



# The Multi-Domain Combat Cloud in Light of Future Air Operations

IX

## An Enabler for Multi-Domain Operations

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### Introduction

**M**uch has been published on new operational concepts to re-enhance Western air superiority when facing threats posed by peer or near-peer competitors with long-range and precise fires. Most experts advocate for a much more integrated force approach to impose multiple military dilemmas on opponents at a high tempo. Network-collaborated manned and unmanned assets will regain combat mass and the ability to manoeuvre. In doing so, opponents will be forced to make decisions based on uncertain, options thus jeopardizing the result of their actions. Such a new paradigm calls for Multi-Domain Operations (MDO).

MDO could be described as both the ability to produce military effects in one domain with sensors and effectors coming from all domains and the capability

to delegate Command & Control (C2) to the lowest possible level. Advocating the integration of platforms and subsidiarity in the C2 chain constitutes a baseline for re-enforcing the flexibility, resilience and reactivity of a force. The Joint Force Commander (JFC) in theatre would act as an orchestrator of the MDO. They would have the ability to allocate sensors and effectors amongst tactical commanders for a dedicated task, synchronize the effects between all domains and delegate as needed the control of a task right down to the tactical edge.

This can be achieved through an inclusive Information Technology & Communications (IT & COM) ecosystem called the Multi-Domain Combat Cloud (MDCC), forming a combat network of actionable sensors, effectors and C2 nodes across domains. Using the NATO C3 Taxonomy, a MDCC would offer the means to enable and enhance interoperability within NATO nations and partners for increased operational effectiveness.

The following paper will illustrate the principles of integration and subsidiarity through a fictitious operational scenario on the horizon of 2040 and highlight their consequences in terms of operational perspectives and functional requirements for the MDCC.

### **The MDCC as an Inclusive Enabler in the Early Stage of an Operation**

The fictitious operational scenario begins with an 'Air Force Protection' which shifts later on to an Air Advanced Base Operations (A2BO)<sup>1</sup> following an unacceptable raid from a red country against its ethnic minority. The United Nations (UN) mandates NATO to conduct a military campaign. NATO forces encompass a Next Generation Weapon System (NGWS)<sup>2</sup> squadron with New Generation Fighters (NGFs) and Remote Carriers (RCs), some Enhanced Legacy Fighters, a C2 Airborne Platform coupled with a constellation of Optical, Radar and Communications Satellites, Tankers,

Cyber Assets and Special Forces on the ground. A Carrier Battle Group with Amphibious Forces also joins the area of operations.

Regarding Air Force protection, the objective is to prevent any air attack and counter red harassment on villages of the ethnic minority. At this stage, the JFC decides to designate the Air Force as the supported<sup>3</sup> component, the supporting<sup>4</sup> components being the Special Forces and the Navy. Thus, the Joint Force Air Component Commander (JFACC) is responsible for C2 of all air platforms at the tactical level.

To respond to the red attacks, the JFACC requires a fully recognized picture built from multi-domain sensor inputs (air, land, space and cyber). The detection of public agitation on specific social networks combined with real-time Intelligence Surveillance Reconnaissance (ISR) from Special Forces and space-based assets would allow for a rapid demonstration of force from NGWS over the troubled area. Furthermore, any social networks close to the red authorities and calling for violence against the ethnic minority would be countered by a cyberattack to render them inoperative.

At this stage of the operation, the MDCC is the inclusive enabler based on a shared open IT & COM architecture interconnecting all available sensors. It is providing a common recognized picture enriched by real-time ISR collection and past intelligence. In doing so, the MDCC offers a high level of awareness to properly develop and propose military options from the JFACC to the Future Combat Air System (FCAS<sup>5</sup>) Mission Commander's level in line with JFC directives.

