Marine Corps

Private Cloud Computing Environment Strategy

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Foreword

The United States Marine Corps (USMC) Cloud Strategy supports the Commandant of the Marine Corps' (CMC's) priorities and focus areas, such as fiscal responsibility, expeditionary energy, and green IT. The USMC Cloud Strategy can reduce cost and save energy by consolidating and centralizing resources, including hardware, software, and licenses. This strategy also supports the Marine Corps Information Enterprise (MCIENT) by implementing seamless, mobile communications and knowledge/information management across the enterprise. The benefits of the USMC Cloud Strategy include the realization of a single enterprise for the supporting establishment and forward deployed forces in a manner that is effective and efficient with respect to fiscal restraints, manpower sourcing, and operational tempo.

The USMC Cloud Strategy is rooted in the National Institute of Standards and Technology (NIST) Definition of Cloud Computing and the Federal Cloud Computing Strategy. The foundational enabler for the USMC Cloud Strategy is the Marine Corps Enterprise Information Technology Services (MCEITS), which establishes the Marine Corps' guidance for synchronizing current Marine Corps IT programs. The USMC Cloud Strategy will ensure the Marine Corps complies with and aligns to federal requirements and guidelines by ensuring that IT services are distributed across the enterprise in fiscally and operationally efficient and effective manners.

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1 INTRODUCTION

The Marine Corps is implementing a *private cloud computing environment (PCCE)* with the intent of alignment of its enterprise processes to programs of record and ensuring technical solutions are mission oriented and geographically informed. Through the Marine Corps Enterprise Information Technology Services (MCEITS) program of record (POR), the Marine Corps established a concept and capability for improving the way information technology supports the institution in an evolving strategic landscape. As the Marine Corps reaffirms its role as *America's Expeditionary Force in Readiness* during an era of fiscal constraint, the need emerges for adapting information technology services to be more responsive to the Marine Corps' Title X responsibilities in a more effective and efficient manner. By leveraging economies of scale through the MCEITS PCCE, the Marine Corps will measure consumed IT resources more effectively, increase or decrease capabilities to match evolving requirements and budget constraints, and better leverage the underlying capacity of shared IT services. The Marine Corps' movement toward a PCCE is informed by and aligns with the guidance and requirements outlined in the following documents(see Appendix I):

- 25 Point Implementation Plan to Reform Federal Information Technology Management
- Federal Cloud Computing Strategy
- The National Institute of Standards and Technology(NIST) Definition of Cloud Computing
- Marine Corps Information Enterprise (MCIENT) Strategy
- Department of Defense (DoD) Cloud Computing Strategy (Draft)
- DoD and Department of the Navy (DoN) IT efficiencies initiatives
- JCIDS documents for MCEITS.
- Marine Corps Net-Centric Data Strategy

