

Joint Concept for Command and Control of the Joint Aerial Layer Network



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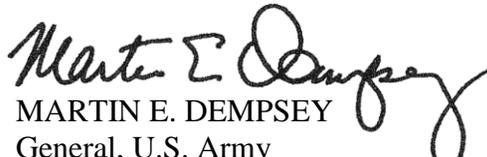
FOREWORD

The Joint Concept for Command and Control of the Joint Aerial Layer Network (JCC2JALN) describes my vision for how joint forces will plan for and employ future JALN capabilities.

The need to maintain net-enabled combat capability across a widely dispersed Joint Force and from the operational to tactical level is critically important in the anticipated future operating environment. Every member of the Joint Force has a vital interest in ensuring that we can efficiently employ our current and future JALN forces to maintain maximum network connectivity as our adversaries seek to degrade the same.

The JCC2JALN explains how we will command and control the JALN to capitalize on its capability to augment and to extend the space and terrestrial communications networks that currently provide network connectivity. The concept was developed jointly by the Services and Combatant Commands in coordination with other stakeholders. It proposes new organizational constructs, processes, tools, and information that will enable the joint force commander to optimize JALN employment.

The JCC2JALN is an important step toward ensuring the Joint Force retains its wide-ranging and potentially decisive net-enabled combat capabilities in support of future joint operations.


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Executive Summary

There is a lethality, survivability, and responsiveness difference between units with functioning net-enabled combat capabilities and those without. *Net-enabled combat capability is the enhancement in combat capability dependent on network connectivity.* That capability difference can be turned off and on with network support or degraded if network support declines. Nonstop warfighting improvements leveraging networks ensure the capability gap between “with” and “without” network support will continue to expand.

The operational impact of having or not having that additional capability will vary by unit and situation, but having the right capability at the right place and time could be critical to operational success—even determining mission viability. Priority joint forces must be able to continue net-enabled operations even in the face of overburdened infrastructure, difficult environments, or determined adversaries. The extent to which forces can exercise their net-enabled capabilities influences not only operational effectiveness but also risk. The key for the joint force commander (JFC) is to maximize operational capabilities while minimizing operational risk to the joint forces.

This concept introduces two new ideas: that net-enabled combat capability can be measured, managed and prioritized; and that the control of joint aerial network assets must be based on the joint force’s prioritized net-enabled combat capabilities.

Central to this concept is the assumption that future Joint Aerial Layer Network (JALN) capabilities outlined in the JALN initial capabilities document (ICD) will be pursued in the applicable time frame extending from the present to 2030 and beyond.¹ JALN² is expected to be a low-density, high-demand resource that can provide limited but flexible tactical network support. In certain scenarios, only JALN assets will rapidly mitigate network connectivity issues. As a result, the JFC must be able to monitor, understand, plan, decide, and direct limited JALN airborne assets. To do so, the JFC must first understand where net-enabled combat capabilities are most critical before JALN airborne assets can be logically tasked; getting the employment decision right is the foundation for command and control (C2) of JALN.

Thus, this concept’s focus is on understanding where net-enabled combat capabilities are operationally most critical. Formally identifying net-enabled combat capability as an operational factor within the joint forces planning and execution processes and creating an organizational process for command and control, as proposed in this joint concept, will contribute to the optimization of operational capability, the efficient/effective use of tactical network resources, and the reduction of risk across the Joint Force.

¹ JALN ICD, 2009, page 3. Additionally, this concept assumes that any future JALN C2 system will be consistent and interoperable with other fielded C2 and net management systems, and will comply with all mandatory interoperability testing processes.

² JALN description: JALN is airborne network communications intended to augment and extend tactical networks using a variety of communications capabilities that will support operations in challenging or degraded communications environments within a joint operations area (JOA). Its primary purpose is to connect/reconnect warfighters executing specific missions and tasks.

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1. Introduction

As warfighting capabilities increasingly rely on access to robust networks, the Nation's adversaries target this critical network infrastructure. In response, the Department defined the future JALN to host a variety of communications capabilities that will support operations in challenging or degraded communications environments.

JALN DEFINED: JALN is augmentation and extension of tactical networks using a variety of communications capabilities that will support operations in challenging or degraded communications environments within a joint operations area (JOA). Its primary purpose is to connect/reconnect warfighters executing specific missions and tasks. As a high demand/low density resource, JALN employment must be prioritized.

All of the Services are actively engaged in expanding their tactical networks,³ and tactical networking, at its core, adds value by creating or enhancing net-enabled combat capability.⁴ Conducting operations without the anticipated level of net-enabled combat capability has the potential of putting missions and forces at risk.⁵

NET-ENABLED COMBAT CAPABILITY DEFINED: the enhancement in combat capability (lethality, survivability, and responsiveness) dependent on network connectivity.

The C2 solution described in this concept will support answering the question, “When and where do we employ JALN assets to best support operational priorities?” That question cannot be answered without understanding the operational impacts of changes in the net-enabled combat capabilities of the joint force. Solutions for the C2 of JALN forces will assess the net-enabled combat capabilities impacts and measure the degree to which network plans can be supported. With this new understanding, commanders can prioritize the application of rapidly repositionable JALN assets.

Although this concept acknowledges that C2 systems controlling both aerial platforms and networks are necessary components of overall C2 of JALN, those C2 systems are not the focus. This concept is based on the recognition that net-enabled combat capability exists as an operational factor, can be measured, and can be managed. Both C2 of JALN and the measurement of net-enabled combat capability must be interoperable and synchronized with appropriate existing doctrine, processes, and broader joint/coalition C2 systems.

³ The term “tactical networks” refers to the systems employed at the tactical edge of the operational area/battlespace. These systems are designed to provide network capability to front line combat and combat support forces in order to enhance their combat effectiveness.

⁴ Joint Publication (JP) 6-0, *Joint Communications System*, 10 June 2010, says network enabled operations are differentiated by the integration of geographically dispersed decision makers, sensors, forces, and weapons resulting in increased combat power, achieving greater speed of command decisions and increasing the lethality, survivability, and responsiveness of the force

⁵ Capstone Concept for Joint Operations (CCJO): Joint Force 2020, 10 September 2012, page 14, “The greatest risk to a highly-networked joint force is that...communications are not available.”

2. Purpose

This concept is intended to assist joint force development by:

- Establishing a common definition of net-enabled combat capabilities.
- Generating dialogue on how best to measure net-enabled combat capability, assess its operational impact, and monitor the sufficiency of net-enabled combat capability.
- Establishing an overarching conceptual framework for C2 of JALN from which subsequent joint and Service concepts; doctrine; and tactics, techniques, and procedures (TTPs) can be developed.
- Informing future studies, evaluations, war games, and experiments that will result in changes to doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P).
- Guiding Department of Defense (DoD) science and technology (S&T) and JALN materiel developers to address the capabilities required for C2 of JALN.

3. Scope

Concept assumptions:

- Net-enabled combat capabilities will continue to expand and become increasingly important to operations.
- Net demand will exceed supply impacting full exploitation of net-enabled combat capabilities.
- Net-enabled combat capability as an operational consideration can be measured and managed.
- DoD will pursue future JALN capabilities outlined in the JALN ICD within the ICD defined time frames extending through 2030. JALN will provide a rapid, flexible theater net supply source for solutions, but JALN assets will be limited (high demand/low density assets).
- DoD will acquire JALN ICD/Analysis of Alternatives (AoA) like capabilities and include maintenance considerations. Categorized by JALN ICD capability gaps, illustrative examples include:
 - Network capacity and connectivity: radio, waveform, antenna.
 - Information sharing: message format, data structure, gateways.
 - Network management: Information exchange requirements, standardization, interoperability, TTPs.
- Technical standardization across JALN-related efforts will be accomplished in conjunction with acquisition activities following the approaches identified in DoD efforts such as the Joint Information Environment (JIE) and the DoD Information Technology (IT) Enterprise Strategy and Roadmap and that interoperability will be documented as appropriate within documents such as the Chairman of the Joint Chiefs of Staff Manual (CJCSM) 6231, *Manual for Joint Tactical Communications*.

- Any JALN force or JALN planning system will have met required guidelines for interoperability prior to fielding and will be subject to theater interoperability validation processes where they exist.
- Coalition interoperability will be addressed exploiting advances made by efforts such as Coalition Interoperability Assurance and Validation (CIAV) allowing JALN to operate as successfully as possible in a Mission Partner Environment (MPE).
- Acquisition activities will address network and information security considerations (including integrity, confidentiality, availability, non-repudiation, and authenticity) across JALN related efforts and appropriately incorporated into operational employment TTPs. This will include, when practical, smart network management advances such as default-configured components, policy management, and cognitive network and cognitive spectrum capabilities.
- Services will organize dedicated JALN platforms and ground control to provide discrete deployment capability packages for allocation and deployment purposes. Dedicated JALN airborne platforms will be deliberately planned/tasked to provide a responsive JALN in accordance with JFC priorities and will be referred to collectively as JALN forces.
- Airborne platforms that are equipped with JALN capability will provide opportunistic JALN resources; however JALN is not their primary mission. Opportunistic JALN platforms will be tasked in accordance with their primary mission, but may contribute to a responsive JALN incidentally as a secondary deliberate tasking, or potentially as a dynamic re-role during mission execution. Opportunistic JALN platforms will not be referred to as part of the collective JALN force unless they are released for planning/tasking as a dedicated JALN platform.
- Air planning and control processes and systems will automatically exchange platform status information.
- Air planning and control processes and organizations will accomplish platform scheduling and C2.
- Network planning and control processes and systems will automatically exchange network management information.
- Network planning and control processes and systems will accomplish Network management.
- All appropriate architecture products and processes related to the above will be developed in support of the system lifecycle.
- C2 of JALN as a system of systems that operates in both the electromagnetic spectrum (EMS) and cyberspace domain will be interoperable and synchronized with appropriate existing doctrine, processes, and broader joint/coalition C2 systems.
- The EMS will continue to be a vital resource that is congested and contested. Appropriate EMS coordination and synchronization will be accomplished for C2 of JALN forces.

This concept applies to Combatant Commands, joint task forces, and subordinate functional components⁶ and focuses on commanding and controlling JALN assigned and attached forces.

The concept introduces new ideas, specifically that:

- A measurable difference exists between joint forces with fully supported net-enabled combat capabilities and joint forces with less than fully supported capabilities.
 - Measurable in terms of operational impact (mission and risk).
 - Operational impact significance:
 - Is situation dependent.
 - Impact can be rolled up from unit to mission/operation significance.
- Net-enabled combat capabilities are manageable.
 - Communications support changes can directly correlate to net-enabled combat capability changes.
 - Net-enabled combat capability decreases without sufficient communications support.
 - Fidelity of measurement/management is yet to be determined.
 - Management takes place across the planning spectrum from deliberate planning to dynamic battle management.
 - JALN and/or other capability modifiers can be used to change a force's net-enabled combat capability support levels in time frames that are sufficiently responsive for battle management.
- An effective system⁷ for C2 of JALN will allow the JFC to maximize net-enabled combat capabilities and mitigate risk exposure for prioritized forces and missions during critical time frames

The concept addresses optimizing operational outcomes by directing and positioning low-density/high-demand JALN airborne assets in denied, degraded, intermittent, or limited (DDIL) communications environments to provide the net-enabled combat capabilities critical to achieving the JFC's objectives and priorities. Application of JALN capabilities are examined within the Joint Capability Area (JCA) framework of C2 activities that include organizing, monitoring, understanding, planning, deciding, and directing.

This concept addresses:

- JALN employment decisions based on the decision authority's understanding of:
 - Factors influencing levels of net-enabled combat capabilities.

⁶ Although this concept uses the term "functional component" throughout, it makes no distinction between that and any particular network service or capability if provided by a Service component. The JFC is concerned with any/all network capabilities being used for operational purposes, regardless of who is providing them.

⁷ Command and control system is defined as "the facilities, equipment, communications, procedures, and personnel essential to a commander for planning, directing, and controlling operations of assigned and attached forces pursuant to the missions assigned." JP 1-02, *DoD Dictionary of Military and Associated Terms*, 8 November 2010, page 49.

- Operational ramifications of changes in net-enabled combat capabilities.
- Possible courses of action (COAs) (both JALN and other-than-JALN options) to align net-enabled combat capabilities with command priorities.
- A framework for determining future content for the JALN planning system’s decision support display(s).

JALN airborne assets may only present one of many options for response to changes in net-enabled combat capabilities depending on the source or cause of that change. The broad range of potential solution options could include weapons employment, spectrum management actions, cyberspace actions, other network solutions, and/or JALN employment. Other areas will have important roles in ensuring sufficient net-enabled combat capabilities and, in general, this idea helps shape joint C2. However, the JALN characteristics of rapid mobility and systems flexibility ensure C2 of JALN will focus on optimizing net-enabled combat capabilities. Therefore, while acknowledging that other areas are relevant; this concept is focused on JALN as the primary C2 capability driver.

This concept addresses the need for a C2 system to assist in planning, directing, and controlling assigned/attached JALN forces using centralized but collaborative planning and decision making that is implemented through de-centralized execution for network management and platform control activities.

This concept is designed to bridge the Capstone Concept for Joint Operations (CCJO), other concepts that leverage net-enabled capabilities, and the planned and ongoing DoD activities to mature net-enabled capabilities. Other concepts leverage what networks enable, like shared knowledge and situational awareness, force synchronization, integrated operations, and cross-domain synergy, but they do not provide insight into how the JFC will use these ideas to control the delivery of net-enabled combat capabilities or describe the C2 system required to do that.

4. The Nature of Network Enabled Operations and JALN in the Future Operating Environment

Use of networks in the operational environment continues to grow year after year. Many warfighting developments leverage networks, some to the point of relying on reachback far beyond the battlefield for information and guidance, intelligence data, rules of engagement, etc. The capability to access pertinent and often critical information at the tactical edge of operations isn’t developing simply because it’s technically feasible but because of the warfighting enhancement or improvement in net-enabled combat capabilities it brings to dispersed, highly mobile forces.

“National and Defense senior leaders, CCDRs, and Joint forces at all echelons require robust, multi-layer (space, aerial, and surface), high capacity communications networks at all security levels to employ military capability across the ROMO in support of national security objectives.”

JALN ICD, August 2009, page 1

The trend extends down to the lowest tactical levels with net-enabled combat capabilities even being discussed, developed, and/or fielded at the individual combatant

level (Figure 1). The ability to enhance net-enabled combat capabilities is outpacing the ability to control the risk created if net-enabled capabilities degrade.⁸

As future tactical network capabilities expand, they will provide the opportunity for the JFC, the functional components and tactical forces to become more collaborative and better equipped to understand, anticipate, and act on rapidly changing conditions on the battlefield. Robust connectivity will enable the dynamic, high-tempo operations that will help joint forces outpace the adversary's planning and execution cycles.⁹ Paralleling this technical development trend is an effort known as JIE which has a desired end-state of improving network compatibility and integration by streamlining the infrastructure, enterprise services, and security architectures of joint mission networks.¹⁰ Additionally, the DoD is maturing interoperability assessment and validation processes to address interoperability between joint and coalition systems.¹¹

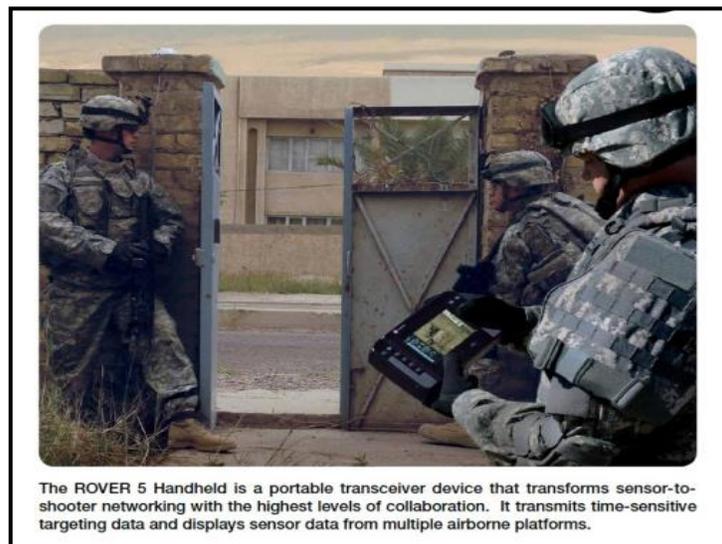


Figure 1: Net-Enabled Combat Capability at the User Level

The U.S. and its allies are not the only ones leveraging technology to achieve desired ends. State and nonstate actors are not just rapidly gaining ground on the technology necessary to operate in the cyberspace domain but are also innovating with the adaptive, creative approaches needed to effectively employ this technology to achieve their desired effects.

Many of those same advances will be available to America's opponents, who will use them to attack, degrade, and disrupt communications and the flow of information.

Joint Operational Environment 2010, page 24

⁸ Numerous sources like the Joint Operational Environment, CCJO, JP 6-0, and others outline in great detail the disconnect between the advancements in network enabled capabilities and the joint force's ability to ensure the connectivity required to realize those capability gains will be there when it is needed. While capabilities like JALN are being designed to fill the connectivity shortfall, there is currently little to no effort underway to fully command and control JALN's gap-filling capabilities. The risk indicated above is captured as the number one risk in the CCJO: Joint Force 2020, 10 September 2012, page 14.

⁹ CCJO: Joint Force 2020, 10 September 2012, pages 4-5.

