band/multi-mode capable, network capable, and provide simultaneous voice, data, and video communications. The Joint family of radios that comprise the JTRS will fully integrate into the GIG to enable successful implementation of new service and Joint warfighting concepts (e.g., MAGTF C2, Army Future Force, Expeditionary Maneuver Warfare (EMW), etc.) and systems (e.g., NECC, JCTW, FCS FoS, WIN-T, Automated Digital Network System (ADNS), etc.). The JTRS is a key portion of the communications network that supports NECC. Specifically, JTRS will provide the warfighters vertical and horizontal network connectivity across the RF spectrum that will permit them to achieve the information dominance that is critical to the style of warfare intended in the future. The Marine Corps will highly leverage JTRS capability when available.

7.1.4 Warfighter Information Network – Tactical (WIN-T)

The WIN-T is the Army Future Force high-speed and high capacity backbone communications network, which supports Army applications for NECC. It will be focused on moving information in a manner that supports commanders, staffs, functional units, and capabilities-based formations – all mobile, agile, lethal, sustainable, and deployable. The WIN-T will provide required reach, reachback, and network operations for the brigade Infospheres and seamlessly interface with JTRS, which extends to the individual warfighter platform level. At the division level and above, WIN-T will provide command centers and staff elements with the communications capabilities to link to adjacent divisions and above, subordinate brigades, the sustaining base, and JIM. The WIN-T will provide Network Operations (NETOPS) to enable command, control, communications, and computers operations and Information Management (C4IM). While a key Army capability of importance in the Joint arena, the Marine Corps is a partner in WIN-T in areas of common capability.

7.1.5 High Capacity Communications Capability (HC3)

The Joint Family of HC3 terminals will provide, High Bandwidth High Throughput (HBHT) communications capability for the Joint tactical ground domain for 2014 and beyond. HC3 provides secure ground-to-air, ground-to-satellite, surface-to-air, surface-to-satellite, subsurface-to-satellite, and communications for Joint On-The-Move (OTM), At-The-Quick-Halt (ATQH) and At-The-Halt (ATH) platforms. HC3 leverages future wideband communications in a single architecture and enables seamless integration into the Joint and Intra-service tactical networks.

8.0 NSS AND ITS SUPPORTABILITY

For purposes of clarification – National Security Systems (NSS) refers to the operational application functionality (NECC, et al.) and Information Technology Systems (ITS), the operational infrastructure (terminal devices, transmission systems and transmission paths). This document is consistent with US Code and Joint definitions for NSS and ITS. See the NECC CDD for further details.

9.0 INTELLIGENCE SUPPORTABILITY

Refer to the NECC capabilities development documentation. Further definition of USMC Intelligence related capabilities are provided in Marine Air/Ground Intelligence Systems (MAGIS)-related documentation.

10.0 ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) AND SPECTRUM SUPPORTABILITY

E3 and Spectrum Supportability for this annex are to be provided by other documentation. Refer to the NECC CDD.

11.0 ASSETS REQUIRED TO ACHIEVE IOC

IOC should be defined by a complete capability within a theater of operations. The NECC IOC will be defined in the NECC CDD.

12.0 SCHEDULE AND IOC/FOC DEFINITIONS

FOC should be defined by a complete capability within all theaters of operations. The NECC FOC will be defined in the NECC CDD.

13.0 OTHER DOTMLPF CONSIDERATIONS

13.1 Doctrine

Doctrine will both drive transformation and adapt as the force transforms. Emerging doctrine will focus on the necessary capabilities to engage any adversary across the full range of military operations with a Joint force sharing common systems, TTPs and doctrine.

13.2 Organizations

Joint mutual support becomes the key factor in determining Service roles and missions, and mission context will determine the apportionment of Marine Corps HQ and forces. The range of missions assigned to Marine Corps will exercise the flexibility and light footprint of the Corps. As each operation proceeds, the makeup of the deployed Marine Corps will evolve, shifting in composition as the mission and circumstances require. While units that are stationed with the HQ may align for training and readiness, actual operational groupings will be based upon mission requirements.