1.1 VISION

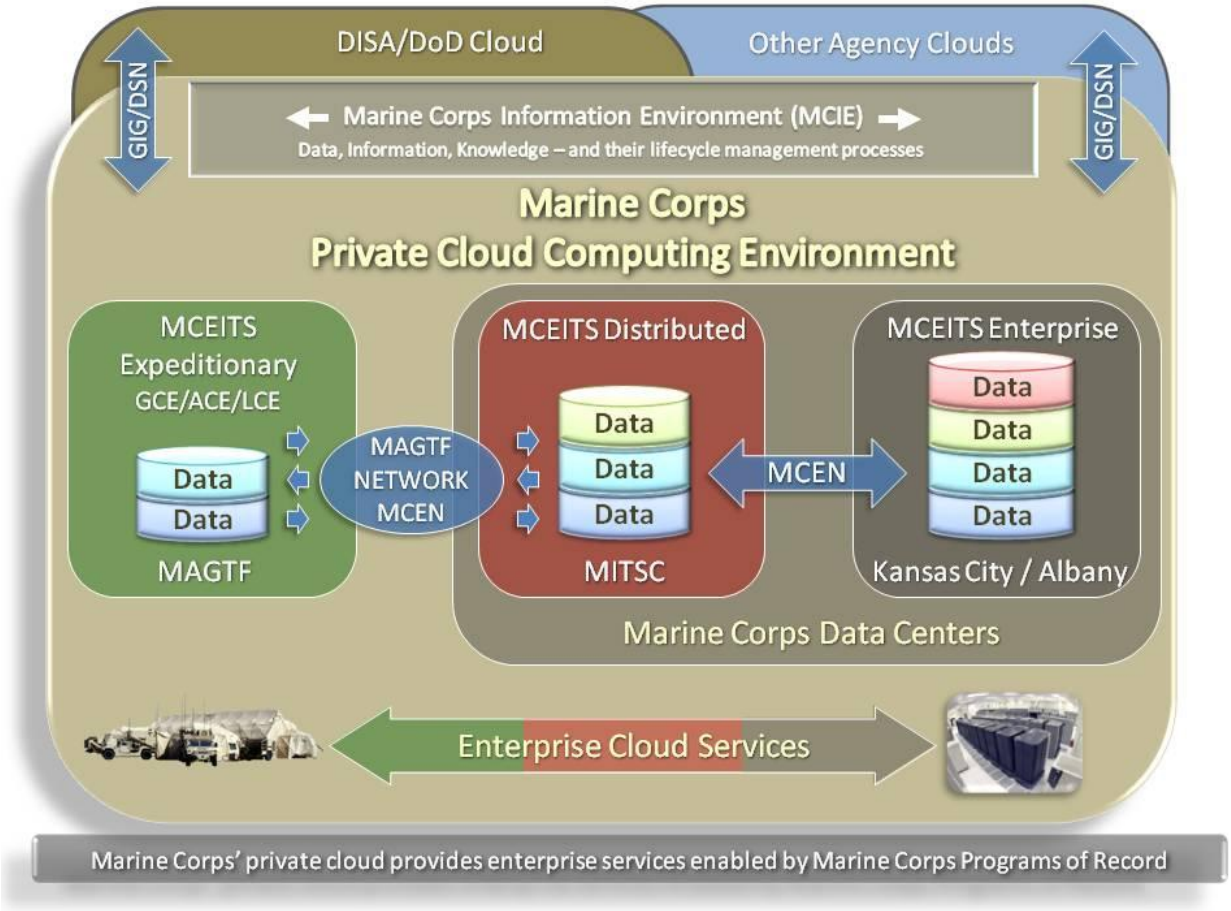
The Marine Corps' private cloud computing environment provides federated enterprise services enabled by Marine Corps Programs of Record.

The Marine Corps PCCE services will provide access from anywhere across the Marine Corps information environment at any time, via the Marine Corps Enterprise Network (MCEN) to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can rapidly be provisioned and released with reduced management effort. The Marine Corps PCCE will provide access to applications and data to all Marines, in garrison and forward deployed environments through Marine Corp's programs and initiatives. This cloud environment will host applications and provide federated enterprise services (see Appendix II) in a fashion that enhances the operational capabilities and effectiveness of a knowledge based force. The federated shared environment will improve operational effectiveness by providing forward deployed forces the ability to reach cloud services when reachback is available. This will also allow them to operate autonomously when reachback is unavailable. Federation achieves effectiveness. Efficiencies will be achieved through informed and judicious implementation, resulting in a reduced total cost of IT ownership. Enterprise cloud services will be distributed by the MCEN (transport) and provided via MCEITS and other PORs, which are elements of the Marine Corps Information Technology Environment.

When executing Marine Corps operating concepts, services such as e-mail *must* be resident within all elements of the MCIENT. By maintaining control of its PCCE, the Marine Corps will enable seamless secure command and control functions in bandwidth constrained environments with limited connectivity. When the MCEITS Expeditionary instances are operating in a Disconnected, Intermittent, Limited (DIL) state from the MCEITS Distributed and/or MCEITS Enterprise presence, the enterprise services resident within the MCEITS Expeditionary instances must continue to provide services to the forward deployed forces (see Appendix III). Once connectivity is regained, any updates to the federated enterprise services can be synchronized. Thus, reliance on an external entity or agency to provide any of the MCEITS PCCE federated services would place our forward deployed forces at

risk. This concept is also applied to applications. Applications that reside in a tactical environment and at the enterprise level would be part of the Marine Corps PCCE.

The operational view in Figure 1 represents the Marine Corps PCCE as an element of the overarching DoD cloud construct. It conveys the private cloud, federated enterprise services, and PORs cumulative view of the MCIE and forward deployed forces in an interconnected state.