¹⁰ Joint Information Environment CONOPS, 18 October 2012, page 6. Joint information environment is an envisioned end state where interoperability and integration from a security and policy level is seamless. Cross component net-integration would be greatly simplified and enhanced as a result.

¹¹ U.S. Central Command (USCENTCOM) initiated a Coalition Interoperability Assurance Validation (CIAV) process to ensure the Afghan Mission Network and forces were interoperable.

The core functions are defined as:

- **High Capacity Backbone (HCB)** - Provides a capability to transport large amounts of information throughout a JOA.
- **Distribution/Access/Range Extension (DARE)** - Delivers a tailored and scalable network transport capability in support of forces/operations in the Space/Air/Land/Maritime/Cyberspace domains. The DARE function will provide such capabilities as 5th to 4th generation weapon systems connectivity, Link 16 reach-back to the DODIN, Warfighter Information Network Tactical (WIN-T), and/or Extended Dynamic Range (XDR) range extension.
- **Transition** - Facilitates exchange and translation of network information and waveforms between the HCB and the DARE functions.

While the JALN ICD and the JALN AoA focused on a specific number of dedicated platforms to host these core functions,¹³ and some Services are pursuing a more platform-agnostic adaptive payload approach to delivering JALN capabilities, some non-JALN platforms will have the potential to provide additional airborne networking/communications capabilities. Under certain circumstances, these opportunistic platforms/payloads may be able to augment JALN functions.

A Combatant Commander (CCDR) or JFC could be presented with a situation in a future conflict where the level of network access needed to maximize the forces' net-enabled combat capabilities and minimize risk to the joint forces is compromised. While having a system such as JALN providing augmentation to or extension of network communications is an essential piece of being able to successfully react to operational situations, having an effective, collaborative JALN planning system that enables rapid, effective planning and execution in an operationally relevant time frame is equally as important.

5. The Military Problem: Maximizing Net-Enabled Combat Capability Through Effective C2 of JALN Forces

Without a collaborative, integrated method of C2 over JALN airborne assets, the JFC cannot effectively respond to changes in net-enabled combat capabilities and therefore will be less effective at mitigating risk exposure for priority forces and missions. The challenge for the future JFC is to understand how changes to joint and coalition forces' net-enabled combat capabilities will impact operations and make informed decisions on when and where to employ JALN airborne assets to maximize force net-enabled capabilities while managing risk consistent with mission objectives.

¹³ The JALN AoA recommended a preferred option. Follow-on post-AoA work has begun to associate specific platforms with those AoA-recommended alternative components but is not critical to the discussion in this concept.

6. Central Idea

Future JFCs will C2 JALN forces using new organizational constructs and processes, collaborative automated tools,¹⁴ and force characterization information, to allow the JFC to prioritize net-enabled capability needs, understand net-enabled capability impacts, and optimize employment of JALN airborne assets to support the JFC's highest priorities.

7. A Concept for Command and Control of the Joint Aerial Layer Network

When network demand exceeds supply and/or a capable adversary targets U.S. forces' communications, JALN airborne assets may be the only option that allows a JFC to ensure the highest priority missions operate with their full potential of net-enabled combat capabilities. An effective C2 of JALN planning capability will support JFC prioritization of net-enabled combat capabilities and efficient employment of JALN airborne assets in support of those priorities.

Determining the impact net-enabled combat capability changes will have on operations will require two correlated types of information. First, how important the net-enabled capabilities are to a specific unit/mission. This importance is based on multiple factors and could change during the course of a mission. Factors may include details of the specific tasking, enemy disposition and capabilities, rules of engagement (ROE), supported/supporting relationships for the mission, friendly force strength, etc. The second type of information is the degree to which the network can satisfy the need. How well the network need can be satisfied can be determined (or estimated) in advance, but the ability to satisfy the need, or "satisfiability," can also rapidly change with conditions in the operating environment. During planning, communications planners can often look at a planned operation and determine ahead of time that there may be time periods or

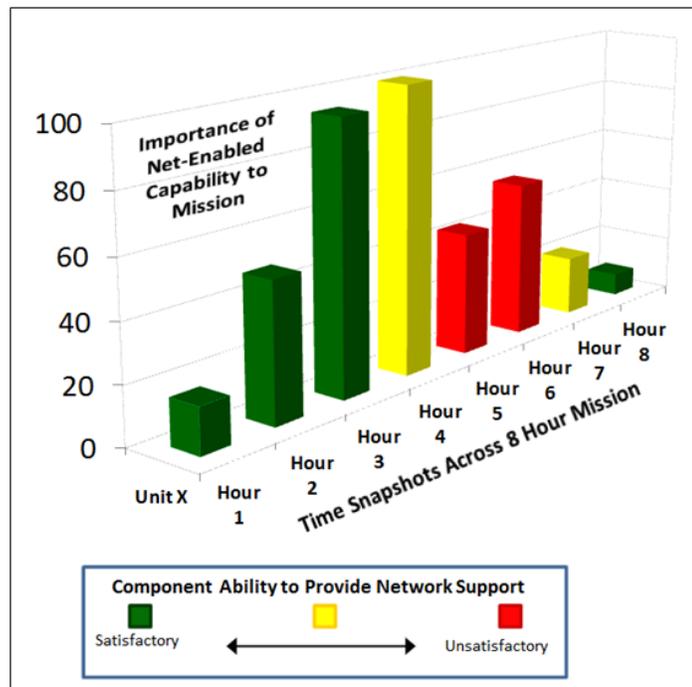


Figure 3: Notional Criticality of Net-Enabled Capability vs Satisfiability

¹⁴ Future JALN planning system automated tools will integrate seamlessly with the existing overall JFC C2 system as well as network management and network control automated tools.

geographic operating areas where their ability to support the network requirements may not meet the full need of the operational unit.¹⁵ Other times during operations, conditions could change as a result of meteorology, equipment status, enemy activity, etc., that reduce network support to particular units.

These two areas of measurement (net-enabled capability importance and satisfiability) can be assessed over the mission time frame to provide an operational impact indicator. Figure 3 is not a portrayal of a display but rather an illustration of this idea of net-enabled capability importance vs satisfiability across time.¹⁶ In this notional example, the importance of net-enabled combat capability could be depicted as a series of columns where the height of the column indicates the unit’s assessed importance of their net-enabled combat capabilities at several projected key points in time during an eight-hour mission. The color code of each column depicts the unit communications planner’s anticipated ability to provide the required network support using organic and assigned resources during that same eight-hour mission. Their projection of changing support levels might be caused by the fact that the mission is expected to progress geographically beyond satisfactory network support range between hours four and seven before returning back into range.

The ability for a unit to estimate the net-enabled capability gain can be developed through experience, either in exercises/training or during actual operations. After experiencing operations both with and without network access, the unit acquires the ability to determine how critical net-enabled combat capability is at various times/points during a given mission. This determination of the criticality and its correlation with available network support provides the first level of an operational risk assessment. The idea is that these new planning

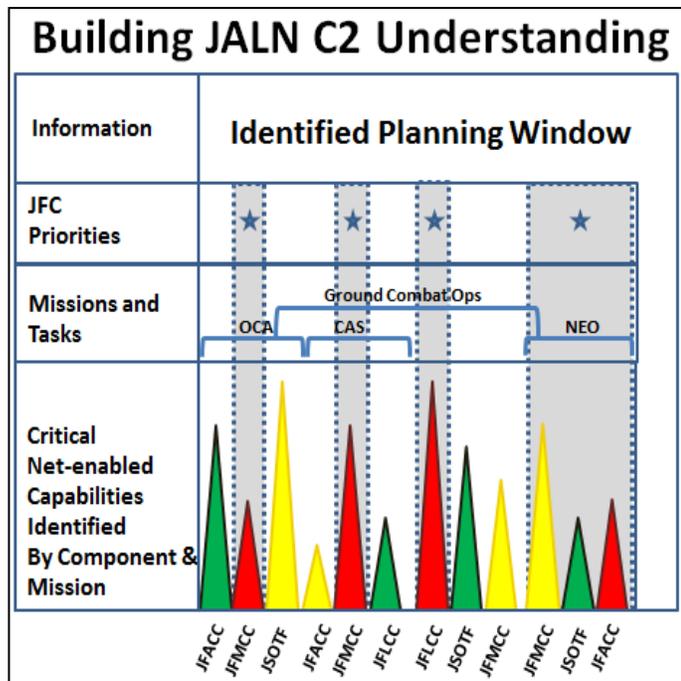


Figure 4: Notional Net-Enabled Capability vs Missions & Priorities

¹⁵ The term “communications planners” is used here because of the broader aspect of JALN’s planned capabilities which will include digital network elements as well as analog voice components. Communications planners would be the larger set that includes both network planners and spectrum management planners.

¹⁶ The graphics used throughout this section are only designed to illustrate the concepts being discussed and are not intended to represent a notional display that might be developed in the JALN planning system or used by a JFC during planning or execution and would, if pursued, require a research and development (R&D) and acquisition effort in order to field.

parameters are known and correlated, and that results are communicated to pertinent command levels.¹⁷

The unit level results will then be rolled up to increments and accumulated across a time interval meaningful to a component's participation in a mission. The JALN planning system uses the relationship between the rolled up results and other relevant information to develop understanding of the operational impact.¹⁸ This is modeled in Figure 4 as a notional depiction of the relationship between JFC priorities, forces aligned by missions, and the importance and satisfiability of network-enabled combat capabilities.¹⁹

The JALN planning system synthesized information supports an overlay of JFC operational priorities based on mission, component, or unit. The JALN planning system must provide a concise depiction of the nexus of information to create the understanding necessary to address the relationship between component requirements, satisfaction levels, net-enabled capabilities, risk, mission/operation, and JFC priorities.

This information combined with knowledge of friendly/enemy force strengths, capabilities, and disposition as well as geo-political events, strategic guidance, etc. provides the understanding of the operational environment to enable the JFC to make risk assessments concerning net-enabled combat capabilities.²⁰ Figure 5 depicts this idea of the combined information enabling the operational risk assessment aligned with JFC priorities.²¹ This information facilitates the JFC's risk management decisions determining which conditions present minimal

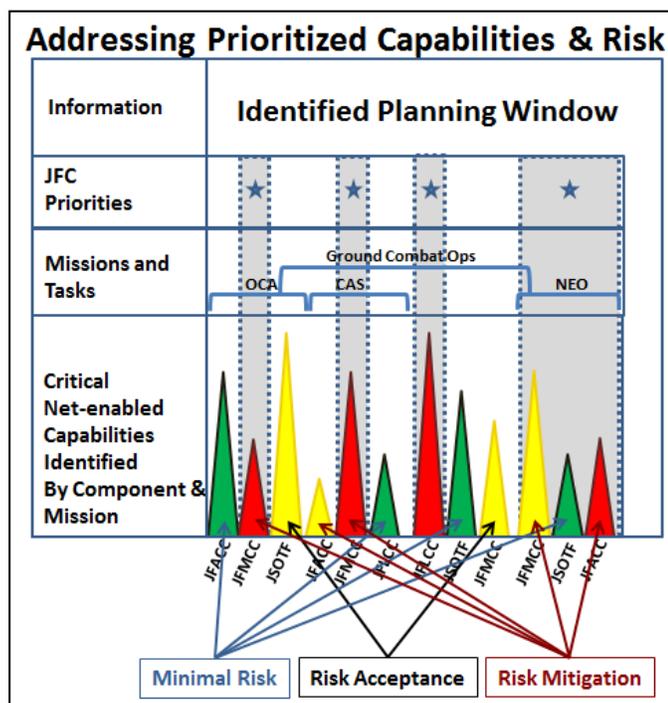


Figure 5: Notional Risk Analysis

¹⁷ Unified Engagement (UE) 12 Final Report indicated that JFCs and component planning staffs need to identify critical mission based information exchange requirements (IERS), identify optional approaches for ensuring those IERS can be supported, and consider the employment of JALN from the initiation of a given operation on through the conclusion if the potential threat indicates potential challenges.

¹⁸ JCA Section 5.2.2.2, defines "Analyze Information" as "the ability to methodically examine information by decomposing it into its constituent parts and studying their interrelations in a given context."

¹⁹ While the temporal aspect of the two factors of criticality and satisfiability still apply, Figures 4, 5, and 6 have been portrayed in a two-dimensional perspective for simplicity's sake to be able to demonstrate the concepts discussed in Figure 3 across the entire joint force and by missions/priorities.

²⁰ JCA Section 5.3.1, defines "Analyze Problem" as "the ability to review and examine all available information to determine necessary actions."

²¹ Established processes, such as USCENTCOM's CIAV, could be an input into this risk assessment process.

risks, which are acceptable, and which must be mitigated with available JALN airborne assets.

The JALN planning system then supports the creation and refinement of COAs designed to maximize net-enabled combat capabilities for the JFC's priority forces while reducing risk to acceptable levels, leading to the decision to select the best JALN COA. COA refinement and selection decisions are supported by analytical comparisons looking at pertinent characteristics, summaries, or projected results defined by JFC requirements. Figure 6 notionally depicts JALN airborne assets applied to specific components and/or missions based on a specific COA selection that was focused on those areas requiring risk mitigation actions. The resulting enhancement to net-enabled combat capabilities drives a reduction in risk to forces. In this depiction, the alignment of JALN airborne assets is selected in order to bring the operational risk within the JFC's acceptable tolerance levels for the JFC's priority missions (depicted by the change in satisfiability coloring within the columns).²²

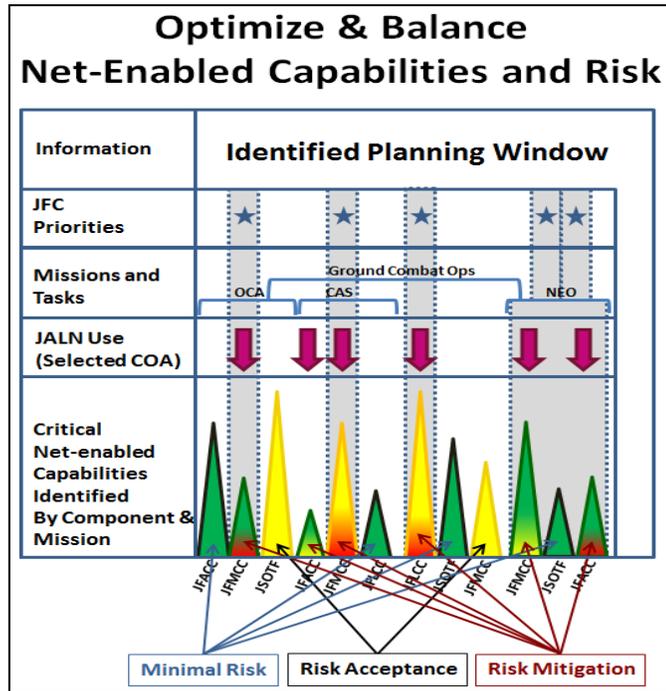


Figure 6: Notional COA Application

C2 Joint Capability Area Framework. The DoD's core C2 processes rely on activities that are defined in the C2 JCA.²³ The JCA-defined C2 activities include: organize, monitor, understand, plan, decide, and direct. C2 of JALN requires an integrated set of capabilities and processes within each of the six C2 JCA defined activities. The greatest C2 of JALN process challenge, however, may be the most fundamental; the operational impact of changes in net-enabled capabilities must be understood before meaningful control is possible.

The JFC's C2 of JALN process structure must have the ability to:

- Organize in a way that JALN forces are clearly assigned/allocated and authorities, roles, relationships, and processes are executable in a collaborative, flexible, dynamic, and responsive way.²⁴

²² Enhancements to net-enabled capabilities in this example are depicted by the shading of colors from the original capability/risk color (on the bottom) to the new capability/risk color (on the top).

²³ Joint Capability Areas, 8 April 2011.

²⁴ *UE12 Final Report* indicated that a clear understanding of the allocation/apportionment of JALN forces was critical to effective employment in support of JFC priorities.

- Monitor the sufficiency of and changes to forces' net-enabled combat capabilities.²⁵
- Understand the force capability and operational risk impact that changes in network connectivity and access are having or will have on current or planned operations.
- Collaboratively plan and refine JALN COAs with components to align net-enabling capability with operational priorities.
- Collaboratively review and decide on a COA to implement.
- Direct decentralized implementation of the selected COA through the established organizational construct.

Although for simplicity's sake the C2 JCAs are described as sequential throughout the remainder of this concept, they are much more iterative, overlapping, and simultaneous in nature. Specifically for the C2 of JALN process, the monitoring and understanding activities are continuous. Planning is refined iteratively, while the deciding and directing activities are performed sequentially when appropriate. Additionally, there is significant overlap across most of these activities. For example, as understanding increases, it simultaneously shapes preliminary planning decisions concerning solution approaches. The C2 of JALN-process activities support both deliberate and crisis action planning, but there is an element of scale and time difference between them. In deliberate planning conditions, the geographic and resource elements are more likely to be focused across the entire JOA and all available JALN airborne assets for the designated planning period. Crisis action planning, on the other hand, would typically be characterized by a narrower geographic focus and limited to resources that are in a position to affect the situation. Throughout the following sections, we will be describing the C2 of JALN process using C2 JCA terms and applying them to the previous graphical portrayal of these concepts and processes (Figure 7).

²⁵ If forces cannot communicate with the JALN C2 Cell or the Joint Network Control Center (JNCC), operational and relevant network indicators would still highlight change in network status and net-enabled combat capability in order to drive the JFC's C2 decision process.