13.3 Training

In past operations, ad hoc task forces, whether Multinational or Joint, usually relied on inventiveness and adaptability during operations to overcome a lack of prior collective training. This lack of prior training resulted mostly from the ad hoc nature of the task force, and a limited amount of time from alert to deployment. Having recognized the absolute need for completely flexible tailoring of forces and command elements, peacetime training should be designed to routinely engage widely varying force packages in the most difficult and demanding, as well as the most likely, tasks that they perform in war in order to identify and correct weaknesses in C2. All leaders and units must also train tasks that contribute to their leader development, as well as individual and collective proficiency. The point is to build synergy and synchronization across disparate force packages that potentially could be mixed to accomplish ever changing national objectives. To ensure that a lean deployed staff is effective with ever changing force structures, it must be continuously trained in complex Joint and Multinational operations at the operational and tactical levels. This training is essential both to build the basis for trust and rapport (essential human qualities for effectiveness), which will be vital in war, and to use training opportunities for leader development as well as to identify the abilities and limitations of certain force packages and their C2 elements. For ad hoc Coalitions, the same methodology applies, but the time available may be condensed or occur during deployment or actual hostilities.

As a means to frequently train the skills and techniques associated with C2 of tailored force packages, NECC, with its Marine Corps applications, require embedded training modules supported by low-cost, low-overhead, simulations. Furthermore, Marine Corps applications for NECC will have the embedded capability to individually train commanders and staff planners on essential operational process skills that may be applied through the range of strategic, operational and tactical levels of war. Small unit training will remain the bedrock of readiness and effectiveness, and will be supported by Marine Corps applications in their operational mode.

13.4 Materiel
Materiel solutions are discussed throughout the Marine Corps Annex to NECC CDD

13.5 Leadership and Education
Marine Corps applications within NECC will help leaders focus on critical decisions, highlight opportunities for initiative, and facilitate teamwork. Future Marine Corps leaders must be trained to aggressively manage information and instill trust in the output of decision support tools that automated systems provide.

13.6 Personnel
Effective use of Marine Corps applications within the modular and distributed NECC capability will require new combinations of personnel. The NECC capability however, should be designed and deployed such that its operation is intuitive as much as possible. The right combinations of Active and Reserve Components, Marine Corps civilians and contractors will be determined through research, experimentation, unit exercise and operational experience.

13.7 Facilities
The Marine Corps NECC capability will be integrated with the Navy platforms designed to carry Marines in an amphibious role. Ashore, installations will continue to evolve into strategic platforms for global operations. Marine Corps and Navy installations must be capable of performing all functions and tasks that are not essential to be performed in the Joint Operations Area (JOA), thereby, reducing the deployable footprint. They must be capable of supporting multiple contingencies from a fixed secure location. Prior to unit deployment, these fixed facilities can collect and process large volumes of data such as terrain databases that must be pre-positioned down to platform level prior to deployment. During operations, they have access to high-speed data networks to filter and disseminate relevant information to disadvantaged deployed elements.

Appendix A: REQUIRED USMC FUTURE C2 CAPABILITIES

Joint Concepts: JC2 and NCOW Capability Lists

1.0 JC2 CAPABILITIES

"In 2015, Joint C2 will be agile across the range of military operations. Joint forces, interagency, multinational partners, and non-governmental organizations will be able to rapidly respond and decisively execute Commander's Intent in a complex, uncertain and dynamic operating environment. C2 processes will be performed collaboratively to improve the speed and quality of the individual decisions and allow for the rapid and continuous synchronization of multiple decisions to achieve unity of effort. Commanders will rapidly tailor their C2 capabilities to any situation and will be able to exploit the benefits of decentralization – initiative, adaptability and tempo – without sacrificing unity of command. This will be achieved through a collaborative information environment that enables cohesive teams, regardless of location, to develop a shared understanding of Commander's Intent, and of the battlespace, enabling flexible synchronization and superior decision making."[1] *~ Concept Statement from* ***Joint Command and Control Joint Functional Concept***

- **Basic C2 Capabilities**
  - The ability to monitor and collect data
  - The ability to develop a situational understanding
  - The ability to develop courses of action and select one
  - The ability to develop a plan
  - The ability to execute the plan including providing direction and leadership to subordinates
  - The ability to monitor the execution of the plan and adapt as necessary
  - The ability to execute the C2 process
- **Collaborative C2 Capabilities**
  - The ability to network
  - The ability to share information
  - The ability to interact
  - The ability to develop shared awareness
  - The ability to develop shared understanding
  - The ability to decide in a collaborative environment
  - The ability to synchronize
  - The ability to execute the collaborative C2 process