(Figure 1)

1.2 PURPOSE

Headquarters Marine Corps (HQMC) Command, Control, Communications, and Computers (C4) has identified MCEITS as the foundational precept for the Marine Corps PCCE, and establishes the Marine Corps' guidance for synchronizing current Marine Corps IT programs.

1.2.1 Marine Corps PCCE Foundational Precept

The Marine Corps PCCE concept is grounded in the assumption that forward deployed Marine forces and their mission partners will continue to operate in austere environments with severe bandwidth and connectivity constraints. The Marine Corps PCCE will support these forces in all locations and environments. To meet this considerable challenge, the cloud concept must consider how best to support Marines across degraded or disconnected networks. The MCIENT Strategy establishes a requirement for forward deploying data to mitigate bandwidth and connectivity limitations. This implies the need for adopting a cloud that leverages multiple "tiers" that draw from regionalized supporting establishment and tactical data stores, the MCEN, and MCEITS. Per the

Marine Requirements Oversight Council Decision Memorandum 36-2010, the MCEITS program consists of three scalable instances: Enterprise, Distributed, and Expeditionary. The initial Enterprise instance is located at the Kansas City Enterprise IT Center (EITC); the other EITC is planned for MCLB Albany; Distributed instances will be hosted by the MAGTF IT Support Centers (MITSCs) and the Marine Corps Netowork Operations and Security Center (MCNOSC) (see Appenix IV for locations); Expeditionary instances will be provided to forward deployed forces via Data Distribution System - Modular (DDS-M) and Combat Operations Center (COC) IT suites. Figure 1 and Appendix III portray the relationships of these instances.

1.2.2 Guidance for synchronization

Because multiple PORs provide capabilities related to data, the MCEN, and MCEITS, the Marine Corps PCCE synchronizes efforts to ensure a unified approach to achieve the Marine Corps' enterprise private cloud computing vision. The MCEITS PCCE promotes availability of and is aligned with the following essential characteristics and three service models.

1.3 CHARACTERISTICS

- **Secure on-demand self-service**. End users connected to the MCEN, via secure means, can access available services from the cloud provider when and where needed.

- **Flexible broad network access**. Capabilities are available over the MCEN and accessed through standard internetworking mechanisms. This is a tenet of the "Plug and Play" resource that supports Strategic Objective 2 of the MCIENT: Improve Reach-back Support and Interoperability.

- **Resource pooling**. The Marine Corps' computing resources are pooled to serve multiple end users. Eleven primary data centers with multiple expeditionary extensions are available through different physical and virtual resources. These are dynamically assigned and reassigned according to end user demand. To meet peak demands resource pooling allows for more efficient and cost effective use of resources that otherwise normally require over allocation. Examples of pooled resources include storage, processing, memory, facilities, and virtual machines.

- **Elastic**. Cloud capabilities can be rapidly provisioned (quickly increased, decreased or dynamically provisioned). To the end user, the capabilities (e.g., storage and processing) available for provisioning often appear to be unlimited.

- **Measured Service**. Cloud systems with a use of metering capability appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts) can automatically control and optimize resource use. Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service. These metrics provide data required for return on investment analysis and assist in identifying shortfalls and surpluses.

1.4 SERVICE MODELS- MARINE CORPS PCCE

- *Cloud Software as a Service (SaaS).* The capability to use the provider's applications on demand and manage application data through means such as backup and end user data sharing. This capability is provided to the consumer via the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings.

- *Cloud Platform as a Service (PaaS)*. The capability to use the provider's tools and execution resources to develop, test, deploy and administer applications. This capability is provided to the consumer to deploy

into the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

- *Cloud Infrastructure as a Service (IaaS).* The capability to utilize the provider's fundamental computing resources, such as virtual servers and network-accessible storage. The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run authorized software, which can include Operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components such as firewalls, and configuration services.

2 GUIDANCE

The Marine Corps PCCE guidance encompasses the following key tenets:

2.1 SUPPORT TACTICAL AND SUPPORTING ESTABLISHMENT USERS

- Forward deployed data is integral to MCEITS to enable the reuse of deployed data and information.
- Enterprise services are distributed to the various MCEITS instances for user access.
- Structured and unstructured data spanning all functional areas supports the distribution, forward staging, and sharing, among all command echelons.
- Support portal capabilities providing end user version control and sharing for many common office applications.