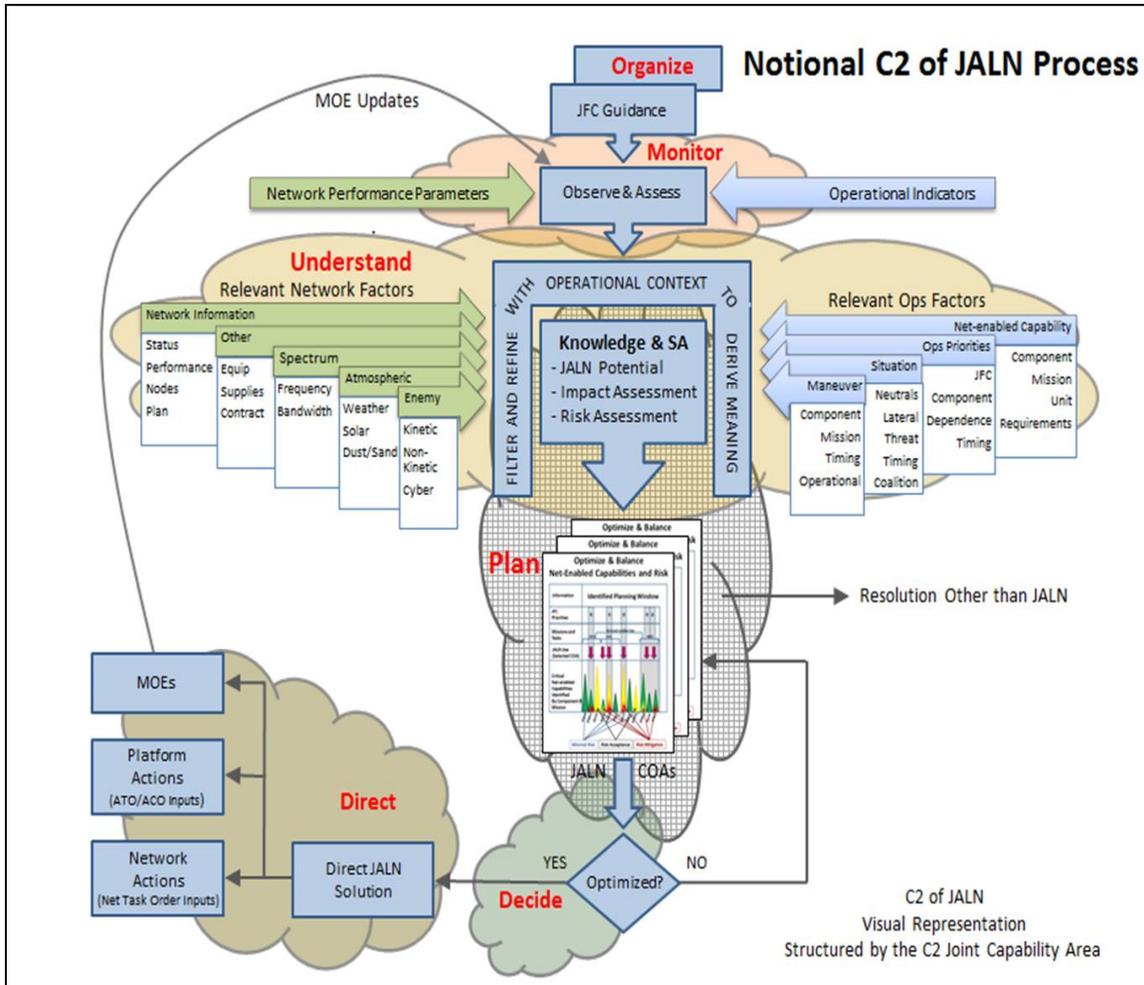


Figure 7: Notional C2 of JALN Process

Additionally, the following vignette introduced and then expanded in follow-on sections, illustrates what an operational situation might look like where network access has been, or could be, compromised.

Maintaining Net-Enabled Combat Capability

Scenario – With the dissolution of the fledgling Kamelstan state, the broader Mid-East was once again thrown into disarray. Terrorist organizations, with the help of rogue nation states and global narco-terrorist cartels, began exerting pressure on key energy supply lines of communication (SLOC) in the Persian Gulf, the Red Sea, and the Mediterranean. Additionally, recent cyberspace-attacks by a far eastern nation had resulted in the compromise of advanced technologies for electronic protection and cyber defense capabilities related to satellites and satellite control nodes as well as surface communication switching control software. (continued)

(continued) Nations providing safe havens to the terrorists were suspected to be equipped with the latest surface-to-air missiles, advanced jammers as well as a moderate number of advanced fighters. Suspected mine laying in the SLOCs, conduct of missions supporting maritime and air exclusion zones, and the threat of both kinetic and cyber terror attacks against strategic and operational command centers generated significant concern and demands from regional U.S. allies that something be done. Several allied nations offered the U.S. both basing options within the region and augmentation forces.

As a result, the President of the United States and Secretary of Defense (SECDEF), after consulting Congress, the United Nations, and pertinent allies; stood up a combined, joint task force for Mediterranean operations (CJTF-Med). CJTF-Med was tasked with ensuring freedom of navigation throughout key SLOCs and maintaining a visible presence along those SLOCs to counter efforts of the aggressors. CJTF-Med composition included: Combined Force Air Component Commander (CFACC), Combined Force Maritime Component Commander (CFMCC), Combined Force Land Component Commander (CFLCC), and Multi-National Force Special Operations Component Commander (MNFSOCC). The commander, Air Force Forces (COMAFFOR) was dual hatted as both the CFACC and Area Air Defense Commander (AADC). The Air Force Forces (AFFOR) and Naval Forces (NAVFOR) assigned included units with JALN HCB, DARE, and transition gateways. The Army Forces (ARFOR) and Special Operations Forces (SOF) included several units with opportunistic JALN capabilities. Additionally, the CJTF-Med and all the functional component command centers were equipped with JALN planning capabilities.

ORGANIZE. The JALN planning system will enable the JFC to monitor and understand the operational impact of changes to net-enabled combat capability; and to plan, decide, and direct the JALN network in support of the JFC's operational priorities. The JALN planning system will support whatever organizational construct the JFC selects for managing the integration of JALN functional capabilities into the joint force component's warfighting plans.

The JFC has several JALN organizational options: decide to let the components retain control over their organic dedicated JALN platform assets for their own use, decide to task-organize some or all of those assets under a single component, or retain control at the JFC staff level via the J3. Due to JALN's significant impact upon the C2 of the joint force, the JFC will generally consolidate JALN control assigned to either the component with the preponderance of JALN assets and the capability to control them or with the JFC/J3. In either case, the JFC should appoint a JALN Control Authority (JALNCA), responsible for JALN planning and execution IAW JFC priorities. However, the complexity of JALN capability prioritization and integration across the component's planning favors a JFC/J3 JALNCA. This organizational construct is similar to the Collection Management Authority (CMA) typically assigned to the JFC/J2 for prioritization and integrated planning of intelligence, surveillance, and reconnaissance and (ISR) collection platform capabilities. To support the JALNCA, a cross-functional

staff organizational approach²⁶ should be considered that includes participation by the JFC J2/3/4/5/6 and components. The output from this level of JALN prioritization and integrated planning should be a JALN Plan that defines JALN platform, airspace and network configuration requirements. These JALN requirements then flow into the appropriate existing processes: air tasking order (ATO) process for JALN platform

Maintaining Net-Enabled Combat Capability (cont)

Organize – Upon stand-up, the CJTF-Med commander established missions and priorities, designating the CFMCC as the lead for his number one mission priority of securing freedom of navigation in the applicable maritime areas, conducting maritime intercept operations (MIO), and on order, executing noncombatant evacuation operations from a U.S. embassy in one of the involved belligerent nations. Additionally, the JFC established the number two priority as air and missile defense assigned to the AADC. The JFC tasked both his CFLCC and CFMCC as supporting commanders to the AADC, providing forces (e.g., Patriot and Aegis) capable of sensor and shooter roles in the integrated air and missile defense (IAMD) mission. Assigned to the MNFSOCC, the third priority was strategic reconnaissance and, on order, directing action against coastal anti-shipping batteries, electronic attack sites, and cyber operation centers in the belligerent countries.

Expecting aggressive electronic and cyber-attack activities directed at JFC communications and networking architectures, the JFC established his C2 of JALN structure and communicated his initial JALN force apportionment priorities. The JFC designated the CJTF-Med, J3 as the JALNCA and directed establishment of a collaborative JALN Planning Cell in the J3 comprised of reps from J2, 3, 4, 5, 6, and liaisons from his functional components and AADC. The JFC further established the CFACC as the JOM with execution responsibility for JALN airborne platform operations. JFC initial allocation of JALN HCB and DARE platforms was primarily aligned towards his primary CFMCC mission with the remaining JALN resources made available to his CFACC in support of the IAMD mission.

tasking, airspace control order (ACO) process for JALN airspace, and a JALN network configuration tasking process similar to the tactical data link (TDL) process. Assuming the JALNCA is at the JFC staff level, there would need to be a JALN Operations Manager (JOM) role/responsibility assigned to the CFACC authority for airborne JALN platform management during execution—similar to the Collection Operations Management (COM) role/responsibility also assigned to the CFACC for ISR platform management during execution. While beyond the scope of this concept, these constructs will need to be further explored and developed.

The JFC will select the most appropriate organizational construct to control the optimization of JALN actuated net-enabled combat capability aligned with operational

²⁶ Joint Publication (JP) 3-33, Joint Task Force Headquarters, 30 July 2012, pages II-10 to II-14.

priorities. JALN organization is the common framework directly supporting achievement of the other C2 JCA activities: monitor, understand, plan, decide, and direct.

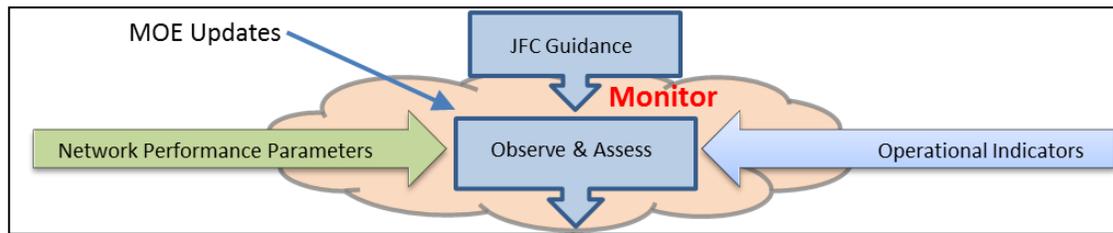


Figure 8: Notional JALN Planning System Monitor Process Flow

MONITOR. The C2 JCA defines the monitor activity as “the ability to adequately observe and assess events/effects of a decision.”²⁷ This concept focuses the “observe and assess” aspect of monitoring on the status of joint force net-enabled combat capabilities. Monitoring answers the question: Are net-enabled combat capability levels meeting expectations/requirements?²⁸ Answering this question requires that C2 activities define the expectations, that appropriate metrics be defined for tracking expectation attainment, and that the metrics be observed and reported in an operationally relevant time frame.²⁹

Under this concept, the JALN planning system will actively monitor the network performance parameters and operational indicators (Figure 8). The network performance parameter monitoring will be conducted in conjunction with the component’s tactical network control organizations. Those network control organizations will manage assigned network assets to keep net-enabled capabilities within acceptable parameters specified during planning or in accordance with JFC special instructions. JALN plan development that determines the importance of net-enabled combat capability and the degree to which network solutions will support that capability (discussed previously in relationship to Figure 4) defines the network performance parameters and shapes the operational indicators that need to be tracked. Network performance parameters establish situational dependent performance thresholds for network support and security.³⁰ Operational indicators, also situation dependent, are observable operational events that, when correlated with net-enabled capabilities, determine if net-enabled combat capability levels are meeting expectations. Operational indicators can be thought of as identifying significant differences between planned and actual events. The generation of both network performance parameters and operational indicators is also linked iteratively to JALN COA (plan) development, refinement, and selection.³¹

²⁷ JCA approved 8 April 2011, page 37.

²⁸ JCA Section 5.6.1 defines “Assess Compliance with Guidance” as “the ability to determine if performance adheres to established parameters and expectations.”

²⁹ Measurements will include network performance parameters, but it is beyond the scope of this concept to define those parameters. The need for these measurements is addressed in Implications.

³⁰ JCA Section 5.6.2 defines “Assess Effects” as “the ability to analyze, track, and measure the results of actions taken.”

³¹ JCA Section 5.5.3 defines “Establish Measures of Performance” as “the ability to establish criteria or conditions used to measure task accomplishment.”

Following a “report by exception” approach, the JALN planning system will provide an alert when the preestablished monitoring thresholds are exceeded, indicating there is a net-enabled capability event and/or risk change requiring attention. The alert indicator reflects either:

- Operational capabilities and/or risk impact. An alert indicates either mission indicators or preestablished performance thresholds are exceeded and as a result, a capability or risk change has occurred which requires attention.
- A component has identified a change in requirements for JALN force augmentation. For example, projected network degradation or an unanticipated increase in demand exceeds organic mitigation capabilities.

The JALN C2 alert will both trigger and guide access to the underlying information important to understanding the causes and operational impact(s).³² While large amounts of data are electronically accessible, only the small set of relevant information is desirable. The alert’s preliminary information, including location, timing, and units involved, facilitates the refinement of information discovery, selection, and refinement in follow-on JALN C2 activities.

Maintaining Net-Enabled Combat Capability (cont)

Monitor - As operations proceeded, the JALN planning system monitored a wide array of data points related to network performance parameters and operational indicators. Network performance indicated that throughput was declining while error rates and data losses were climbing. Based on additional operational indicators correlated with the negative network performance trends, the JALN planning system flagged a likely event impacting monitored net-enabled combat capability. The affected components worked with the CJTF-Med J6 to restructure satellite and surface network allocations to avert these trends. Aided by the JALN planning system, the JALNCA directed analysis of additional indicators to develop a broader understanding of the likely causes and operational impacts to critical joint force net-enabled combat capabilities.

UNDERSTAND. The JALN C2 “understand” activities encompass:

- Compiling information with the ability to filter and refine the discovery, selection, and gathering of information from available sources (e.g., friendly, adversary, neutral, environmental, sociological).
- Developing knowledge and situational awareness with the ability to organize, analyze, and apply specific context (time and geographic constraints, etc.), experience, and intuition to data and information to derive meaning and value and to assess the consequences of potential decisions.

³² JCA Section 5.2 defines “Understand” as “the ability to individually and collectively comprehend the implications of the character, nature, or subtleties of information about the environment and situation to aid decision-making.”

JCA Section 5.2.1 defines “Organize Information” as “the ability to discover, select, and distill information within an established context.”

JCA Section 5.2.1.1 defines “Compile Information” as “the ability to gather information from available sources (e.g., friendly, adversary, neutral, environmental, sociological).”

- Sharing knowledge and situational awareness with the ability to identify relevant stakeholders, form collective perspectives, and share conclusions

Applied to JALN C2, the understand activity happens continuously, concurrent with all other C2 activities. As understanding increases, it iteratively shapes and refines C2 planning/replanning and potential decisions.³³ Additionally, the JALN C2 understand activity supports both the deliberate and the crisis action (or execution) planning cycles, requiring the same type of information but along different geographic and time scales. Deliberate planning is typically area of responsibility (AOR) wide and measured in days. Crisis action planning cycle activity, on the other hand, characteristically is event driven and more tightly focused in geography and time.

The focus of the JALN C2 “understand” activity is to establish and convey the relationship between JALN and net-enabled combat capabilities and how that capability change impacts prioritized operations. This requires a system that can draw on a variety of sources to discover, gather, refine, and combine event-relevant network performance parameters, environmental factors, and operational factors.

Relevant network related factors include such things as network status, security, equipment and its configuration/status/availability, spectrum allocations/conflicts, atmospheric and weather, cyber, electromagnetic environment, and enemy capabilities/actions relative to the network. Relevant operational factors include things such as units and their net-enabled capability requirements and criticality, unit status and situation, mission timing, duration, and dependencies, enemy status/activity/capabilities, and supporting forces status/activity/capabilities (Figure 9).

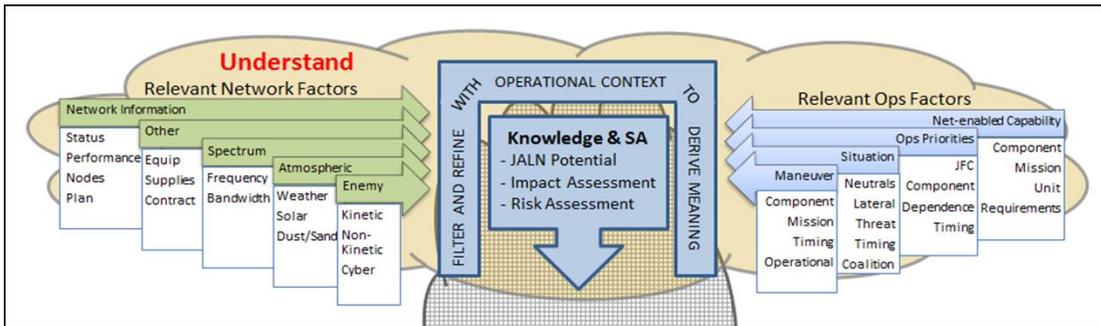


Figure 9: Notional C2 of JALN Understand Process Flow

³³ JCA Section 5.2.2.1 defines Understand Implications as – The ability to derive meaning and significance of selected information in a given context (within specific time and geographic constraints) and to assess the consequences of potential decisions

As there is a spectrum of interactions possible between network support, combat capability, and operational risk, the JALN planning system must synthesize this information into a usable format with an initial focus on the causes, capability and risk impact to priority operations.³⁴ The JFC needs the information to rapidly understand where JALN airborne assets can be employed to better align net-enabled combat capabilities with command priorities and what impact those options will have on other current and/or planned operations.³⁵ The JALN C2 process for enabling understanding will ensure relevant information is discovered, distilled, and analyzed within context including consequences of potential decisions. Assessments coming out of the CIAV process would be an example of information on interoperability capabilities that could influence risk assessment in the understand phase based on preidentified capabilities or disconnects as they relate to network system interoperability and therefore net-enabled combat capability.