2.0 NET - CENTRIC C2 CAPABILITIES

"By providing the Joint Force and mission partners with the technical connectivity and interoperability necessary to rapidly and dynamically share knowledge among decision-makers and others—while protecting information from those who should not have it—the NCOE will facilitate the coherent application of joint action. Indeed, the NCOE has the potential to revolutionize joint operations by optimizing and even transforming how information and

knowledge are generated, presented, and used throughout the Joint Force and mission partners. The timeframe is 8 to 20 years in the future. The [Net - Centric Operating Environment Concept's] central idea is that, for the future Joint Force to achieve decisive levels of shared knowledge and technical connectivity, the NCOE must provide the Joint Force with pervasive knowledge through the full integration of knowledge management (KM), network management (NM), and information assurance (IA).." Statement from the Net Centric Operational Environment Joint Integrating Concept version 1.0

- **Net - Centric C2 Capabilities**
  - The ability to establish appropriate organizational relationships
  - The ability to collaborate
  - The ability to synchronize actions
  - The ability to share situational awareness
  - The ability to share situational understanding
  - The ability to conduct collaborative decision making/planning
  - The ability to operate interdependently
  - The ability to create/ produce information
  - The ability to store/share/exchange
  - The ability to establish an information environment
  - The ability to process data and information
  - The ability to employ geo-spatial information
  - The ability to employ information
  - The ability to find and consume information
  - The ability to provide user access
  - The ability to access information
  - The ability to validate/assure
  - The ability to install/deploy
  - The ability to operate/maneuver
  - The ability to maintain/survive
  - The ability to provide network services

3.0 NAVAL C2 CONCEPT: FORCENET

"FORCEnet is defined as the operational construct and architectural framework for naval warfare in the Information Age, integrating warriors, sensors, command and control, platforms, and weapons into a networked, distributed combat force. The objective of FORCEnet is to provide commanders the means to make better, timelier decisions than they currently can and to see to the effective execution of those decisions. The underlying premise from which FORCEnet gets its power is the network effect, which causes the value of a product or service in a network to increase exponentially as the number of those using it increases. Since most headquarters are already well connected, the real power of FORCEnet is connecting the extremities of the force—individual people, weapons, sensors, platforms, munitions, shipments, end items, parts, and so on. A main objective of FORCEnet is extending visibility and empowerment to the extremities. The greatest breakthrough that FORCEnet will achieve in future command and control is in the area of maximum decentralization.

The essence of this concept is a decentralized and highly adaptive form of command and control that uses the digital, global communication network to foster and exploit the human capacity for mutual understanding, implicit communication, and anticipatory cooperation. Exploiting the network effect achieved by organizing all nodes into an information-rich, collaborative, global network will enhance these qualities. Every node in the network—commander, staff, unit, supporting organization, platform, or piece of equipment—can be a producer, processor and user of information, and all information can be readily available to any node."

- **FORCEnet C2 Capabilities**
  - Provide robust, reliable communication to all nodes, based on the varying information requirements and capabilities of those nodes.
  - Provide reliable, accurate and timely location, identity and status information on all friendly forces, units, activities and entities/individuals.
  - Store, catalogue and retrieve all information produced by any node on the network in a comprehensive, standard repository so that the information is readily accessible to all nodes and compatible with the forms required by any nodes, within security restrictions.
  - Process, sort, analyze, evaluate, and synthesize large amounts of disparate information while still providing direct access to raw data as required.
  - Provide each decision maker the ability to depict situational information in a tailorable, user-defined, shareable, primarily visual representation.
  - Provide distributed groups of decision makers the ability to cooperate in the performance of common command and control activities by means of a collaborative work environment.

- Automate lower-order command and control sub-processes and to use intelligent agents and automated decision aids to assist people in performing higher-order subprocesses, such as gaining situational awareness and devising concepts of operations.
- Provide information assurance.
- Function in multiple security domains and multiple security levels within a domain, and manage access dynamically.
- Interoperate with command and control systems of very different type and level of sophistication.
- Allow individual nodes to function while temporarily disconnected from the network.
- Automatically and adaptively monitor and manage the functioning of the command and control system to ensure effective and efficient operation and to diagnose problems and make repairs as needed.
- Incorporate new capabilities into the system quickly without causing undue disruption to the performance of the system.
- Provide decision makers the ability to make and implement good decisions quickly under conditions of uncertainty, friction, time, pressure, and other stresses.