2.2 SUPPORT FORWARD DEPLOYED FORCES

- Facilitate secure communications and IT services that provide robust collaboration tools and near real time access to mission critical data, information, and knowledge.
- Provide a net-centric information environment enabling battalion and below forces with access to rear echelon data resources.
- Enable the ability to conduct dispersed operations in a non-linear battle-space over greater distances by providing more information with fewer deployed resources.
- Implement virtualization technologies to reduce footprint, reduce energy usage requirements, and increase speed of network implementation.

2.3 MAGTF INFORMATION TECHNOLOGY SUPPORT CENTERS (MITSC)

- MITSCs are key data distribution nodes for enterprise cloud services.
- MITSCs rely on MCEITS and Expeditionary PORs to provide rapid access to the Marine Corps PCCE for enterprise services and 'fit-for-purpose' data.

2.4 HOSTED BY MARINE CORPS DATA CENTERS

- Enterprise services are provided by the cloud – MCEITS.

- A shared data environment, where data is distributed for maximum efficiency and robustness.

- Promotes sharing of the Marine Corps Information Technology Environment.

2.5 IT EFFICIENCIES & GREEN IT

- Reduce energy costs and system footprints.

- Servers and their processing power are better leveraged.

- Promotes effective collaboration via portals, file sharing, web conferencing, chat and video conferencing.

- Storage virtualization technology allows the end user to pool storage resources and easily scale storage resources up or down as needed.

2.6 INCREASE MANPOWER EFFICIENCY

- Server consolidation will require less maintenance hours in terms of patching applications, server maintenance, and data backup.

- Enterprise software maintenance times are significantly decreased with SaaS. All upgrades are done in the cloud level.

2.7 COST REDUCTION

- Application licensing costs could be driven significantly lower with a “one-to-many” vice a “one-to-one” model.

- Consolidation of IT resources focused on the supporting establishment with the intent to reduce the number of tactical server stacks.

- Data storage is more efficient by utilizing cloud services.

- Reduced time and effort to stand up and develop software / applications testing environments.

- Based on the duplicative nature of cloud data distribution, a separate enterprise continuity of operations (COOP) site is not required.

2.8 NEXT STEPS– IDENTIFICATION OF FOLLOW ON DOCUMENTS

- Develop a Concept of Integration (COI) for the Marine Corps PCCE. This document will identify the PORs and enabling technologies that facilitate the employment, use of, and interdependencies of Enterprise Services throughout the MCIENT.

- In coordination with CD&I, MCSC and associated working groups (e.g., MCSC SOE Working Group (MSWG), Net-Centric Data Working Group (NCDWG)), C4 will create policy, governance and directives such as a migration strategy to compel action. This will achieve strategic MCIENT objectives as they pertain to the Marine Corps PCCE.

- Assess the application of commercial "Public" Cloud offerings. The Marine Corps will continue to focus our efforts on private cloud and consider the limited use of public or semi-public clouds to missions that can tolerate some disruption or data loss.