Maintaining Net-Enabled Combat Capability (cont)

Understand – Once the degradation/denial levels reached a point where the functional components could no longer resolve the issues with organic capability, the JALN planning system was used to assess operational impacts and determine probable causes. The JALN planning system’s information analysis tools were able to assess a vast amount of data on network status, environmental factors, enemy action, friendly force/system status, net-enabled combat capability levels, and risk and provided results in a way that decision makers could intuitively understand the situation and ramifications. Cyber-attacks were degrading the net-enabled combat capabilities of the CFACC’s IAMD system by interrupting the automated information sharing and coordination between maritime and ground-based IAMD sensors and missile defense launch systems. Although the CJTF Cyber Support Element was activity engaged, the source of the cyber-attacks was unknown. The CFMCC was also experiencing adversary jamming, but the source of the degradation was located by ISR systems and Combined Joint Special Operations Task Force (CJSOTF) strategic reconnaissance teams. As a result, the JFC had options for resolving this CFMCC issue other than by using JALN assets. The JALN planning system was able to synthesize the myriad of complex environmental factors, the planned operations, JFC priorities, and net-enabled combat capability impacts to assess and portray the level of risk posed to the JFC’s priority forces/missions and provide key information to decision makers.

Understanding the relationship between JALN and net-enabled combat capabilities and how a change in those net-enabled capabilities affects priority operations provides the knowledge to assess risk and to determine if JALN can be used to change the

³⁴ JCA Section 5.2.2 defines “Develop Knowledge and Situational Awareness” as “the ability to apply context, experience, and intuition to data and information to derive meaning and value.”

³⁵ JCA Section 5.2.2.1 defines “Understand Implications” as “the ability to derive meaning and significance of selected information in a given context (within specific time and geographic constraints) and to assess the consequences of potential decisions.”

capability and risk calculation. This understanding provides the basis for JALN C2 planning.

PLAN. The JALN C2 planning³⁶ activity involves J2, J3, J4, J5, and J6 representatives collaborating with the JTF functional components. The planning activities, building on situational awareness developed during the understand phase and using the approach capped by Figure 6, produces the initial planning decision—whether or not to use JALN to mitigate the net-enabled capability event (Figure 10).

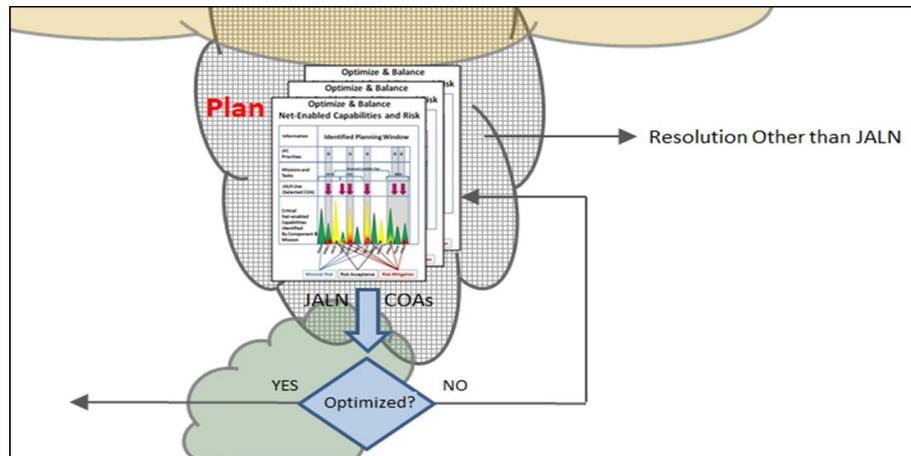


Figure 10: Notional C2 of JALN Plan Process Flow

Where JALN solutions are appropriate, the JALN planning system builds a range of COAs designed to optimize net-enabled combat capabilities for JFC operational priorities. Where JALN is not the preferred method to deal with the problem, planning processes for those other solutions (cyber, kinetic, etc.) would then pick up the effort.

JALN C2 planning activities include:

- Analyzing the problem³⁷ using situational awareness including intelligence assessments, environmental conditions, and force assessments.³⁸ Iteratively building on the information selected and refined in the “understanding” activity and guiding further “understand” activities, JALN planning system processes define the operational impact of net-enabled combat capability changes.
- Applying situational understanding³⁹ and determining vulnerabilities⁴⁰ and opportunities.⁴¹ The JALN planning system’s ability to assess the impact of

³⁶ JCA Section 5.3, defines “Planning” as “the ability to establish a framework to employ resources to achieve a desired outcome or effect.”

³⁷ JCA Section 5.3.1 defined “Analyze Problem” as “the ability to review and examine all available information to determine necessary actions.”

³⁸ JCA Section 5.3.1.1 defined “Analyze Situation” as “the ability to evaluate synthesized situational awareness, including intelligence assessments, environmental condition, and force assessments to prepare strategies or plans.”

³⁹ JCA Section 5.3.2 defined “Apply Situational Understanding” as “the ability to use synthesized information and awareness applicable to a given situation or environment to further understand the problem.”

⁴⁰ JCA Section 5.3.2.2 defined “Determine Vulnerabilities” as “the ability to assess existing and potential weaknesses.”

⁴¹ JCA Section 5.3.2.3 defined “Determine Opportunities” as “the ability to assess existing and potential circumstances leading to success.”

net-enabled combat capability changes supports the evaluation of vulnerabilities and opportunities. Achieving a specific level of net-enabled combat capabilities may not always involve changes to JALN plans as JALN may not always be the most appropriate response. For example, cyberspace actions could counter adversary cyber-attacks, or kinetic strikes or special forces' actions might better counter enemy jammers.

- Developing strategy⁴² and developing and analyzing courses of action. Where JALN is recognized as the appropriate response, JFC priorities shape the COA development. While many JFC priorities are enduring or preestablished, others are guided by the situational understanding available within the relevant reaction time frame. JALN C2 supports the comparison of network requirements, net-enabled combat capabilities, satisfiability, operational priorities, and risk, within the context of the relevant operational and environmental conditions to facilitate development of COAs for employing JALN airborne assets.⁴³

Maintaining Net-Enabled Combat Capability (cont)

Plan – The CJTF-Med JALN Planning Cell used the planning system to collaboratively develop and coordinate the JALN Plan with the functional components and AADC. The JALN planning system used pertinent information (including JFC priorities and guidance, network status, environmental conditions, current and planned mission data, force characterization data, source/location of the degradation/denial, and likely enemy courses of action) analyzed with modeling and simulation tools to rapidly determine a select range of possible JALN COAs to resolve the experienced and expected degradation/denial conditions.

As concurrent understand and plan activities build knowledge, a resolution other than JALN could emerge and exit this C2 process with action assigned outside of JALN airborne assets.

DECIDE. The JALN planning system supports the ability to refine COAs and decide on the most suitable one for implementation. As the JCA describes this activity, it is the “ability to select a COA informed and influenced by the understanding of the environment or a given situation.”⁴⁴

⁴² JCA Section 5.3.3 defined “Develop Strategy” as “the ability to create a framework that synchronizes and integrates the resources available to achieve a desired outcome or effect.”

⁴³ Ibid.

⁴⁴ JCA Section 5.4, Decide, page 35.

The JFC's ability to decide among a set of possible JALN COAs is a direct output of the JALN planning system's ability to support monitoring, understanding, and planning to align net-enabling JALN airborne assets with the highest priority need for net-enabled capability. The JFC, in deciding which COA to implement in order to maximize net-enabled combat capabilities, minimize risk to the force, and achieve the desired operational outcomes, needs the JALN planning system to help the JFC rapidly manipulate and optimize the interconnectivity of several very complex and dynamic variables (network requirements, satisfaction levels, net-enabled combat capabilities, risk, environment, mission/operation and JFC priorities).⁴⁵ Ideally, decision making is collaborative because of the joint nature of the JALN capabilities. Advanced dynamic, predictive, modeling capabilities allow the JALN planning system to rapidly analyze numerous complex options simultaneously (Figure 11).

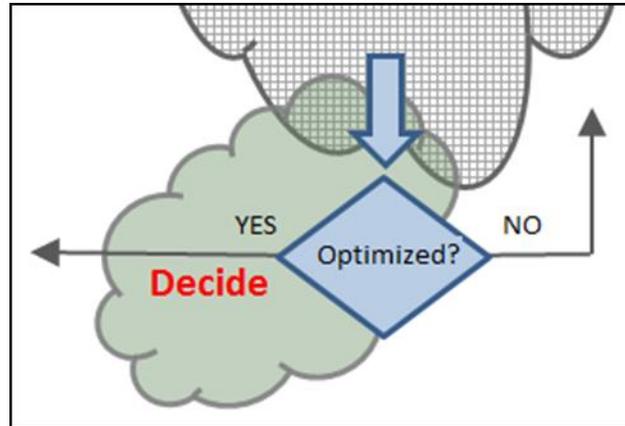


Figure 11: Notional C2 of JALN Decide Process Flow

Maintaining Net-Enabled Combat Capability (cont)

Decide – The J3, as the JALNCA, in coordination with affected component commanders and the AADC presented the situation and selected COAs to the JFC. During the update, the JFC recognized that his secondary mission (IAMD) was taking the greater level of degradation/denial with negative impact to their net-enabled combat capability. With the knowledge the source of the degradation/denial to the priority mission was identified and could be addressed with conventional forces, the JFC selected the COA that re-prioritized JALN airborne assets in support of the AADC's IAMD mission. The COA selected used 5th to 4th Gen transition gateways to establish connectivity with the forward 5th Gen fighters, DARE gateways to connect distributed CFMCC and CFLCC forces that were supporting the AADC's IAMD mission, and HCB gateways to provide theater wide connectivity of the various component forces with the greater global architecture. There remained a small number of DARE platforms allocated to the CFMCC for other missions, but the JALN priority of effort was directed to support the AADC's IAMD mission. The JFC also directed the CFACC and CJSOTF to develop non-JALN COAs to systematically remove the source of the degradation/denial to his primary mission, the CFMCC's energy supply lines of communications (E-SLOC)/ MIO/noncombatant evacuation operations (NEO), using the most effective, responsive means possible.

⁴⁵ There will likely be situations where no JALN COA will result in a resolution of all network issues and this may in fact drive a decision to alter the operational plan, scheme of maneuver, timing, etc. of the ongoing or upcoming operations.

DIRECT. As the JCA activity indicates, directing is “the ability to employ resources to achieve an objective.”⁴⁶ The C2 of JALN employs a centralized control, decentralized execution approach so that when directed, decentralized command centers will execute or synchronize with the selected COA (Figure 12).⁴⁷ For example, the Joint Air Operations Center (JAOC) receives the JALN platform tasking while the network tasking flows to the Joint Network Control Center (JNCC) and appropriate supporting and supported functional component network control centers. Where possible, the JALN planning system will transmit direction and situational awareness information with rapid and accurate machine-to-machine exchanges.⁴⁸

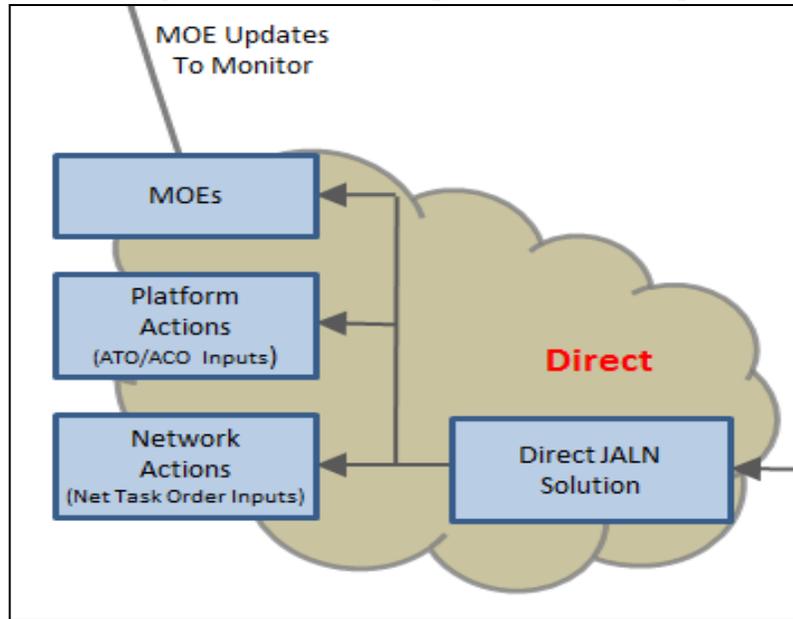


Figure 112: Notional C2 of JALN Direct Process Flow

The information derived during the monitoring activity, synthesized during the understand activity, and then thoughtfully considered during planning and COA selection decision, also provides a basis to refine and redirect associated measures of effectiveness for future monitoring.⁴⁹ This information shapes new network performance parameters and operational indicators establishing the new monitor activity objectives required for the JALN planning system to assess the effects of the directed action.

Maintaining Net-Enabled Combat Capability (cont)

Direct – Once a COA was selected, the JFC, through his J3 as the JALNCA, directed implementation. The JALN planning system transmitted the details on the selected COA simultaneously to all affected functional components and the AADC. The JOM (dual hatted with the CFACC) began orchestrating immediate movement of JALN assets into position to support the directed COA and began planning changes to both the ATO and ACO for longer-term JALN support--timing, orbit locations, altitudes, airspace coordination, etc. Simultaneously, the affected functional component network control centers and component J6s coordinated detailed network management configuration changes with the JNCC for execution of the directed COA.

⁴⁶ JCA section 5.5, Direct, pag e 36.

⁴⁷ JCA Section 5.5.2, Task – describes the act of providing direction of actions and resources

⁴⁸ JCA section 5.5.1, Communicate intent and guidance, page 36

⁴⁹ JCA Section 5.5.3.2 Establish Measures of Effectiveness – The ability to establish criteria used to assess changes in system behavior, capability, or operational environment that are tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect.

Maintaining Net-Enabled Combat Capability (cont)

Outcome - The end result was that CJTF-Med, using an effective JALN planning system (systems, organizations, people and processes), was able to dynamically adapt to changing conditions within the JOA. Military operations continued in an austere environment in the presence of significant communications saturation and adversary attempts to degrade/deny network access and communications. C2 decisions effectively re-allocated JALN capability to align with changing mission priorities in order to maintain maximum net-enabled combat capabilities for the JFC's priority missions/forces. In a more complex real-world situation, where this type of sub-optimal condition, re-prioritization, and re-allocation happens much more frequently, against many more forces/missions, in constantly changing degrees of impact, the need for an effective, highly automated, JALN planning system becomes self-evident.

8. Concept Implications

This section provides examples of this concept's implications. The idea of exercising C2 over JALN to maximize the operational impact of net-enabled combat capability has extremely broad reaching implications that cross joint warfighting operations, network management, planning and execution tools for both operations and networks and the current tactical network paradigm. Effectively achieving this capability requires the orchestration of ongoing DoD activities over time. This orchestration could be addressed with a methodology and a structure to create and execute an Implementation Plan (IPlan). The IPlan would evolve over time but would initially focus on capturing critical path activities (paying additional attention to near-term critical activities) and establishing the framework for the methodology and structure. The framework helps identify and align generic capability-maturing activities. For example, the following areas could form the basis of such a framework:

- **Common Future Capability Vision:** Create and maintain awareness to keep this capability as a DoD objective. Activity examples include: Joint Training, Functional Capability Boards (FCBs), bi-lateral Service "Talks," and consultation with technologists.
- **Operationalization:** Mature concept application ideas and operational employment concepts. This area addresses a spectrum of activities ranging from studies and analysis that further develop/mature concept ideas to the set of activities leading to the development of TTPs for actual capability employment. Activity examples include: doctrine updates, Service concepts of operation (CONOPs), experiments, wargames, exercises, multi-Service TTPs (MTTPs), other joint concepts, DOTMLPF-P impact, and curriculum/studies/analysis/wargame support arranged via military schoolhouses.
- **Technology Readiness:** Ensure enabling technologies are available when needed for capability development and risk mitigation. Activity examples include: Joint Capability Technology Demonstrations (JCTDs), Defense Advanced Research

Projects Agency (DARPA), and Service laboratory efforts coordinated by DoD Science and Technology (S&T).

- Family of Systems (FoS) Synchronization: Converge/coordinate JCIDS/Acquisition efforts to efficiently support the defined capability. Activity examples include data standardization, architectures, network environment roadmaps, Global Information Grid (GIG) Technical Profile (GTP) standards, JIE, and capability alignment with programs of record (PoRs).
- External Dependencies: Identify and track external critical dependencies and associations. Activity examples include: other joint concepts, JALN capability, JALN network management, JALN platform management, spectrum management, and appropriate cyber operations.

The IPlan has not been addressed during the development of this concept. However, if the IPlan is addressed at some point following the approval of the joint concept, this Implications Section with the framework described above and the topics that follow can accelerate and focus IPlan activities. Developing these IPlan activities will be critical to testing and maturing the ideas, technology, and employment considerations of this future capability. This concept's broad implications follow.