4.0 MARINES CORPS C2 EMW CAPABILITY LISTS

The *EMW Capabilities List* shows the capabilities that are required for the MAGTF to successfully execute C2 in the future. These capabilities range across the areas known as the main tenets of expeditionary warfare: Joint/Multinational Enabling, Strategic Agility, Operational Reach, and Support and Sustainment. The USMC *EMW Capabilities List* is directly provided by the *Capabilities List (ECL)*

MAGTF C2 will have:

- **Joint and Multinational Enabling**
  - The ability to conduct seamless Joint and multinational operations.
  - The ability to lead, enable, or participate in a Joint task force (JTF) and/or multinational force (MNF).
  - The ability to conduct command, control, and coordination within the force (JTF, MNF, Component, and/or MAGTF).
  - The ability to conduct coordination with agencies external to the force (JTF, MNF, Component, and/or MAGTF.)
  - The ability to provide, share and tailor battlespace visualization.
  - The ability to conduct distributed collaborative planning, rehearsal, execution and assessment across networked Joint/MAGTF and multinational C2 system(s).
  - The ability to manage information.

- The ability to execute the Regional Combatant Commanders' theater engagement plans.
- The ability to conduct information operations (IO).
- The ability to provide officers and SNCOs with the requisite skills to serve on Joint, multinational, component, and MAGTF staffs.

- **Strategic Agility**
  - The ability to deploy and employ task-organized forces anywhere in the world from CONUS and/or forward bases.
- **Operational Reach**
  - The ability to synchronize warfighting functions to achieve desired effects within the designated area of operations.
  - The ability to accurately locate and identify friendly forces in the battlespace.
  - The ability to conduct over the horizon and/or beyond line of sight command and control.
  - The ability to conduct composited naval staff operations from the "Sea-base," fully integrating Navy/Marine Corps staffs and capable of transitioning to sustained operations ashore.
- **Tactical Flexibility**
  - The ability to correlate, fuse, disseminate, and display information to enhance situational awareness and decision-making.
  - The ability to rapidly and positively identify and engage targets.
  - The ability to conduct operations across the spectrum of conflict.
  - The ability to develop and employ commander's intent and planning guidance in order to foster decentralized execution.
  - The ability to rapidly update, disseminate, and receive feedback on commander's critical information requirements (CCIRs).
  - The ability to conduct analysis of enemy actions to satisfy critical intelligence requirements.
  - The ability to make timely decisions in spite of incomplete and/or conflicting information.
- **Support and Sustainment**
  - The ability to plan, execute, and assess sustainment of the force.

Appendix B – Integrated Architecture Products

See Extension A-Integrated Architecture Products, NECC CDD.

Appendix C – References

The following USMC-specific documents were referenced in addition to those appearing in Extension B—References, NECC CDD.

- Acquisition Programs & Terms, Transportation Coordinator's Automated Information for Movement System II (TC-AIMS-II) Fact Sheet.
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- Marine Corps Tactical Data Systems Reference Guide JINTACCS-U-RG-GE-6033.
- Marine Corps Task List, 1 Sept 2005.
- Marine Corps Warfighting Publication 2-11, MAGTF Intelligence Collection.
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- Marine Corps Warfighting Publication 3-25.4 TACC Handbook.
- Marine Corps Warfighting Publication 3-25.7, TAOC Handbook.
- Marine Corps Warfighting Publication 3-40.1, Marine Air Ground Task Force Command and Control, 17 March 2003.
- Marine Corps Warfighting Publication 4-11, Tactical Level Logistics.
- MCTSSA C2PC Fact Sheet and Marine Corps Tactical Data Systems Reference Guide -2005.
- MCTSSA Intelligence Operations Server (IOS V2 (AN/UYQ-91 (v) 2) Fact Sheet.
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- Operational Maneuver from the Sea, 4 January 1996.
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- Seabasing Joint Integrating Concept, Version 1.0, 01 August 2005.
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Appendix D – Glossary

See Extension C—Glossary, NECC CDD.