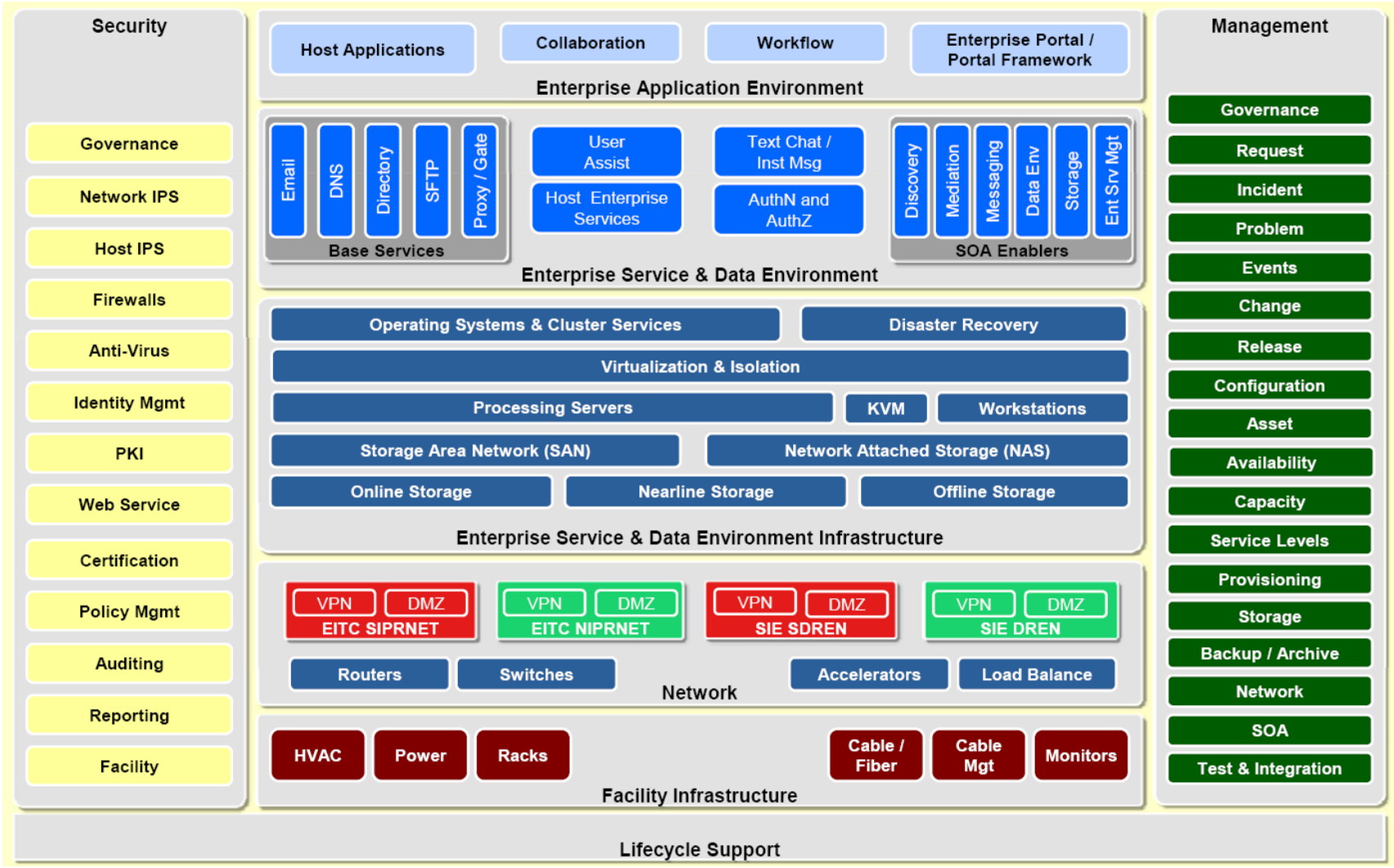
3 SUMMARY

The United States Marine Corps (USMC) Private Cloud Computing Environment (PCCE) Strategy continues the Marine Corps efforts to improve the way information technology supports the institution in an evolving strategic landscape. PCCE services will provide access to applications and data to all Marines, in garrison and forward deployed, from anywhere across the Marine Corps information environment at any time. The USMC PCCE will utilize the Marine Corps Enterprise Network (MCEN) to access a shared pool of configurable computing resources that can be rapidly provisioned and released with reduced effort. The USMC PCCE Strategy is grounded in the assumption that forward deployed Marine Corps forces, and their mission partners, will continue to operate in austere environments with severe bandwidth and connectivity constraints and will benefit from a secure on-demand self-service, with flexible broad network access, resource pooling, elastic provisioning and measured services. By leveraging economies of scale the Marine Corps will be able to measure the amount of consumed Information Technology (IT) resources more effectively, increase or decrease capabilities to match requirements and budget constraints, and better leverage the underlying capacity of shared IT services. The USMC PCCE Strategy will support tactical and supporting establishment users, forward deployed forces, utilize MAGTF Information Technology Support Centers (MITSC), be hosted by Marine Corps data centers, provide for IT Efficiencies & Green IT, increase Manpower efficiency, and reduce IT related costs. HQMC C4 will coordinate with the HQMC Intelligence Department to develop a COI to ensure alignment regarding their respective cloud computing environments.