Existing Concepts. The idea of exercising C2 over the delivery of net-enabled combat capabilities will have a significant impact on a number of concepts in effect today. This is demonstrated when concepts like the Joint Operational Access Concept (JOAC) describe capability dependent on networks and communications connectivity. As the JOAC states, “To meet that challenge, future joint forces will leverage *cross-domain synergy*—the complementary vice merely additive employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others.”⁵⁰ Cross-domain synergy implies the need to coordinate and communicate across mission sets or domains, with adjacent units, between components, across Combatant Command boundaries, and in some cases back to national resources and agencies. As the JOAC puts it, “Attaining cross-domain synergy to overcome future access challenges will require a greater degree of integration than ever before.”⁵¹ Attaining this level of integration against highly capable adversaries will take considerable effort. The JOAC goes on to highlight the need for joint forces to be able to operate in austere environments where infrastructure will be weak to nonexistent. Having an effective C2 system to efficiently employ adaptable network communications systems such as JALN will be key to ensuring the highest priority missions are supported and to achieving the cross-domain synergy needed to maintain the combat edge.

Joint Concept Structure. The ideas promulgated in this concept have applicability to other areas being explored for joint concepts. The areas of electromagnetic spectrum management and cyberspace are currently in the initial steps of developing joint concepts and are exploring many of the same C2 issues dealt with in this concept. As indicated throughout this concept, net-enabled combat capabilities are determined, to a large extent, by network access, spectrum availability, and cyberspace related issues. Each of these

⁵⁰ JOAC, page ii.

⁵¹ Ibid., page ii.

three areas could likely benefit from an approach to C2 that shared or integrated C2 concepts, systems and processes. There is currently a Joint Integrating Concept (JIC) on C2 dating back to 2005. While the foundational C2 precepts discussed in the C2 JIC are timeless, the importance of spectrum, cyberspace, and network access to C2 is notably absent. Joint concept development for these and other areas, particularly in the area of C2, would be improved if the C2 JIC could be updated to provide an updated, overarching view of C2 and the connection to JFC priorities, net-enabled combat capabilities, and risk management. By developing an overarching C2 concept document, C2 concepts for specific areas such as JALN, cyberspace, spectrum management, and others could be more easily developed and synchronized.

DoD S&T and Joint Concept Development Linkage. The Purpose section states this joint concept is intended to assist future joint force development by guiding DoD S&T and JALN materiel developers to address the capabilities required for JALN C2. The capabilities described in this joint concept are targeted at 2020 and expected to mature through 2030, aligning with the JALN ICD time frame. During that time frame, it is expected these capabilities will be iteratively supported by the Joint Capabilities Integration and Development System (JCIDS) and DoD acquisition actions. To mitigate risk, DoD acquisitions are restricted to focusing primarily on matured technology. This joint concept, however, has implications that may require new or altered technologies. Technology availability must be addressed in the appropriate sequence and time frame to support iterative JCIDS and acquisition cycles maturing the JALN C2 capability. Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) has responsibility to develop plans that exploit technology, oversee a process to identify critical technology areas, oversee matters associated with R&E at DoD labs, and provide advice and assistance in developing policies for rapid technology transition.⁵² Recommend (1) implementation activities engage ASD(R&E) to help focus DoD technology research to support this concept's capability evolution and (2) broader exploration with J7, the DoD joint concept development community, and ASD(R&E) to define formal linkage between the future capability needs captured by the joint concept process and DoD S&T.

Leveraging the Tactical Network Environment. The JALN characteristics of interoperability and speed to reposition JALN airborne assets in the JOA are unique among tactical networks. Effective JALN C2 leverages these characteristics to support critical net-enabled combat capabilities and thereby reduce risk to the force. While other tactical networks may be less flexible than JALN, the potential exists to gain additional capability by leveraging them to dynamically support the JFC's highest priorities. Exercising this ability to orchestrate other tactical networks would require some degree of interoperability between the networks, preestablished employment concepts, and an appropriate control system. Recommend appropriate joint documentation (concept, doctrine, TTP) be developed to address leveraging other Service-provisioned, functional component employed tactical networks to deliver new joint capabilities as an adjunct to or expansion of the capabilities described in this concept.

⁵² DoD Directive (DoDD 5134.3, Director of Defense Research and Engineering (DDR&E), 3 November 2003, pages 2 and 3.

This concept could also provide focus to the JIE initiative. It would focus the goals of JIE on elements that would help ensure networks attain the level of interoperability necessary to ensure net-enabled combat capabilities are supported for the JFC's priority forces/missions.

Additionally, any future JALN airborne assets will likely be low density/high demand assets. The effectiveness of this concept's idea of supporting net-enabled combat capability could be greatly enhanced through the purposeful analysis of how best to incorporate opportunistic airborne platforms that carry some degree of JALN-like capabilities. Taking advantage of these opportunistic JALN-like capabilities would greatly enhance the effectiveness of the aerial layer by thickening the availability of connectivity pathways in support of critical net-enabled combat capabilities.

New C2 Information Needs. "In one way or another, C2 is essentially about information: getting it, judging its value, processing it into useful form, acting on it, and sharing it with others."⁵³ This concept introduces a requirement for new C2 information inputs. Whether JALN C2 is supported by an automated planning tool as the result of a materiel solution or accomplished via manual methods, new C2 information is required to effectively control JALN airborne assets. Currently, the net-enabled combat capability delta and associated risk is unrecognized as a C2 factor and is not defined, measured, assessed, calculated, or captured. The ability to collect these new C2 information items should be developed on a timeline that appropriately aligns with other activities to mature the JALN C2 capabilities. Recommend a joint analysis to define the C2 information items required for effective C2 of JALN airborne assets.

Electromagnetic Spectrum and Cyberspace Connection. JALN C2 will direct the employment of electromagnetic spectrum-dependent systems with portions operating within the cyberspace domain. JALN C2 must leverage and align with DoD's evolving joint electromagnetic spectrum operations and cyberspace operations C2 capabilities and processes. At the operational and tactical levels, the electromagnetic spectrum and cyberspace support net-enabled combat capabilities and operations within both have the potential to impact combat capabilities. Recommend JALN, electromagnetic spectrum, and cyberspace C2 share a common approach to providing operational impact assessment information to joint C2.

Net Enabled Combat Capability's Impact on Networks. The assessment of net-enabled combat capabilities has potential implications for network design in that it looks at networks as a combat capability enabler in a completely new and different way. Assessing the operational importance of net-enabled combat capabilities may provide new information that should be compared with cyber risk factors and conditions. This connection of the cyber risks, the importance of net-enabled capabilities and the details of operational plans may, in fact, drive a new and different approach to network planning.

⁵³ JP 6-0, *Joint Communications System*, 10 June 2010, page I-2.

Doctrine. Joint and Service doctrine publications will need to incorporate elements of this concept during upcoming review cycles. This concept's discussion of collaborative planning and the implications of executing various JALN courses of action on planned and/or ongoing network and air operations mean that existing doctrine documents will need to change. Documents such as JP 2-0, *Joint Intelligence*; JP 3-0, *Joint Operations*; JP 5-0, *Joint Operations Planning*; JP 6-0, *Joint Communications System*; and JP 3-33, *Joint Task Force Headquarters*, will need to incorporate applicable portions of this concept when they come up for revision. JP 3-30, *C2 for Joint Air Operations*, will need to address the JALN C2 process and organizational structure much like it currently addresses the Joint Targeting Process. As the JALN C2 capability matures, a dedicated joint publication may be needed to fully define the processes, organizational ramifications, and responsibilities to effectively C2 net-enabled combat capabilities.

In total, these document changes will need to completely describe the concept of delegation/placement of authorities with respect to monitoring, planning, and executing JALN network actions and airborne asset actions. They will have to describe the relationship between Service/component organic networks, support of other Service/component network requirements, and the relationship between the JFC's JALN network employment actions and interaction with the global network infrastructure. Additionally, there will be organizational implications that will need to be covered in doctrine.

Organization. This concept proposes new ways for the joint force to accomplish command and control over net-enabled combat capability actuating assets. Once validated, these new approaches may necessitate changes in the way the joint force organizes to accomplish missions, execute functions, and deliver joint warfighting capabilities.

Training. This concept may indirectly influence individual, staff, and collective joint training by identifying the need for changes in joint doctrine or TTPs. Combatant Commanders may adopt these changes to more effectively prepare the joint force to respond to operational requirements and execute assigned or anticipated missions. Concept developers may engage and support exercise planners to incorporate appropriate aspects of the joint operating environment into scenario and game play, educate the training audience on the concept and required capabilities, and observe event execution.

Materiel. The set of required capabilities (Section 9) in this concept provides the starting point for generating proposed nonmateriel and materiel solutions.

Leadership and Education. Military leadership requires both general familiarization and actionable understanding of the concept of shaping and maintaining net-enabled combat capabilities to effectively exercise C2 of JALN. Service and joint component commander and staff orientation courses and other professional military education (PME) courses will need to address the ideas behind these concepts and capabilities. Appropriate courses will need to add material on the implications of

net-enabled combat capabilities, JALN capabilities, and the concepts underpinning C2 of JALN and JALN planning and employment.

Personnel. While new automation will help alleviate the impact on what would otherwise be labor intensive processes, there will be moderate cumulative manpower impacts as a result of C2 of JALN. Formal manpower studies must be pursued after refinement of the concept, doctrine, and TTPs are completed in war games, exercises, experiments, etc.

Facilities. No measurable increase in facilities is projected as a result of this concept.

Policies. The implementation of the new approaches and capabilities articulated in this joint concept will identify policy implications. If not resolved through changes in policy, these implications could negatively impact the desired improvements in operational capability.

9. Required Capabilities

The following capabilities have emerged as essential to the implementation of this concept. They were derived logically from the concept itself or from accompanying experimentation events.⁵⁴ This list is neither all-encompassing nor prioritized. It is designed merely to provide a baseline for follow-on concept development, analysis, and experimentation. Although grouped by JCA for ease of understanding, many of these capabilities apply across multiple JCAs and at multiple command levels. Furthermore, many of these capabilities have implications for DOTMLPF-P as well as for integration with interagency and foreign partners.

These capabilities will likely require a capabilities-based assessment (CBA) to validate and quantify the nature of the capability gaps, identify potential ongoing or future technology demonstrations or experiments that might be leveraged to realize these capabilities earlier rather than later, and to provide a formal foundation for requirements initiation and validation (JCIDS).

ORGANIZE

JALN-C2-001C Ability to organize with defined roles, responsibilities and authorities

MONITOR

JALN-C2-002C Ability to monitor joint force capacity to meet both current and planned net-enabled combat capability thresholds

⁵⁴ ASD(R&E)'s Joint Tactical Edge Network forum with Service and Defense laboratories conducted multiple reviews of the projected technical C2 system requirements and affirmed that it would be within the realm of achievable on the timeline laid out in the concept. Additionally, the C2 of JALN process was instantiated in UE 12 where the organizational and process constructs outlined in the concept were validated.

UNDERSTAND

JALN-C2-003C Ability to understand operational impacts of changes to forces' net-enabled combat capabilities

PLAN

JALN-C2-004C Ability to align net-enabling capabilities with operational priorities and generate options

DECIDE

JALN-C2-005C Ability to select JALN options optimized to support operational priorities

DIRECT

JALN-C2-006C Ability to transmit/implement directed tactical network and JALN airborne platform changes

Note: Annex C outlines an expanded list of capabilities using the C2 JCA as a relational starting point.

10. Risks of Adopting This Concept

Overall, the risks associated with adopting this concept fall into three broad categories: materiel solutions insufficiently supported; lack of integration between Services and functional systems; and inadequate C2 information development.

MATERIEL SOLUTIONS INSUFFICIENTLY SUPPORTED—The C2 capability described in this concept is expected to mature over a period of time roughly in alignment with the maturing of the physical JALN environment projected by the JALN ICD as “2012 to 2020. However, the ICD supports growth for transformational communications through 2030 and beyond.”⁵⁵ Incremental capability gains are anticipated during that time frame. Technologies that may be applicable to early increments are in demonstration today; however, technology research is required to ensure later increments are supported. There is a risk future technology needs will not be identified or the research funded to support later capability increments. Across the entire time frame, failure to invest in the materiel capabilities required by this concept could stop capability achievement. This risk could overtly terminate system development. Alternatively, insufficient investment might result in a shift to manual approaches that could prove extremely slow, cumbersome, manpower intensive, and ineffective in achieving the capabilities described in this concept.

LACK OF INTEGRATION BETWEEN SERVICES AND SYSTEMS—Like the JALN network itself, effective maturing, acquisition, and delivery of the capabilities described in this concept require managed collaboration and cooperation between the Services and participating allies and other mission partners. Priorities vary across Service provisioned tactical network initiatives and the lack of a joint governance

⁵⁵ JALN ICD, 2009, page 3.

construct consistently applied with a JALN C2 focus makes Service cooperation difficult to achieve and maintain. Efforts such as the Joint Information Environment, Mission Partner Environment, and the DoD Information Technology Enterprise Strategy⁵⁶ may help overcome these differences, but their impact is yet to be determined. There is a risk the Service efforts will diverge, increasing the cost and difficulty of creating the capability to fully leverage net-enabled combat capabilities for the joint force.

Additionally, a JALN C2 capability will need to be interoperable with electromagnetic spectrum operations and cyberspace operations management systems employed in theater. The future C2 of net-enabled combat capabilities will need to exchange information with both those systems to build a comprehensive understanding of the current situation and plan support for priority operations.

Adoption of this concept does not address the challenges the joint force will face with spectrum interference, adversary electronic warfare, and adversary counter-air capabilities.

INADEQUATE C2 INFORMATION DEVELOPMENT—New C2 information is required to effectively control JALN airborne assets. The idea of a net-enabled capability delta associated with communications support is not currently recognized as a C2 factor. The new C2 information items should be developed on a timeline that appropriately aligns with other activities to mature the JALN C2 capability. Without that information, this concept’s central idea is not executable. There is a risk the required information is unidentifiable or cannot be collected within the accuracy or timeliness requirements. Additionally, synchronization of allied and other mission partner systems with this requirement for new C2 information will also be critical to effective integration across the entire mission force.

11. Conclusion

This concept introduced the two new ideas of recognizing, measuring, and prioritizing net-enabled combat capabilities and controlling joint network assets to support prioritized net-enabled combat capabilities.

There is a lethality, survivability, speed, and effectiveness difference between units with functioning net-enabled combat capabilities and those without. That capability difference can be turned off and on with network support or degraded if network support declines. Nonstop warfighting improvements leveraging networks ensure the capability gap between “with network support” and “without network support” will continue to expand.

The operational impact of having or not having that additional capability will vary by unit and situation, but having the right capability at the right place at the right time could be critical to operational success. Priority joint forces must be able to continue net-enabled operations, even in the face of overburdened infrastructure, difficult

⁵⁶ DoD IT Enterprise Strategy and Roadmap, Version 1.0, 6 September 2011.

environments or determined adversaries. The extent to which forces can exercise their net-enabled capabilities influences not only operational effectiveness but also risk. The key for the JFC is to maximize operational capabilities while minimizing operational risk to the joint forces.⁵⁷

JALN is expected to be a low-density, high-demand resource that can provide limited tactical network support. As a result, the JFC must be able to monitor, understand, plan, decide, and direct limited JALN airborne assets. To do so, the JFC must understand where net-enabled combat capabilities are most critical before JALN airborne assets can be logically tasked; getting the employment decision right is fundamental to JALN C2.

Transforming these ideas into a C2 of JALN capability requires sequenced actions and the first action must address the new C2 information. Information-related actions include recognizing and defining net-enabled capability variability, its importance/impact, and associated risk as C2 factors; determining the measurements and correlations; defining the information flow from generation and capture to manipulation and handling; and conceptualizing the depiction and use of the information within decision support tools. The accomplishment of these activities will frame follow-on evolution, addressing the systems, processes, organizations, and documentation to mature the capability.

Although this concept acknowledges that C2 systems controlling both aerial platforms and networks are necessary components of overall C2 of JALN, those C2 systems are not the focus. The focus is on understanding where net-enabled combat capabilities are operationally most critical. Formally identifying net-enabled combat capability as an operational factor within the joint forces planning and execution processes, as defined in this joint concept, will contribute to optimization of operational capability, efficient/effective use of tactical network resources, and reduction of risk across the joint force.

⁵⁷ Approved Universal Joint Task List (UJTL) Database With Conditions Version 7.1 (17 July 2012), Section OP 5 says: “All plans and orders must maximize the operational capability while simultaneously minimizing the risk to the force.”