Appendix E – Acronyms

The following USMC-specific Acronyms are provided in addition to those appearing in Extension C —Glossary (Part I), NECC CDD.

Acronym	Definition
ABCS	Army Battle Command System
ACE	Aviation Combat Element
ACO	Air Control Order
ADNS	Automated Digital Network System
AFATDS	Advanced Field Artillery Tactical Data System
ATO	Air Tasking Order
BCOTM	Battle Command on the Move
C2	Command and Control
C2PC	Command and Control Personal Computer
C4IM	Command, Control, Communications, and Computers Operations and Information Management
CAC2S	Common Aviation Command and Control System
CBRNE	Chemical, Biological, Radiological, Nuclear, or High Yield Explosive
CCIR	Commander's Critical Information Requirements
CDD	Capability Development Document
CDS	Computer Data Security
CFACC	Combined Forces Air Component Commander
CIE	Collaborative Information Environment
CLC2S	Common Logistics Command and Control System
COC	Combat Operations Center
COE	Common Operating Environment

Acronym	Definition
CONUS	Continental United States
COP	Common Operational Picture
COTS	Commercial Off The Shelf
CPOF	Command Post of the Future (Army)
DCGS	Distributed Common Ground System
DCGS-MC	Distributed Common Ground System - Marine Corps
DII	Defense Information Infrastructure
DJC2	Deployable Joint Command and Control System
DMS	Defense Message System
DMSS	Defense Medical Surveillance System
DO	Distributed Operations
DOTMLPF	Doctrine, Organizations, Training, Materiel, Leadership and Education, Personnel, and Facilities
DTSS	Digital Topographic Support System
ECL	EMW Capabilities List
EMW	Expeditionary Maneuver Warfare
FCS	Future Combat Systems
FoS	Family of Systems
GCCS	Global Command and Control System
GCCS-J	Global Command and Control System - Joint
GCCS-M	Global Command and Control System - Maritime
GCE	Ground Combat Element
GCSS-MC	Global Combat Support System-Marine Corps
GIG	Global Information Grid
GOTS	Government Off The Shelf
GTN	Global Transportation Network
IA	Information Assurance
IAS	Intelligence Analysis System
IC	Intelligence Community

Acronym	Definition
ICD	Initial Capability Document
IDM-T	Information Dissemination Management
IO	Information Operations
IP	Internet Protocol
IPsec	IP Security
JDISS	Joint Deployable Intelligence Support System
JDST	Joint Decision Support Tools
JFACC	Joint Forces Air Component Commander
JIM	Joint Interagency and Multinational
JOA	Joint Operations Area
JROCM	Joint Requirements Oversight Council Memorandum
JCTW	Joint COP Tactical Workstation
JTF	Joint Task Force
JTRS	Joint Tactical Radio System
JWARN	Joint Warning and Reporting Network
KM	Knowledge Management
LCE	Logistics Combat Element
MACCS	Marine Air Command and Control System
MAGTF	Marine Air-Ground Task Force
MCEITS	Marine Corps Enterprise Information Technology Services
MCO	Major Combat Operations
MNF	Multinational Force
MPF	Maritime Pre-positioned Force
MSE	Major Subordinate Element
NATO	North Atlantic Treaty Organization
NCES	Network Centric Enterprise Services
NCOE	Net Centric Operational Environment
NCOW	Net Centric Operations and Warfare

Acronym	Definition
NECC	Net Enabled Command and Control
NETOPS	Network Operations
NLOS	Non-Line Of Sight
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OMFTS	Objective Maneuver From The Sea
QoS	Quality of Service
RCC	Regional Combatant Commander
RT	Real Time
SIAP	Single Integrated Air Picture
SLO	Sustained Land Operations
SNCO	Staff Non-Commissioned Officers
TACC	Tactical Air Command Center
TBMCS	Theater Battle Management Core System
TCO	Tactical Combat Operations
TDB	Technical Data Base
TIM	Toxic Industrial Material
TPED	Tasking, Processing, Exploitation, and Dissemination
TPPU	Tasking, Posting, Processing, and Using
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
VPN	Virtual Private Network
WIN-T	Warfighter Information Network Tactical