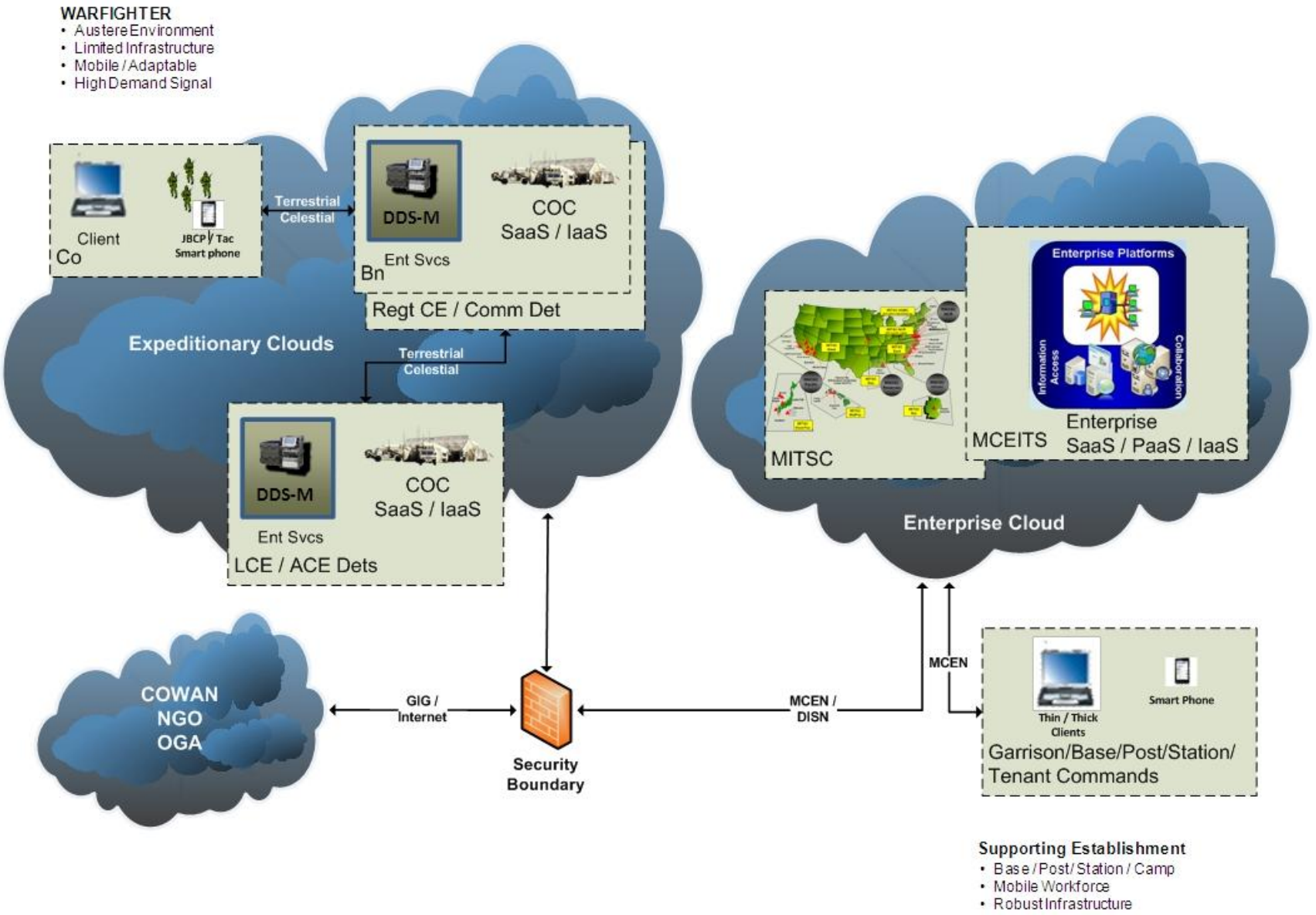
Appendix I – References

- 25 Point Implementation Plan to Reform Federal Information Technology Management. 2011
- Federal Cloud Computing Strategy. 2011
- The National Institute of Standards and Technology (NIST) Definition of Cloud Computing SP800-145. 2011
- Marine Corps Information Enterprise (MCIENT) Strategy. 2010
- Department of Defense (DoD) Cloud Computing Strategy (Draft). 2011
- Department of Defense (DoD) and Department of the Navy (DoN) Information Technology. 2011
- Marine Corps Enterprise Information Technology Services (MCEITS) Capability Development Document. 2004
- Marine Requirements Oversight Council Decision Memorandum 36-2010; MCEITS Capability Productions Document. 2010
- Marine Corps Net-Centric Data Strategy. 2009