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ANNEX A References

1	Approved Universal Joint Task List (UJTL) Database With Conditions Version 7.1, 17 July 2012
2	Army Unified Exploitation CONOPS, 20 June 2012
3	C2 Joint Integrating Concept, 1 September 2005
4	Capstone Concept for Joint Operations: Joint Force 2020, 10 September 2012
5	CJCSM 3010.02B, Joint Concept Development Process, 27 January 2006
6	Joint Aerial Layer Network Initial Capabilities Document, August 2009
7	Joint Capability Areas, 8 April 2011
8	Joint Information Environment CONOPS, 25 January 2013
9	Joint Information Environment Increment 1 Transition CONOPS, 25 July 2013
10	Joint Operational Access Concept (JOAC), January 2012
11	JP 3-0, Joint Operations, August 2011
12	JP 3-30, C2 of Joint Air Operations, 12 January 2010
13	JP 6-0, Joint Communications System, 10 June 2010
14	Major Combat Ops Joint Operational Concept, December 2006
15	Mission Command White Paper, 3 April 2012
16	Net-Centric Joint Functional Concept, October 2005
17	Quadrennial Defense Review Report, February 2010
18	The National Military Strategy of the United States, 2011

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ANNEX B Glossary and Acronyms

air domain—The atmosphere, beginning at the Earth’s surface, extending to the altitude where its effects upon operations become negligible. (JP 3-30)

airspace control—A process used to increase operational effectiveness by promoting the safe, efficient, and flexible use of airspace. (JP 3-52)

airspace control order—An order implementing the airspace control plan that provides the details of the approved requests for airspace coordinating measures. It is published either as part of the air tasking order or as a separate document. Also called **ACO**. (JP 3-52)

air tasking order—A method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties, capabilities and/or forces to targets and specific missions. Normally provides specific instructions to include call signs, targets, controlling agencies, etc., as well as general instructions. Also called **ATO**. (JP 3-30)

allocation—Distribution of limited forces and resources for employment among competing requirements. (JP 5-0)

allotment—The temporary change of assignment of tactical air forces between subordinate commands. The authority to allot is vested in the commander having Combatant Command (command authority).

apportionment—In the general sense, distribution of forces and capabilities as the starting point for planning, etc. (JP 5-0)

area of operations—An operational area defined by the joint force commander for land and maritime forces that should be large enough to accomplish their missions and protect their forces. Also called **AO**. (JP 3-0)

area of responsibility—The geographical area associated with a Combatant Command within which a geographic Combatant Commander has authority to plan and conduct operations. Also called **AOR**. (JP 1-02)

centralized control—1. In air defense, the control mode whereby a higher echelon makes direct target assignments to fire units. (JP 3-01) 2. In joint air operations, placing within one commander the responsibility and authority for planning, directing, and coordinating a military operation or group/category of operations. (JP 3-30)

Combatant Command—A unified or specified command with a broad continuing mission under a single commander established and so designated by the President, through the Secretary of Defense and with the advice and assistance of the Chairman of

the Joint Chiefs of Staff. Combatant commands typically have geographic or functional responsibilities. (JP 5-0)

Combatant Command (command authority)—Nontransferable command authority established by Title 10 (“Armed Forces”), United States Code, Section 164, exercised only by commanders of unified or specified Combatant Commands unless otherwise directed by the President or the Secretary of Defense. Combatant command (command authority) cannot be delegated and is the authority of a Combatant Commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Combatant command (command authority) provides full authority to organize and employ commands and forces as the Combatant Commander considers necessary to accomplish assigned missions. Operational control is inherent in Combatant Command (command authority). (JP 1-02)

Combatant Commander—A commander of one of the unified or specified Combatant Commands established by the President. Also called **CCDR**. (JP 3-0)

command—1. The authority that a commander in the armed forces lawfully exercises over subordinates by virtue of rank or assignment. Command includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions. It also includes responsibility for health, welfare, morale, and discipline of assigned personnel. 2. An order given by a commander; that is, the will of the commander expressed for the purpose of bringing about a particular action. 3. A unit or units, an organization, or an area under the command of one individual. Also called **CMD**. (JP 1-02)

command and control—The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called **C2**. (JP 1-02)

command and control system—The facilities, equipment, communications, procedures, and personnel essential to a commander for planning, directing, and controlling operations of assigned and attached forces pursuant to the missions assigned. (JP 6-0)

commander's critical information requirement—An information requirement identified by the commander as being critical to facilitating timely decision making. Also called **CCIR**. (JP 3-0)

commander's intent—A clear and concise expression of the purpose of the operation and the desired military end state that supports mission command, provides focus to the staff, and helps subordinate and supporting commanders act to achieve the commander's desired results without further orders, even when the operation does not unfold as planned. (JP 3-0)

command relationships — The interrelated responsibilities between commanders, as well as the operational authority exercised by commanders in the chain of command; defined further as Combatant Command (command authority), operational control, tactical control, or support. (JP 1-02)

cyberspace attack—Cyberspace actions that create various direct denial effects in cyberspace (i.e., degradation, disruption, or destruction) and manipulation that leads to denial that is hidden or that manifests in the physical domain. (JP 3-12)

continuity of command—The degree or state of being continuous in the exercise of the authority vested in an individual of the Armed Forces for the direction, coordination, and control of military forces.

control—1. Authority that may be less than full command exercised by a commander over part of the activities of subordinate or other organizations. (JP 1-02) 2. In mapping, charting, and photogrammetry, a collective term for a system of marks or objects on the Earth or on a map or a photograph, whose positions or elevations (or both) have been or will be determined. (JP 2-03) 3. Physical or psychological pressures exerted with the intent to assure that an agent or group will respond as directed. (JP 3-0) 4. An indicator governing the distribution and use of documents, information, or materiel. Such indicators are the subject of intelligence community agreement and are specifically defined in appropriate regulations. (JP 2-01)

crisis action planning—The Adaptive Planning and Execution system process involving the time-sensitive development of joint operation plans and operation orders for the deployment, employment, and sustainment of assigned and allocated forces and resources in response to an imminent crisis. Also called **CAP**. (JP 5-0)

deliberate planning—1. The Adaptive Planning and Execution system process involving the development of joint operation plans for contingencies identified in joint strategic planning documents. 2. A planning process for the deployment and employment of apportioned forces and resources that occurs in response to a hypothetical situation. (JP 5-0)

Department of Defense Information Networks (DODIN)—Air Force Manual (AFMAN) 33-116, *Long Haul Communications Management*, 16 May 2013, the Global Information Grid (GIG) is renamed “DoD Information Networks (DODIN).

distributed network control—Describes network and other types of monitoring, management, and control systems where the monitoring, management, or control elements are not centrally located but rather distributed throughout the system or systems being managed thereby providing the capability for each managed NE to be controlled by more than one NM system. (DoDI 8410.03)

electromagnetic environment—The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. Also called **EME**. (JP 3-13.1)

electromagnetic jamming—The deliberate radiation, reradiation, or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy’s effective use of the electromagnetic spectrum, and with the intent of degrading or neutralizing the enemy’s combat capabilities. (JP 3-13.1)

electromagnetic spectrum—The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. (JP 3-13.1)

electromagnetic spectrum management—Planning, coordinating, and managing use of the electromagnetic spectrum through operational, engineering, and administrative procedures. (JP 6-01)

fire support—Fires that directly support land, maritime, amphibious, and special operations forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives. (JP 3-09)

functional component command—A command normally, but not necessarily, composed of forces of two or more Military Departments which may be established across the range of military operations to perform particular operational missions that may be of short duration or may extend over a period of time. (JP 1-02)

Global Network Operations Center—United States Strategic Command operational element responsible for providing global satellite communications system status; maintaining global situational awareness to include each Combatant Commander’s planned and current operations as well as contingency plans; supporting radio frequency interference resolution management; supporting satellite anomaly resolution and management; facilitating satellite communications interface to the defense information infrastructure; and managing the regional satellite communications support centers. Also called **GNC**. (JP 6-0)

in support of—Assisting or protecting another formation, unit, or organization while remaining under original control. (JP 1-02)

integrated air and missile defense—The integration of capabilities and overlapping operations to defend the homeland and United States national interests, protect the joint force, and enable freedom of action by negating an adversary’s ability to create adverse effects from their air and missile capabilities. Also called **IAMD**. (JP 3-01)

interoperability—1. The ability to operate in synergy in the execution of assigned tasks. (JP 3-0) 2. The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases. (JP 6-0)

joint aerial layer network control authority—The individual in whom the JFC has vested command and control authority for prioritization, apportionment, allocation, and other operational level decisions pertaining to JALN airborne assets. Execution of decisions made by the JALNCA will be decentralized to the JFACC and JNCC/Component NCC as appropriate for detailed planning and execution. Also called **JALNCA**.

joint aerial layer network forces—Dedicated JALN platforms and ground control will be organized to provide discrete deployment capability packages for allocation and deployment purposes. Dedicated JALN airborne platforms will be deliberately planned/tasked to provide a responsive JALN in accordance with JFC priorities and will be referred to collectively as JALN forces.

joint air operations—Air operations performed with air capabilities/forces made available by components in support of the joint force commander’s operation or campaign objectives, or in support of other components of the joint force. (JP 3-30)

joint air operations center—A jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander’s operation or campaign objectives. Also called **JAOC**. (JP 3-30)

joint communications network—The aggregation of all the joint communications systems in a theater. The joint communications network includes the joint multichannel trunking and switching system and the joint command and control communications system(s). Also called **JCN**. (JP 6-0)

joint concept—Links strategic guidance to the development and employment of future joint force capabilities and serve as “engines for transformation” that may ultimately lead to doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF-P) and policy changes. (CJCSI 3010.02)

joint data network operations officer—The joint task force operations directorate officer responsible to the commander for integrating data from supporting components into a common database used to generate the common tactical picture. Also called **JDNO**. (JP 3-01)

joint electromagnetic spectrum management operations—Those interrelated functions of frequency management, host nation coordination, and joint spectrum interference resolution that together enable the planning, management, and execution of operations within the electromagnetic operational environment during all phases of military operations. Also called **JEMSMO**. (JP 6-01)

joint fires—Fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective. (JP 3-0)

joint force air component commander—The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. Also called **JFACC**. (JP 3-0)

joint force commander—A general term applied to a Combatant Commander, sub-unified commander, or joint task force commander authorized to exercise Combatant Command (command authority) or operational control over a joint force. Also called **JFC**. (JP 1-02)

joint force land component commander—The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking land forces; planning and coordinating land operations; or accomplishing such operational missions as may be assigned. Also called **JFLCC**. (JP 3-0)

joint force maritime component commander—The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking maritime forces and assets; planning and coordinating maritime operations; or accomplishing such operational missions as may be assigned. Also called **JFMCC**. (JP 3-0)

joint force special operations component commander—The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking special operations forces and assets; planning and

coordinating special operations; or accomplishing such operational missions as may be assigned. Also called **JFSOCC**. (JP 3-0)

joint functions—Related capabilities and activities placed into six basic groups of command and control, intelligence, fires, movement and maneuver, protection, and sustainment to help joint force commanders synchronize, integrate, and direct joint operations. (JP 3-0)

joint information environment—JIE is a secure joint information environment, comprised of shared information technology (IT) infrastructure, enterprise services, and a single security architecture to achieve full spectrum superiority, improve mission effectiveness, increase security and realize IT efficiencies. JIE is operated and managed per the Unified Command Plan (UCP) using enforceable standards, specifications, and common tactics, techniques, and procedures (TTPs).

joint network operations control center—An element of the J-6 established to support a joint force commander. The joint network operations control center serves as the single control agency for the management and direction of the joint force communications systems. The joint network operations control center may include plans and operations, administration, system control, and frequency management sections. Also called **JNCC**. (JP 6-0)

joint operations area—An area of land, sea, and airspace, defined by a geographic Combatant Commander or subordinate unified commander, in which a joint force commander (normally a joint task force commander) conducts military operations to accomplish a specific mission. Also called **JOA**. (JP 3-0)

joint operations center—A jointly manned facility of a joint force commander's headquarters established for planning, monitoring, and guiding the execution of the commander's decisions. Also called **JOC**. (JP 1-02)

joint special operations task force—A joint task force composed of special operations units from more than one Service, formed to carry out a specific special operation or prosecute special operations in support of a theater campaign or other operations. Also called **JSOTF**. (JP 3-05)

joint targeting coordination board—A group formed by the joint force commander to accomplish broad targeting oversight functions that may include but are not limited to coordinating targeting information, providing targeting guidance and priorities, and refining the joint integrated prioritized target list. The board is normally comprised of representatives from the joint force staff, all components, and if required, component subordinate units. Also called **JTCB**. (JP 3-60)

mutual support—That support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities. (JP 3-31)

network-enabled combat capability—Net-enabled combat capability is the degree of enhancement in force lethality, survivability, and responsiveness and exists from the individual unit level through a joint force.

network enabled operations—military operations that exploit state-of-the art information and networking technology to integrate widely dispersed human decision makers, situational and targeting sensors, forces and weapons into a highly adaptive, comprehensive system. Network enabled operations exploit the combat power derived from the robust networking of well informed, geographically dispersed forces. A networked force can increase combat power, achieving greater speed of command decisions and increasing the lethality, survivability, and responsiveness of the force. (JP 6-0, page I-5)

network management—The execution of the set of functions required for controlling, planning, allocating, deploying, coordinating and monitoring the resources of a telecommunications network, including performing functions such as initial network planning frequency allocation, predetermined traffic routing to support load balancing, cryptographic key distribution authorization, CM, fault management, security management, performance management, and accounting management. NM does not include user terminal equipment. (DoDI 8410.03)

network management domain—A group of networks and their component Network Elements and management systems that operate under common rules and procedures, typically under the control of a single organization (DoDI 8410.03)

noncombatant evacuation operations—Operations directed by the Department of State or other appropriate authority, in conjunction with the Department of Defense, whereby noncombatants are evacuated from foreign countries when their lives are endangered by war, civil unrest, or natural disaster to safe havens as designated by the Department of State. Also called **NEOs**. (JP 3-68)

on-station time—The time an aircraft can remain on station that may be determined by endurance or orders. (JP 3-50)

operational area—An overarching term encompassing more descriptive terms (such as area of responsibility and joint operations area) for geographic areas in which military operations are conducted. Also called **OA**. (JP 3-0)

operational authority—That authority exercised by a commander in the chain of command, defined further as Combatant Command (command authority), operational control, tactical control, or a support relationship. (JP 1-02)

operational control—Command authority that may be exercised by commanders at any echelon at or below the level of Combatant Command. Operational control is inherent in Combatant Command (command authority) and may be delegated within the command.

Operational control is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions; it does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. (JP 1-02)

operation order—A directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. Also called **OPORD**. (JP 5-0)

operation plan—1. Any plan for the conduct of military operations prepared in response to actual and potential contingencies. 2. A complete and detailed joint plan containing a full description of the concept of operations, all annexes applicable to the plan, and a time-phased force and deployment data. Also called **OPLAN**. (JP 5-0)

opportunistic JALN capabilities—Those forces being employed in the joint operational area that are designed for, and tasked with, missions other than JALN support, but that have some of the JALN capabilities for networking and communications connectivity which can be used in an emergency situation to fill a short term critical need and/or supplement the JALN forces. This will likely entail a decision by the JFC or his designee to re-role these opportunistic forces temporarily to a JALN role.

other government agency—Within the context of interagency coordination, a non-Department of Defense agency of the United States Government. Also called **OGA**. (JP 1-02)

permissive environment—Operational environment in which host country military and law enforcement agencies have control as well as the intent and capability to assist operations that a unit intends to conduct. (JP 3-0)

rules of engagement—Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called **ROE**. (JP 1-04)

support—1. The action of a force that aids, protects, complements, or sustains another force in accordance with a directive requiring such action. 2. A unit that helps another unit in battle. 3. An element of a command that assists, protects, or supplies other forces in combat. (JP 1-02)

supported commander—1. The commander having primary responsibility for all aspects of a task assigned by the Joint Strategic Capabilities Plan or other joint operation planning authority. 2. In the context of joint operation planning, the commander who prepares operation plans or operation orders in response to requirements of the Chairman of the Joint Chiefs of Staff. 3. In the context of a support command relationship, the commander who receives assistance from another commander's force or capabilities, and who is responsible for ensuring that the supporting commander understands the assistance required. (JP 3-0)

supporting commander—1. A commander who provides augmentation forces or other support to a supported commander or who develops a supporting plan. 2. In the context of a support command relationship, the commander who aids, protects, complements, or sustains another commander's force, and who is responsible for providing the assistance required by the supported commander. (JP 3-0)

tactical control—Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed direction and control of movements or maneuvers within the operational area necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of Combatant Command. Tactical control provides sufficient authority for controlling and directing the application of force or tactical use of combat support assets within the assigned mission or task. Also called **TACON**. (JP 1-02)

tactical data link—A Joint Staff-approved, standardized communication link suitable for transmission of digital information. Tactical digital information links interface two or more command and control or weapons systems via a single or multiple network architecture and multiple communication media for exchange of tactical information. Also called **TDL**. (JP 6-0)

tactical operations center —A physical grouping of those elements of a general and special staff concerned with the current tactical operations and the tactical support thereof. Also called **TOC**. (JP 1-02)

task-organize—The concept of temporarily grouping forces with capabilities specifically suited for a particular mission or task.

theater of operations—An operational area defined by the geographic Combatant Commander for the conduct or support of specific military operations. Also called **TO**. (JP 3-0)

unified command—A command with a broad continuing mission under a single commander and composed of significant assigned components of two or more Military Departments that is established and so designated by the President, through the Secretary of Defense with the advice and assistance of the Chairman of the Joint Chiefs of Staff. Also called **unified Combatant Command**. (JP 1-02)

unified command plan—The document, approved by the President, that sets forth basic guidance to all unified Combatant Commanders; establishes their missions, responsibilities, and force structure; delineates the general geographical area of responsibility for geographic Combatant Commanders; and specifies functional responsibilities for functional Combatant Commanders. Also called **UCP**. (JP 1-02)

unity of command—The operation of all forces under a single responsible commander who has the requisite authority to direct and employ those forces in pursuit of a common purpose. (JP 3-0)

unity of effort—Coordination and cooperation toward common objectives, even if the participants are not necessarily part of the same command or organization - the product of successful unified action. (JP 1-02)

unmanned aircraft system—That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. Also called **UAS**. (JP 3-52)