### **Varying Demands during a Multi-Domain-Operation**

The situation quickly deteriorates as red forces launch several surface-to-surface medium-range missiles against ethnic minority villages

resulting in casualties. Furthermore, the reds activate all their Integrated Air Defence Systems (IADS), notably the long-range missiles. Following new UN resolutions, NATO immediately decides to change its military posture. The Alliance orders for the disruption of the red IADS whilst securing NATO's strategic initiative to conduct an amphibious assault later on, if needed.

The overall objective is to firmly respond to the aggression whilst keeping control of the level of escalation. The JFC receives directives from the strategic level to conduct Air Advanced Base Operations (A2BO)<sup>6</sup> in order to neutralise red airbases and to impede the red forces' 'fait accompli' strategy of seizing control of the ethnic minority's enclave. These A2BO aim at expanding air force employment options whilst mitigating the risk of having all air assets located on one vulnerable Main Operating Base. A2BO must also provide greater agility and the ability to outpace the red actions. Close to the fight, distributed Air Operating Locations (AOL) may contribute to the air strike but will also help saturate the red Anti Access Aerial Denial (A2/AD) efforts.

After allocating additional assets from the JFC, the JFACC is now responsible for the engagement against red airbases with ground and sea-based NGWS and cruise missiles from a Defence & Intervention Frigate (FDI). However, depending on the situation's hourly evolution and a possible pop-up threat against the Carrier Battle Group, the JFC maintains a reactive and dynamic reallocation of NGWS and FDI between the JFACC and the Joint Force Maritime Component Commander (JFMCC). Thus, the JFMCC will be able to ask for real-time Air Task Order (ATO), or Airspace Control Order (ACO) changes to the JFACC, after immediate synchronization with the JFC.

Because it is highly expected that several locations could lose connectivity with operational C2, the JFACC communicates beforehand his/her

intent to the AOL Commanders by issuing 'Mission Type Orders' (MTO) in conjunction with delegated and conditions-based authorities.<sup>7</sup> Therefore, these persistent forward NATO-led air forces must be able to conduct Defensive and Offensive Counter Air operations using resilient, low-signature, low-maintenance, and significant quantity of manned and unmanned air assets. The aim is to generate effects against A2/AD red capabilities without the associated vulnerabilities of force concentration by creating more dispersed, resilient, and hard to target AOL. This force comprises NGFs, various RCs (both with sensors and effectors), Enhanced Legacy Fighters and Air Tactical Transports to serve as intra-theatre transport of weapons, unmanned platforms, fuel, and logistics support, all operating through dynamic Communities of Interest.<sup>8</sup> Depending on the state of communication between AOL and NGFs, specific 'Multi-Domain Tactical Functions'<sup>9</sup> will be delegated to the cockpit to allow the FCAS Mission Commanders to assume delegation of control for 'Dynamic Targeting' and 'Time Sensitive ISR'.<sup>10</sup> The Special Forces and dedicated satellites will contribute to the dynamic ISR collection. Due to the theatre's elongation, NGFs coupled with a constellation of satellites will benefit from an extended situational awareness and assume, if needed, broader control responsibilities alongside those already assumed by the 'Front Edge Controlling Team' on board the C2 Airborne Platform.

### **The Network Optional Systems within the MDCC in a Complex MDO**

Coupling A2BO with JFACC and JFMCC's networks enables 'network optional systems' within the MDCC. Such 'network optional systems take advantage of centralized networks' when available and form 'opportunistic networks'<sup>11</sup> amongst available platforms at the tactical edge when cut off from higher authority. Here, the MDCC is the inclusive enabler for such

complex MDO. On the one hand, the MDCC integrates all decision processes (from planning to assessment through execution), including force allocation and effects synchronization, from the JFC to tactical commanders, paving the way for a dynamic supported/supporting framework across domains. On the other hand, it provides subsidiarity between all commanders allowing delegation of C2 at the lowest possible level, such as AOL and NGF.