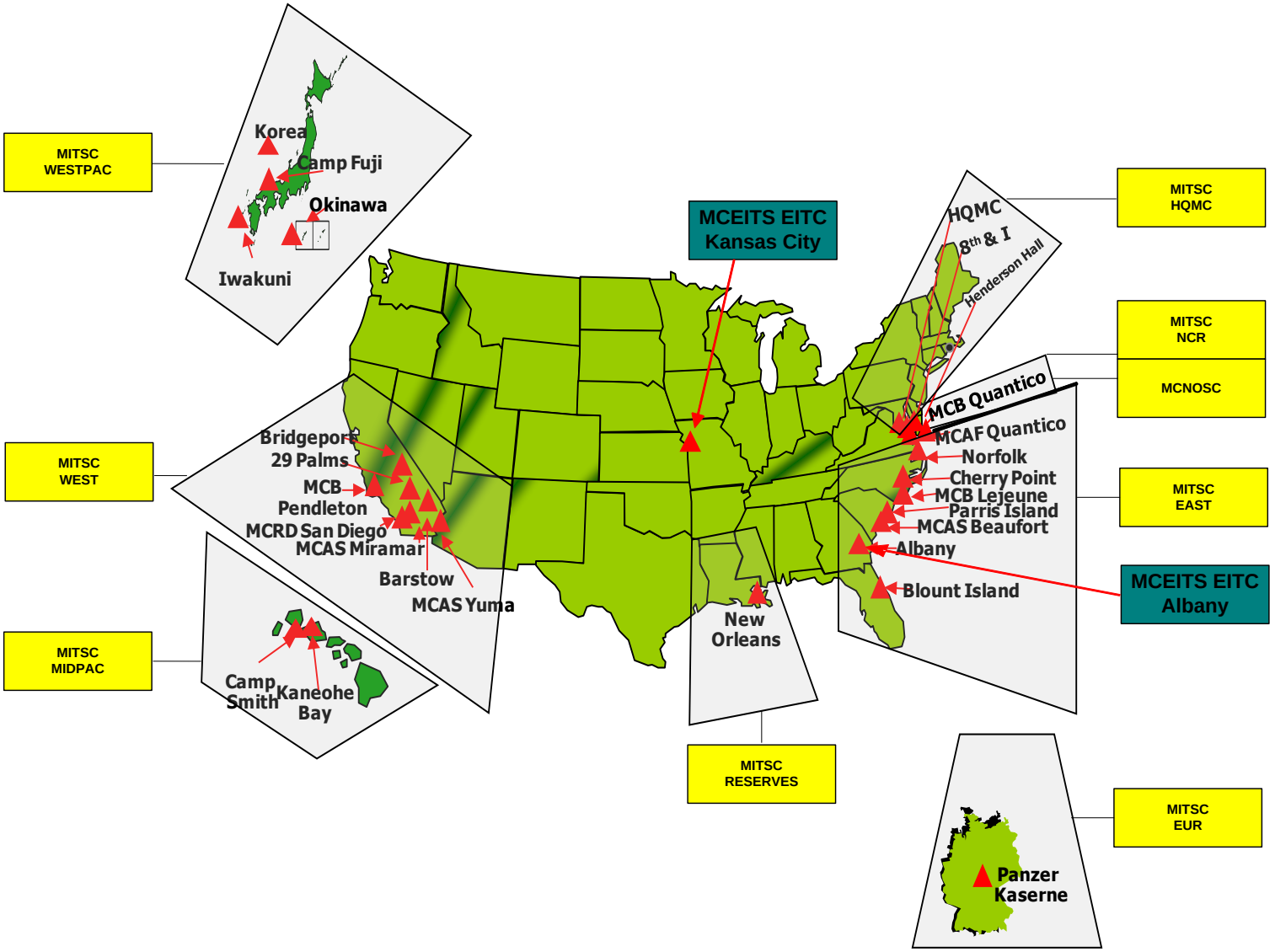
APPENDIX II –MCEITS SERVICES IDENTIFIED IN CAPABILITIES PRODUCTION DOCUMENT



APPENDIX III – MAGTF NETWORK DIAGRAM



APPENDIX IV – EITC / MITSC / MCNOSC MAP



PLEASE PROVIDE FEEDBACK TO HQMC C4 VISION AND STRATEGY (CV) DIVISION

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The mission of the HQMC C4 Strategy and Vision Division is to serve as the primary and dedicated support staff to assist the Director in developing, communicating, implementing, and assessing his vision and priorities for the Marine Corps Information Enterprise across all war fighting domains.

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