Acronym	Definition
AADC	Area Air Defense Commander
ACO	Airspace Control Order
AFFOR	Air Force Forces
ARFOR	Army Forces
AOA	Analysis of Alternatives
AOR	Area of Responsibility
ASD(R&E)	Assistant Secretary of Defense for Research and Engineering
ATO	Air Tasking Order
C2	Command and Control
CBA	Capabilities Based Assessment
CCDR	Combatant Commander
CCJO	Capstone Concept for Joint Operations
CFACC	Combined Force Air Component Commander
CFLCC	Combined Force Land Component Commander
CFMCC	Combined Force Maritime Component Commander
CFSOCC	Combined Force Special Operations Component Commander
CIAV	Coalition Interoperability Assurance and Validation
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CJSOTF	Combined Joint Special Operations Task Force
CJTF	Combined Joint Task Force
CJTF-MED	Combined Joint Task Force Mediterranean
CMA	Collection Management Authority
COA	Course of Action
COCOM	Combatant Command
COM	Collection Operations Management
COMAFFOR	Commander Air Force Forces
CONOP	Concept of Operations
CPD	Capability Production Document
DARPA	Defense Advanced Research Projects Agency
DARE	Distributed Access/Range Extension
DDIL	Denied, degraded, intermittent, limited
DoD	Department of Defense
DODIN	DoD Information Networks

DOTMLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities - Policy
EMS	Electromagnetic Spectrum
ESLOC	Energy Supply Lines of Communications
FCB	Functional Capability Board
HCB	High Capacity Backbone
IAMD	Integrated Air and Missile Defense
ICD	Initial Capabilities Document
IER	Information Exchange Requirement
IPLAN	Implementation Plan
ISR	Intelligence, Surveillance, and Reconnaissance
IT	Information Technology
JALN	Joint Aerial Layer Network
JALNCA	JALN Control Authority
JAOC	Joint Air Operations Center
JC	Joint Concept
JCA	Joint Capability Area
JCD&E	Joint Concept Development and Experimentation
JCIDS	Joint Capabilities Integration and Development System
JCTD	Joint Capability Technology Demonstration
JFC	Joint Force Commander
JFC	Joint Functional Concept
JIC	Joint Integrating Concept
JIE	Joint Information Environment
JNCC	Joint Network Control Center
JOA	Joint Operations Area
JOAC	Joint Operational Access Concept
JOM	JALN Operations Manager
JP	Joint Publication
JSS	Joint Support System
JTF	Joint Task Force
MIO	Maritime Intercept Operations
MNFSOCC	Multi-National Force Special Operations Component Commander
MPE	Mission Partner Environment
MTTP	Multi-Service Tactics, Techniques, and Procedures
NAVFOR	Naval Forces
NC	Net-Centric

NCE	Net-Centric Environment
NCOE	Net-Centric Operational Environment
NEO	Noncombatant Evacuation Operations
NGO	Non-Governmental Organization
OGA	Other Government Agency
PME	Professional Military Education
POR	Program of Record
R&D	Research and Development
ROE	Rules of Engagement
ROMO	Range of Military Operations
SA	Situational Awareness
SATCOM	Satellite Communications
SECDEF	Secretary of Defense
SLOC	Supply Lines of Communications
SOF	Special Operations Forces
S&T	Science and Technology
TDL	Tactical Data Link
TTP	Tactics, Techniques, and Procedures
UE	Unified Engagement
UJTL	Universal Joint Task List
US	United States
USCENTCOM	US Central Command
WIN-T	Warfighter Information Network-Tactical
XDR	Extended Dynamic Range

ANNEX C Supporting Tables

1. Notional C2 of JALN Objective/Effect Table

Number	Objective – Command and control over net-enabled warfighting capability. Effect/Broad Capability
JALN-C2-001C	Ability to organize with defined roles, responsibilities and authorities.
JALN-C2-002C	Ability to monitor joint force capacity to meet both current and planned net-enabled combat capability thresholds.
JALN-C2-003C	Ability to understand operational impacts of changes to forces' net-enabled combat capabilities.
JALN-C2-004C	Ability to align net-enabling capabilities with operational priorities and generate options.
JALN-C2-005C	Ability to select JALN options optimized to support operational priorities.
JALN-C2-006C	Ability to transmit/implement directed tactical network and JALN airborne platform changes.

2. Notional JALN C2 Capabilities Implications Table

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
JALN-C2-001C	Ability to organize with defined roles, responsibilities and authorities	5. C2	Organize – The ability to align or synchronize interdependent and disparate entities, including their associated processes and capabilities to achieve unity of effort.	<p>Tier 3 - Structure Organization to Mission – The ability to dynamically organize elements and define roles, responsibilities, and authorities.</p> <p>Tier 4 - Define Structure – The ability to organize forces to best accomplish the mission.</p> <p>Tier 4 - Assign Roles and Responsibilities – The ability to assign and refine appropriate decision authorities and accountability between leaders and subordinates.</p>	<p>Centralized control of JALN airborne assets within a JOA requires a defined JTF decision authority able to decide and direct JALN Plan solutions within JFC force apportionment parameters. A properly defined JALNCA role with the appropriate responsibilities would exercise the authority to optimize the employment of JALN airborne assets.</p> <p>JALN airborne platform execution control must be integrated into JOA air operations. The JOM role defined with the appropriate responsibilities and authorities and assigned to the CFACC would efficiently ensure integrated air operations.</p>
JALN-C2-002C	Ability to monitor joint force capacity to meet both current and planned net-enabled combat capability thresholds	6. NC	Enterprise Services – The ability to provide to all authorized users awareness of and access to all DoD	Tier 3 - Information Sharing – The ability to provide physical and virtual access to hosted information and data centers across the enterprise	<p>The basic monitor function requires two things: information on or measurements of the thing(s) being monitored and an established framework/context to interpret that information.</p> <p>For JC/C2-JALN purposes, the Monitor capability involves the ability to:</p> <ol style="list-style-type: none"> 1. Receive/collect information: <ul style="list-style-type: none"> A. Performance thresholds for current and planned operational requirements for the network

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
			information and DoD-wide information services.	<p>based on established data standards.</p> <p>Tier 3 - Computing Services – The ability to process data and provide physical and virtual access to hosted information and data centers across the enterprise based on established data standards.</p>	<p>B. Network status/abilities to satisfy the operational requirements</p> <p>2. Compare the operational requirement to the provided level of network support to determine if performance thresholds are satisfied</p> <p>3. Identify situations where operational requirements are not being satisfied</p> <p>The ability to receive/collect information on changes to operational requirements for the network and changes to relevant network status/abilities.</p> <p>The concept’s capability for information collection is focused in two categories: current or planned operations and their situation dependent (dynamic), net-enabled, force capability variance; and physical network status/ability as it relates to force capability. The information must be available in an operationally relevant time frame to appropriately support the understand (assessment), plan, decide, and direct activities.</p>
			<p>Net Management – The ability to configure and re-configure networks, services and the underlying physical assets that provide end-user services, as well as connectivity to enterprise application services.</p>	<p>Tier 3 - Optimized Network Functions and Resources – The ability to provide DoD with responsive network functionality and dynamically configurable resources, to include allocation of required bandwidth, computing and storage.</p> <p>Tier 4 - Network Resource Visibility – The ability to determine real time status and effectiveness of network services and resources.</p>	

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
		5. C2	<p>Understand – The ability to individually and collectively comprehend the implications of the character, nature, or subtleties of information about the environment and situation to aid decision-making.</p>	<p>Tier 3 - Organize Information – The ability to discover, select, and distill information within an established context.</p> <p>Tier 4 - Compile Information – The ability to gather information from available sources (e.g., friendly, adversary, neutral, environmental, sociological).</p> <p>Tier 4 - Distill Information – The ability to filter and refine the discovery and selection of information.</p> <p>Tier 4 - Disseminate Information – The ability to present the refined information to enable comprehension.</p>	
			<p>Monitor – The ability to adequately observe and assess</p>	<p>Tier 3 - Assess Compliance with Guidance – The ability to determine if performance adheres</p>	

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
			events/effects of a decision.	<p>to established parameters and expectations.</p> <p>Tier 4 - Assess Employment of Forces – The ability to determine if forces have been applied to assigned objectives.</p> <p>Tier 4 - Assess Manner of Employment – The ability to determine if force employment has followed established guidance.</p> <p>Tier 3 - Assess Effects – The ability to analyze, track, and measure the results of actions taken.</p> <p>Tier 3 - Assess Achievement of Objectives – The ability to determine when the desired end-state has been reached.</p> <p>Tier 3 - Assess Guidance – The</p>	

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				ability to determine if direction is achieving the desired end-state and is appropriate for the situation.	
JALN-C2-003C	Ability to understand operational impacts of changes to forces' net-enabled combat capabilities	5. C2	<p>Understand – The ability to individually and collectively comprehend the implications of the character, nature, or subtleties of information about the environment and situation to aid decision-making.</p>	<p>Tier 3 - Develop Knowledge and Situational Awareness – The ability to apply context, experience, and intuition to data and information to derive meaning and value.</p> <p>Tier 4 - Understand Implications – The ability to derive meaning and significance of selected information in a given context (within specific time and geographic constraints) and to assess the consequences of potential decisions</p>	<p>The concept's capability explicitly defines a C2 tier 3 and 4 capability to derive operational impact meaning and significance from information on operations, forces, and network capability as they relate to command objectives and priorities.</p> <p>Implications include:</p> <p>A. Required measurements of net-enabled operational capability. While the net-enabled capability measurements for various forces and mission may be predetermined, they will be applied dynamically to adjust for the specifics of the operational situation. The meaning and measures of net-enabled operational capabilities and the adjustments applied to those measurements are yet to be defined. The measurements may include IERs with capacity and timeliness factors.</p> <p>B. Understanding of the network component and potential components relevant to the place, time, and forces involved.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>Tier 3 - Share Knowledge and Situational Awareness – The ability to communicate synthesized information and context.</p> <p>Tier 4 - Define Associated Community – The ability to identify relevant stakeholders.</p> <p>Tier 4 - Establish Collective Meaning (collaboration) – The ability to form collective perspective of the situation.</p>	<p>The concept’s capability to share information across the JFC C2 structure to include the JFC, the JALN control authority, and all JTF components employing or planning to employ tactical networks in the AOR is defined to ensure collaborative efforts and synchronized actions. Both during planning and execution, the JTF Components will use the system to identify the relevant stakeholders including field units and mission assets. Stakeholders will inform the collective perspective of the situation, forces net-enabled capabilities, and network potential.</p>
JALN-C2-004C	Ability to align net-enabling capabilities with operational priorities and generate options	5. C2	Planning – The ability to establish a framework to employ resources to achieve a desired outcome or effect.	<p>Tier 3 - Analyze Problem – The ability to review and examine all available information to determine necessary actions.</p> <p>Tier 4 - Analyze Situation – The ability to evaluate synthesized situational awareness,</p>	<p>The concept’s capability to analyze (1) force net-enabled capabilities’ assessments and parameters (2) tactical network assets potentially applicable to the situation while considering (3) impact on (future) planned operations and guided by (4) current operational priorities and in various combinations to produce COAs shaped by the decision maker and projecting ahead with branches and sequels in alignment with broader relevant situational elements creates a framework to support planning.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>including intelligence assessments, environmental conditions, and force assessments to prepare strategies or plans.</p> <p>Tier 4 - Document Problem Elements – The ability to produce a description of the situation based on the analysis of the guidance and synthesized information.</p>	
				<p>Tier 3 - Apply Situational Understanding - The ability to use synthesized information and awareness applicable to a given situation or environment to further understand the problem.</p> <p>Tier 4 - Evaluate Operational Environment – The ability to assess the circumstances and characteristics of a</p>	<p>The concept’s capability to synthesize multiple variables within any specific situation that involves the use of tactical networks to enhance warfighting capability allows operations/mission/current ops planning within the specific operational environment.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>situation.</p> <p>Tier 4 - Determine Vulnerabilities – The ability to assess existing and potential weaknesses.</p> <p>Tier 4 - Determine Opportunities – The ability to assess existing and potential circumstances leading to success.</p>	
				<p>Tier 3 - Develop Strategy - The ability to create a framework that synchronizes and integrates the resources available to achieve a desired outcome or effect.</p> <p>Tier 4 - Determine End State – The ability to unambiguously define a set of desired final objective conditions.</p> <p>Tier 4 - Develop Assumptions – The ability to analyze and build suppositions on</p>	<p>The concept’s capability to develop strategy is focused on matching net-enabled capability to accomplish objectives with command priorities.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>the current situation or a presupposition on the future course of events, in the absence of positive proof.</p> <p>Tier 4 - Develop Objectives – The ability to clearly define decisive and obtainable goals towards which every operation should be directed in accomplishment of the mission.</p>	
				<p>Tier 3 - Develop Courses of Action - The ability to build and refine sequences of activities to achieve a desired outcome or effect.</p> <p>Tier 4 - Assess Available Capabilities – The ability to determine the adequacy and readiness of the current resources and the means to accomplish a defined objective.</p>	<p>The concept’s capability to develop courses of action is focused on solving the application of net-enabled force capability at the right place at the right time to optimize achievement of the desired effects.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>Tier 4 - Understand Objectives – The ability to comprehend intent and guidance within a given situation.</p> <p>Tier 4 - Develop Options – The ability to create a potential or series of potential activities or actions to achieve the assigned objectives.</p>	
				<p>Tier 3 - Analyze Courses of Action (COA) - The ability to evaluate potential solutions to determine the likelihood of success.</p> <p>Tier 4 - Establish Selection Criteria – The ability to define the valuation metrics to compare COAs.</p> <p>Tier 4 - Evaluate COAs – The ability to assess the strengths and weaknesses of each proposed COA (e.g., exercises, wargames, modeling</p>	<p>The concept’s capability to analyze courses of action includes interactive analysis and COA refinement with the appropriate C2 authority for the specific situation.</p> <p>Implications include real-time interactive decision tools that support aligning command priorities with network potential to optimize potential solutions.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				and simulation, etc.)	
				<p>Tier 3 - Analyze Courses of Action (COA) - The ability to evaluate potential solutions to determine the likelihood of success.</p> <p>Tier 4 - Establish Selection Criteria – The ability to define the valuation metrics to compare COAs.</p> <p>Tier 4 - Evaluate COAs – The ability to assess the strengths and weaknesses of each proposed COA (e.g., exercises, wargames, modeling and simulation, etc.).</p>	<p>The concept’s capability to analyze courses of action includes interactive analysis and COA refinement with the appropriate C2 authority for the specific situation.</p> <p>Implications include real-time interactive decision tools that support aligning command priorities with network potential to optimize potential solutions.</p>
JALN-C2-005C	Ability to select JALN options optimized to support operational priorities	5. C2	Decide – The ability to select a COA informed and influenced by the understanding of the environment or a given situation.	Tier 3 - Manage Risk - The ability to recognize and balance the likelihood and consequences of undesired effects with the desired outcomes/effects.	The concept’s capability to assess risk is integral to the planning and command decisions that go into the iterative planning of COAs where command priorities may include multiple risk assessments inputs.

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>Tier 3 - Select Actions – The ability to choose a prudent idea or set of ideas that leads to a desired outcome or end-state within a defined set of constraints.</p> <p>Tier 4 - Select COA – The ability to choose the sequence of activities that most efficiently and effectively achieves the desired objective.</p> <p>Tier 4 - Select Plan – The ability to choose a framework to employ resources, according to established selection criteria.</p>	The concept’s capability to select actions involves the appropriate JFC C2 tier understanding the impact of variations of net-enabled capabilities (evaluating various viable alternatives) as shaped by the operational objective and command priorities including risk assessments.
JALN-C2-006C	Ability to transmit/ implement directed tactical network and JALN airborne platform changes	5. C2	Direct – The ability to employ resources to achieve an objective.	<p>Tier 3 - Communicate Intent and Guidance - The ability to promulgate a concise expression of the operational purpose, assessment of acceptable operational risk, and guidance to achieve</p>	The concept’s capability to communicate guidance is accomplished collaboratively and by directives. The collaborative assessment, COA development, and decision actions ensure stakeholders receive guidance as it develops. Once the actions are selected, the planning tool will have the complete network configuration plan to communicate to the network management systems. The process requirements for the various network management systems to accept and execute network plans will be determined by the various network authorities (components).

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>the desired end state.</p> <p>Tier 4 - Issue Estimates – The ability to provide current situation, development, or trend analysis and interpret the significance, appraise the future possibilities and forecast the prospective results of the various actions that could be undertaken (DoD Dictionary).</p> <p>Tier 4 - Issue Priorities – The ability to provide prioritized elements to all required organizations and assets.</p> <p>Tier 4 - Issue Rule Sets – The ability to provide all directives applicable to subordinate organizations and assets.</p>	

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>Tier 4 - Provide Concept of Operations – The ability to distribute leadership’s initial determination of a concept of operations, leader expectations, and follow-on adjustments, as necessary, for achieving the mission.</p> <p>Tier 4 - Provide Warnings – The ability to communicate and then gain acknowledgement of dangers implicit in a wide spectrum of activities by potential opponents.</p> <p>Tier 4 - Issue Alerts – The ability to forewarn military decision makers, operating location population and civilian authorities of immediate threats and other dangers.</p>	

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				<p>Tier 3 - Task - The ability to direct actions and resources.</p> <p>Tier 4 - Synchronize Operations – The ability to arrange actions through established links with mission partners to ensure coordination of operations.</p> <p>Tier 4 - Issue Plans – The ability to provide relevant plans.</p> <p>Tier 4 - Issue Orders – The ability to provide directives.</p>	<p>The concept’s capability to direct actions and resources is contained within the understanding, COA, and decision framework as described above.</p>
				<p>Tier 3 - Establish Metrics - The ability to establish objective criteria to assess performance and results.</p> <p>Tier 4 - Establish Measures of Performance – The ability to establish criteria or conditions used to measure task accomplishment.</p>	<p>The concept’s capability to establish metrics is integral to determining the level of net-enabled capability aligned with each force. The capability establishes a minimum network performance threshold that is established and transmitted so those tasked to provide net capabilities have measurements to control execution actions. The JALN C2 will generate performance specifications.</p>

Broad Capability		Most Relevant JCA(s)			Comparison Results and Implications
		Tier 1	Tier 2	Tier 3/4	
				Tier 4 - Establish Measures of Effectiveness – The ability to establish criteria used to assess changes in system behavior, capability, or operational environment that are tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect.	

