

# Continue to Do More With Less - By Design

## *Operating in the fog*

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Doing more with less has been a constant refrain since I was a second lieutenant. Most organizations are perpetually undermanned and under-resourced. This is especially true in the world of Signal. Senior leaders want more data, and they want it as fast as our commercial networks provide. Yet, the modern battlefield demands a more nuanced approach. Our systems need to be leaner, more localized, and operate within intermittent and limited connectivity.

The Army's current suite of mission command (MC) systems is too bulky and requires too much bandwidth to operate optimally. Many units are still lugging around massive tactical server infrastructure stacks that demand manpower, power, and physical space to support. This is exacerbated if the unit is running multiple classifications, such as Classified and Mission Partner Environment. Additionally, leadership's insatiable demand for increased and consistent bandwidth, although understandable, does not fit well into today's battlefield setting. The elasticity and availability of a cloud environment are the right answer for stable environments (e.g., a home station's fiber-connected infrastructure). But as we have witnessed in Ukraine, this isn't reality on the battlefield. That's where fog computing comes in.

Fog computing relies on edge devices for the unit's information processing and storage, supported by a local area network. Its flat design facilitates extensive peer-to-peer connections between edge nodes, which can stand alone or connect with a cloud. This means the MC applications and the data they depend on don't need to constantly ping a remote server thousands of miles away. Instead, they stay local, fast, and resilient. Starlink and Kymeta-like transport terminals represent the future of battlefield connectivity. They deliver high-bandwidth internet that works on the move or while stationary, serving as force multipliers by eliminating the need to tow massive satellite transportable terminals. However, these connections stand out to enemy signals intelligence systems, making the unit vulnerable to long-range attacks, creating a constant tradeoff between speed and survivability. We can't always remain hidden, but we also can't afford to be deaf and blind. Fog computing closes this gap by keeping critical data and applications inside the (logical) perimeter. So, what are we really reaching back to the cloud for? What does it provide that we couldn't have locally?

The amount of small form factor technology available to us today is unprecedented. Ruggedized mini-servers, handheld processors, and low-power graphics processing unit devices can now deliver what used to take entire racks of equipment. Layer in local AI tools, and we gain the ability to anticipate, recommend, and adapt in real time. The result is a self-sufficient, decentralized network that doesn't collapse when the wide area network drops.

Next Generation Command and Control, or NGC2, is already available commercially. Instead of dragging around racks of servers and bulky communications gear, we should have a ruggedized, carry-on-sized kit with a few swappable modules (e.g., a compact server, a mesh radio, or a sensor-fusion module) all built to snap together depending on the mission. A company could drop in a sensor-fusion module to integrate drone feeds or swap it for a language-translation module if the mission shifts to working with local partners. This kit is basically a self-contained mission command node. Add in a small projector or tablet display, a mini-printer, and suddenly the unit has a fully functional ops center in a backpack. Units can reach out to the WAN when bulk updates or data dumps are needed, keeping the footprint lean and the signatures low while still tapping into the bigger fight when necessary. Meanwhile, lower tactical internet communication means (e.g., frequency modulation, high frequency, Joint Battle Command-Platform) will need to make up for the chat and email traffic we have become reliant on.

Mission command has a whole new meaning in our current age of technology. Yes, there are several caveats to this argument, including budget constraints, logistical support, and acquisition timelines. But we must leverage what we can control to its full capacity. We must continue to do more with less – but by design. It's not about adding more work to the S6's plate; it's about giving them smarter, lighter, more resilient tools that enable units to fight and win on the modern battlefield.

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