Following successful A2BO, NATO wants to take advantage of the situation and orders an amphibious operation to fully secure the ethnic minority in the enclave. During this operation, the JFMCC is designated as the supported command and the Air and Special Forces as the supporting ones. All platforms are potentially made available for the amphibious manoeuvre under Navy authorities. The MDCC will enable the JFMCC to integrate sensors and platforms from all domains into the large naval scheme manoeuvre fleet and to delegate C2, when needed, to the best navy platform commander.

### **Conclusion: A MDCC as a Networkable On-demand and Service Agnostic System**

The fictional scenario illustrates the need for integration and subsidiarity through all decision-making processes. Doing so helps to shape a credible technical environment for generating global combat mass with a high operational tempo, integrating manoeuvres from all domains without the vulnerabilities of force concentration, and consequently posing multiple dilemmas to the opponent. This technical environment is provided by the MDCC, which can be described as a 'system of tailored networks' encompassing all available platforms from the rear to the edge. Therefore, the MDCC is the enabler for MDO with dynamic allocation of forces and distribution of C2 as previously described.

As a designer and provider of new technologies, industry stands ready to support the Armed Forces in shaping MDO as a new operational paradigm. Considering the ambition at stake, a strong partnership between both is crucial to ensure a thorough capture of the needs and to design the MDCC without selecting certain technical options too soon, which would hinder future MDO. This journey is still in its early days in terms of operational concepts and technological solutions. Only working hand in hand will allow the meeting of the challenges that lay ahead.

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## Endnotes

1. Air Advanced Base Operations (A2BO): This fictive doctrine is directly referring to the 'Agile Combat Employment' of the USAF, Air Force doctrine Note 1-21, Charles Q. Brown, JR, Chief of Staff of the Air Force. ACE is a future USAF doctrine, which meets the resiliency and forward presence requirements to face peer competitors employing long-range precision fires (A2/AD capabilities) directed at dislodging US forces dependent upon legacy bases, fixed infrastructure, and large targetable platforms. By enabling persistent presence and a more resilient force posture on some dispersed temporary contingency locations, ACE offers the opportunity to conduct air operations to defeat an adversary's strategy without the requirement to destroy all of its forces.
2. The NGWS, being developed by France, Germany and Spain, will include a New Generation Fighter teaming with various unmanned platforms called Remote Carriers.
3. Supported Component: The component having primary responsibility for all aspects of a task assigned by a Joint Commander and who receives forces or other support from one or more supporting components.
4. Supporting Component: A component providing a supported component with forces or other support and/or which develops a supporting plan.
5. Encompasses all Manned and Unmanned Air Combat Systems from JFAC to NGF through notably AEW, Tankers, Legacy Fighters and Remote Carriers.
6. These A2BO aim at expanding air force employment options, whilst mitigating the risk of having all air assets located on one vulnerable Main Operating Base.
7. 'Mission Command' and 'Mission Type Orders' are described in the 'Agile Combat Employment' doctrine of the USAF.
8. A Community of Interest (Col) is here defined as a group of players from JFC to fighter level with shared mission or business processes at a specific time and location. An example of a business process could be the kill chain. Airbus considers this notion of Col (referring to the NATO C3 Taxonomy) as a common tool for operational and engineering communities to describe all exchanges among combat systems.
9. 'Multi-Domain Tactical Functions': The principles of these MDTFs have been developed by Airbus and Dassault in the framework of the FCAS Joint Combat Study. They represent an extension of the already existing 'Tactical Battle Management Functions' exclusively dedicated to the Air Defense mission (Air Doctrine), to all missions and domains, allowing the delegation of multi-domain tactical functions down to the NGF level.
10. This notion of Time Sensitive ISR is part of the scope of MDTFs developed by Airbus with its industry partners.
11. These notions of 'system of network optional systems' and 'system of opportunistic networks' are addressed in the Expeditionary Advanced Base Operations (EABO) Handbook 'Considerations for Force Development and Employment' - 1 June 2018 – Arthur Corbett, Marine Corps Warfighting Lab, Concepts & Plans Division.

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