3. Notional C2 of JALN Capability, Task, and Standard Table

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p><u>Command and Control</u></p> <p>Tier 2 - Organize</p> <p>Tier 3 - Structure</p> <p>Organization to Mission</p> <p><i>Tier 4 - Define Structure</i></p> <p><i>Tier 4 - Assign Roles and Responsibilities</i></p>	<p><u>JALN-C2 – 001C:</u></p> <p>Ability to organize with defined roles, responsibilities and authorities</p>	<p><u>JALN-C2 – 001-1T</u></p> <p>Transition the Combatant Command headquarters from peacetime to a crisis or wartime configuration by the activation of those organizations which allow for a more rapid coordination of headquarters responses.</p> <p><u>JALN-C2 – 001-2T</u></p> <p>Rapidly establish a C2 element capable of planning, coordinating and executing required operations.</p> <p><u>JALN-C2 – 001-3T</u></p> <p>Organize, direct, and coordinate the activities of the joint force staff to efficiently support the JFC and execute the theater military strategy. This task includes developing staff operating procedures.</p>	<p><u>JALN-C2 – 001-1S³</u></p> <p>M4: 48 Hours. To establish appropriate boards, cells and bureaus activated.</p> <p><u>JALN-C2 – 001-2S⁴</u></p> <p>M8: 24-hours. Operate within the Collaborative Information Environment as part of a Joint Task Force to conduct near-real time planning and execution.</p> <p><u>JALN-C2 – 001-3S⁵</u></p> <p>M1: Yes. Staff Operating Procedures developed.</p>	<p>The concept’s capability to organize requires that JALN forces are clearly assigned/allocated and authorities, roles, relationships, and processes are executable in a collaborative, flexible, dynamic, and responsive way.⁶</p> <p>The concept’s capability to organize identifies several JALN organizational options for the JFC: decide to let the components retain control over their organic dedicated JALN platform assets for their own use, decide to task-organize some or all of those assets under a single component, or retain control at the JFC staff level via the J3. Due to JALN’s expected significant impact upon the C2 of the joint force, the JFC will generally consolidate JALN control, assigned to either the component with the preponderance of JALN assets and the capability to control them or with the JFC/J3.</p> <p>The concept’s capability to organize identified the need for a JALN Control Authority (JALNCA), responsible for JALN planning and execution IAW JFC priorities and a JALN Operations Management Manager (JOM) role/responsibility for airborne JALN platform management during execution.</p>
<p><u>Net-Centric</u></p> <p>Tier 2 - Enterprise</p>	<p><u>JALN-C2 – 002C:</u></p> <p>Ability to monitor joint force capacity</p>	<p><u>JALN-C2 – 002-1T</u></p> <p>Maintain visibility over network status relevant to current and planned</p>	<p><u>JALN-C2 – 002-1S</u></p> <p>Timeliness of information: < 1 sec to retrieve all relevant network equipment and</p>	<p>The ability to access (receive/collect) information on changes to relevant network capabilities and changes to operational requirement for the network.</p>

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
Services Tier 3 - Information Sharing Tier 3 - Computing Services Tier 2 - Net Management Tier 3 - Optimized Network Functions and Resources <i>Tier 4 - Network Resource Visibility</i> <u>Command and Control</u> Tier 2 - Understand Tier 3 - Organize Information <i>Tier 4 - Compile Information</i> <i>Tier 4 - Distill Information</i> <i>Tier 4 - Disseminate</i>	to meet both current and planned net-enabled combat capability thresholds.	functional capabilities. The ability to access, retrieve, and capture all relevant network equipment and configuration information from: - Operational networks - Network components - Relevant network execution plans <u>JALN-C2 – 002-2T</u> Maintain visibility over relevant forces’ net-enabled capability levels (actuals, thresholds, and potential variance) for current and planned mission and/or operations <u>JALN-C2 – 002-3T</u> Identify performance breach <u>JALN-C2 – 002-4T</u> Generate an alert to notify C2 operators and initiate information collection when performance breach is detected (defined as operational thresholds exceeded for a critical performance parameter).	configuration status information from operational networks and network components and from network execution plans. <u>JALN-C2 – 002-2S</u> Accuracy – of equipment status and configuration information 99.9%: Percentage of accuracy of information / level of confidence. <u>JALN-C2 – 002-3S</u> Timeliness of information: < 1 sec to retrieve all relevant operations and force net-enabled capability related information <u>JALN-C2 – 002-4S</u> <1 second: Time for performance breach notification and information collection initiation	The ability to access and monitor all information relevant to current and planned net-enabled force capability which might include information on force: status, current and planned IER capabilities (thresholds, actuals, etc.), operational assessments. The information must be available in an operationally relevant time frame for timely monitoring and to support accurate and timely spawned effects by exercising C2 capabilities: understand (assess), plan, decide, and direct. The ability to compare: - Network capacity with established current and planned operational performance thresholds - Operational performance thresholds with network capacity and automatically identify performance threshold breaches, notify C2 operators, and initiate information collection

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p><i>Information</i></p> <p>Tier 2 - Monitor</p> <p>Tier 3 - Assess Compliance with Guidance</p> <p><i>Tier 4 - Assess Employment of Forces</i></p> <p><i>Tier 4 - Assess Manner of Employment</i></p> <p>Tier 3 - Assess Effects</p> <p>Tier 3 - Assess Achievement of Objectives</p> <p>Tier 3 - Assess Guidance</p>		<p>Specific triggers will be force, mission, and situation dependent.</p>		
<p><u>Command and Control</u></p> <p>Tier 2 - Understand</p> <p>Tier 3 - Develop Knowledge and Situational Awareness</p> <p><i>Tier 4 - Understand</i></p>	<p><u>JALN-C2 – 003C:</u></p> <p>Ability to understand operational impacts of changes to forces’ net-enabled combat capabilities</p>	<p><u>JALN-C2 – 003-1T</u></p> <p>Provide awareness of changes to force net-enabled capability for ongoing and planned operations and/or missions.</p> <p><u>JALN-C2 – 003-2T</u></p> <p>Provide awareness of the impact of that net-enabled capability change on current and planned operational</p>	<p><u>JALN-C2 – 003-1S</u></p> <p>Generate situational awareness alert of force capability change in < 1 sec.</p> <p><u>JALN-C2 – 003-2S</u></p> <p>Generate awareness of force capability change on operational objectives and risk factors in < 1 sec.</p>	<p>The ability to assess network impact on force’s net-enabled capability.</p> <p>The ability to assess operational impacts of changes to force’s net-enabled capability.</p> <p>The concept’s capability for information collection includes net-enabled force capability variance (defines what changes, change measurement [amount], and conditions creating change).</p>

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p><i>Implications</i></p> <p>Tier 3 - Share Knowledge and Situational Awareness</p> <p><i>Tier 4 - Define Associated Community</i></p> <p><i>Tier 4 - Establish Collective Meaning (collaboration)</i></p>		<p>objectives and risk factors.</p> <p><u>JALN-C2 – 003-3T</u> Identify the appropriate stakeholders.</p> <p><u>JALN-C2 – 003-4T</u> Collaborate with stakeholders to establish collective meaning and refine the assessment of capability changes and the impact on operational objectives.</p>	<p><u>JALN-C2 – 003-3S</u> Identify stakeholders in < 1 sec.</p> <p><u>JALN-C2 – 003-4S</u> Establish appropriate collaboration framework with stakeholders in < 1 sec.</p>	<p>The information must be available in an operationally relevant time frame to support accurate C2 capability to understand (assess), plan, decide, and direct.</p> <p>Derive operational impact meaning and significance from information on operations, forces, and network capability as they relate to command objectives and priorities.</p> <p>The concept’s capability to share information across the JFC C2 structure to include the JFC, the JALN control authority, and all JTF components employing or planning to employ tactical networks in the AOR is defined to ensure collaborative efforts and synchronized actions. Both during planning and execution, the JTF Components will use the system to identify the relevant stakeholders that might include field units. Stakeholders input will inform the collective perspective.</p> <p>The concept’s capability to analyze (1) organic force capabilities (force assessments) and (2) available capability enablers (net options) in various combinations in alignment with broader relevant situational elements creates a framework to support planning.</p> <p>The concept’s capability to synthesize multiple variables within any specific situation that involves the use of tactical networks to enhance warfighting capability allows planning for operations/mission/current ops within the specific operational environment.</p>

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p><u>Command and Control</u></p> <p>Tier 2 - Planning</p> <p>Tier 3 - Analyze Problem</p> <p><i>Tier 4 - Analyze Situation</i></p> <p><i>Tier 4 - Document Problem Elements</i></p> <p>Tier 3 - Apply Situational Understanding</p> <p><i>Tier 4 - Evaluate Operational Environment</i></p> <p><i>Tier 4 - Determine Vulnerabilities</i></p> <p><i>Tier 4 - Determine Opportunities</i></p> <p>Tier 3 - Develop Strategy</p> <p><i>Tier 4 - Determine End State</i></p> <p><i>Tier 4 - Develop Assumptions</i></p> <p><i>Tier 4 - Develop Objectives</i></p>	<p><u>JALN-C2 – 004C:</u></p> <p>Ability to align net-enabling capabilities with operational priorities and generate options</p>	<p><u>JALN-C2 – 004-1T</u></p> <p>Identify and collect relevant information to address the operational impact that network resources could have on planned or ongoing missions. Specific net-enabled mission performance parameters are TBD.</p> <p><u>JALN-C2 – 004-2T</u></p> <p>Engage C2 decision makers to allow them to best synthesize mission impact potential including operational level aggregation and future impacts.</p> <p><u>JALN-C2 – 004-3T</u></p> <p>Develop courses of action with decision makers engaged to analyze and guide alternatives to best align with operational priorities – at tactical and operational levels and both current and planned operations.</p>	<p><u>JALN-C2 – 004-1S</u></p> <p>Generate awareness of operational impact (specific mission success and risk indicators TBD) for current and planned missions, and as appropriate, aggregate to an operational level assessment in <2 sec.</p> <p><u>JALN-C2 – 004-2S</u></p> <p>Synchronize stakeholder inputs within collaborative planning session in < 1 sec.</p> <p><u>JALN-C2 – 004-3S</u></p> <p>Timeliness of iterative decision maker and stakeholder inputs processed (recalculate impact on current and planned missions/operations) and shared within the collaborative planner’s framework in < 2 sec.</p>	<p>The concept’s capability to develop strategy is focused on matching net-enabled capability to accomplish objectives with command priorities.</p> <p>The concept’s capability to develop courses of action is focused on solving the application of net-enabled force capability at the right place at the right time to optimize achievement of the desired effects.</p> <p>The concept’s capability to analyze courses of action includes interactive analysis and COA refinement with the appropriate C2 authority for the specific situation.</p>

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p>Tier 3 - Develop Courses of Action <i>Tier 4 - Assess Available Capabilities</i> <i>Tier 4 - Understand Objectives</i> <i>Tier 4 - Develop Options</i></p> <p>Tier 3 - Analyze Courses of Action <i>Tier 4 - Establish Selection Criteria</i> <i>Tier 4 - Evaluate COAs</i></p>				
<p>Command and Control</p> <p>Tier 2 - Decide</p> <p>Tier 3 - Manage Risk</p> <p>Tier 3 - Select Actions <i>Tier 4 - Select COA</i> <i>Tier 4 - Select Plan</i></p>	<p><u>JALN-C2 – 005C:</u></p> <p>Ability to select JALN options optimized to support operational priorities</p>	<p><u>JALN-C2 – 005-1T</u> Identify relevant risk factors (guided by decision maker input) associated with COAs.</p> <p><u>JALN-C2 – 005-2T</u> Mitigate risks factors in coordination with the C2 decision authority, JTF components, and appropriate stakeholders.</p>	<p><u>JALN-C2 – 005-1S</u> Identify risk factors and generate awareness of the risk factors within the timeliness of < 2 sec.</p> <p><u>JALN-C2 – 005-2S</u> Timeliness of iterative decision maker and stakeholder inputs processed (recalculate impact on current and planned missions/operations) and shared within the collaborative planner’s framework in < 2 sec.</p>	<p>The concept’s capability to assess risk is integral to the planning and command decisions that go into the iterative planning of COAs where command priorities include multiple risk assessments inputs.</p> <p>The concept’s capability to select actions involves the appropriate JFC C2 tier understanding the impact variations of net-enabled capabilities (evaluating various viable alternatives) as shaped by the operational objectives and command priorities including risk factors.</p>

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
		<u>JALN-C2 – 005-3T</u> Engage and support appropriate level decision maker(s) with the relevant evaluation tasks to enable rapid COA selection.	<u>JALN-C2 – 005-3S⁷</u> M2: 4 hours. To synthesize theater COA analysis and present a recommendation to the commander.	
<u>Command and Control</u> Tier 2 - Direct Tier 3 - Communicate Intent and Guidance <i>Tier 4 - Issue Estimates</i> <i>Tier 4 - Issue Priorities</i> <i>Tier 4 - Issue Rule Sets</i> <i>Tier 4 - Provide Concept of Operations</i> <i>Tier 4 - Provide Warnings</i> <i>Tier 4 - Issue Alerts</i> Tier 3 - Task Tier 4 - Synchronize Operations Tier 4 - Issue	<u>JALN-C2 – 006C:</u> Ability to transmit/ implement directed tactical network and JALN airborne platform changes	<u>JALN-C2 – 006-1T</u> Provide situational awareness during the planning and decision activities for appropriate network and platform organizations. <u>JALN-C2 – 006-2T</u> Direct JALN implementation organizations and inform network using forces.	<u>JALN-C2 – 006-1S</u> Timeliness of notification of JALN C2 decision <1. <u>JALN-C2 – 006-2S⁸</u> M1: 15 Minutes. To transmit an operation order (after approval by Combatant Commander).	The concept described ability to collaborate with the appropriate JTF component C2 elements provides an automated mechanism to create situational awareness during the entire process to C2 JALN which serves the synchronization purpose in the C2 JCA area of 5.5 Direct to include, assessment of acceptable operational risk, issuing estimates, priorities, warnings and alerts. The concept's capability to communicate guidance is accomplished two ways: - A. The collaborative assessment, COA development, and decision actions ensure stakeholders are aware of the pending guidance as it develops. - B. Once the actions are selected, the planning tool will have the complete network configuration plan to communicate to the network management systems. Requirement for network management systems to accept and execute the network plan as determined by the various network authorities (components). The concept's capability to direct actions and resources is contained within the understanding, COA, and decision framework

JCA Traceability ¹	Capability	Task	Standard ²	Associated Concept Effect or Capability
<p><i>Plans</i> Tier 4 - Issue Orders</p> <p>Tier 3 - Establish Metrics <i>Tier 4 - Establish Measures of Performance</i> <i>Tier 4 - Establish Measures of Effectiveness</i></p>				<p>as described immediately above. The concept's capability to determine valid network options and direct the tasking/re-tasking of assets generates the network parameters needed to task/configure the networks. The authorization to actually task/configure the networks is TBD but the generated network tasking must flow to the network operations authority to eliminate translation errors and speed implementation of the directed action.</p> <p>The concept's capability to establish metrics is integral to determining the level of net-enabled capability aligned with each force. The capability establishes a set of network performance thresholds as part of the net capability allocation. It provides those tasked to provide net capabilities with measurements to control execution and management actions.</p>

¹ Joint Capability Areas, as approved 8 April 2011, Joint Staff J7, <http://www.dtic.mil/futurejointwarfare/jca.htm>

² Unless otherwise stated, these performance characteristics (or standards) are based on validated system capabilities in the 2 July 2008 Joint Support System (JSS) Capability Production Document (CPD)

³ Universal Joint Task List (UJTL) Tasks, July 2013, ST 5.4.3.2, Activate Combatant Command Boards, Centers, Cells and Bureaus, M4

⁴ Universal Joint Task List (UJTL) Tasks, July 2013, ST 5.4.3.4, Provide a Standing Joint Force Headquarters, M8

⁵ Universal Joint Task List (UJTL) Tasks, July 2013, OP 5.5.7, Conduct Joint Force Staff Operations, M1

⁶ UE12 Final Report indicated that a clear understanding of the allocation/apportionment of JALN forces was critical to effective employment in support of JFC priorities

⁷ Universal Joint Task List (UJTL) Tasks, July 2013, ST 5.3.1.3, Select/Modify Theater Course of Action and Prepare Commander's Estimate, M2

⁸ Universal Joint Task List (UJTL) Tasks, July 2013, ST 5.4.1 Issue Theater Strategic Operation Plans, Orders, and Rules of Engagement (ROE), M1

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