

# Prospective Space Warfare: Top 5 Takeaways

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## Major points made at the Defense One Summit

The final frontier may not be a battlefield, but it is a critical zone of operations for positioning, navigation, and timing (PNT) with profound and decisive implications for terrestrial military operations. This topic was up for discussion at “Prospective Space Warfare,” a breakout session at the fourth annual Defense One Summit. The session involved two panels that each provided a unique perspective on PNT in the Department of Defense (DoD).

Introducing the session, Trey Obering, Executive Vice President and Lead of Directed Energy within Booz Allen Hamilton’s Strategic Innovation Group, cited the Gulf War as an example of the United States military’s widespread reliance on space technology. “While our space-based capabilities in 1990 were uncontested, that is not the case as we move into the future,” Obering said. “Our ability to defend and dominate in space to meet these threats must be a key element of our new offset strategy.”

Government Business Council (GBC) attended the session in order to better understand the views of senior DoD officials as they relate to PNT and space warfare. The following are GBC’s top five takeaways from the panels.

Space awareness, command, and control are central to all areas of life

“Today there’s a whole generation of Americans that have never experienced a world without ubiquitous

PNT capability,” Obering said. “It permeates every weapon system that we rely on for our defense.” And it’s not just our weapons. Winston Beauchamp, Director of the Principal Department of Defense Space Advisor Staff and Deputy Under Secretary (Space), pointed out that space-based PNT is integral not just to military operations but to numerous aspects of modern life.

But because of this, PNT is easy to take for granted, both as a utility and as a potential threat. Adversaries of the United States have taken note of the role PNT plays in U.S. military operations and have adapted their tactics to either influence or compromise our space-related PNT capabilities. “We just came out of an area in which we had the high ground,” said Rear Admiral Brian Brown, Deputy Commander, Joint Functional Component Command for Space, U.S. Strategic Command. “The logical evolution of that is that people will try to bring us down.”

It’s now incumbent on military organizations to reinforce American strength in this domain.

Space technology in private industry is undergoing a “renaissance”

Beauchamp explained the private sector serves as an important asset for helping DoD with *lift* on major projects (citing key players like SpaceX), *commercial remote sensing*, and *commercial satellite communications*.

Commercial remote sensing refers to the industry-powered collection of data by satellites in Earth's orbit.<sup>1</sup>

## “There’s a real convergence of industrial technology and government needs.”

Winston Beauchamp, Director of the Principal Department of Defense Space Advisor Staff and Deputy Under Secretary (Space)

Scott Szymanski, Mission Manager for Space at the National Geospatial-Intelligence Agency (NGA), pointed to [Planet Labs](#) in San Francisco as an example of how defense organizations could partner with commercial organizations for remote sensing capabilities. During his visit to Planet, Szymanski remembers observing the difference in size between what the lab offered and what NGA had built internally as national technical means of verification (NTM)—government-created imaging satellites used as tools to monitor adherence to international treaties. He compared the difference to that between a loaf of bread and a school bus.

The smaller satellites produced in private industry don't have the exquisite measuring capabilities of NTMs, but they serve a purpose nonetheless. “We are in the process of investigating how we can leverage commercial [capabilities],” Szymanski said. “Instead of very few, very large, very capable satellites, to have dozens or hundreds—a 300-400 [device] constellation. What would that provide us?”

In short, it would provide data—and a lot of it. Agencies like NGA are looking into making purchases of large fleets of satellites like these and using them to get low-lift imaging of the Earth's surface. Then they will employ analytics to pick up on anomalies. If an anomaly requires more sophisticated imaging techniques, they will investigate.

Commercial satellite communications, or sat comm, are equally essential for DoD operations, providing

communication capabilities where other wireless networks are unavailable.<sup>2</sup>

“There’s a real convergence of industrial technology trends and government needs,” Beauchamp said. He’s been working for almost a year with industry and international partners to ensure they’re off on the right foot. “Our goal is to find a way to make commercial sat comm a baseline, not an augmentation.”

As government and DoD continue to make progress, understand threats, and counterplan, Beauchamp believes they will be able to provide sat comm to the U.S. and its allies. At best, government and DoD will partner with industry to generate a space posture so robust and resilient that adversaries analyzing our defenses won't have any cause for optimism.

### Our posture for space is a defensive one

All speakers on the first panel seemed to agree that space operations are in need of regulation. “Everything is about not having a war extend to space,” Brown said. And regulating the final frontier is much like regulating maritime behavior: Certain behaviors emerge as being functional and mutually respectful, and major players codify them.

Currently, the Outer Space Treaty defines how international entities should behave in orbit, but Beauchamp said it's limited. “It's the international equivalent of parents telling kids in the back of a station wagon not to touch each other,” Beauchamp said.

When only governments operated in space, it served a diplomatic purpose. Now, as commercial industries take to the stars in pursuit of rapidly emerging PNT opportunities, some orbits may be threatened with congestion.

But in space, “there’s a difference between responsible and irresponsible behavior,” Beauchamp said. Seeking conflict up there, he seemed to suggest, would be irresponsible behavior. The drive to codify norms of space operations, he explained, comes from the fact that it's an important domain not just for the U.S. but also for humanity as a whole. “We need to be able to operate in space not just to advance our state of technologies but to eventually get the human race off this planet and onto another planet,” he said. “We can't do that if there's a shell of debris.”

## The Army is the largest user of space by volume

Immediately following the first panel was a discussion featuring Kevin Coggins, Program Manager for PNT in the U.S. Army, and Tom Pfeifer, Senior Vice President and Lead of PNT within Booz Allen's Strategic Innovation Group. According to Coggins, the Army is the largest user of space by volume and has three main priorities: the modern soldier, industry-fueled innovation, and collaboration within agencies.

Today's soldier has equipment fielded with hundreds of global positioning satellite (GPS) capabilities, but Coggins issued an important reminder that PNT is far more than the modern technology that is GPS.

**“Now, if you lose GPS, you might be able to continue for 20 or 30 minutes. [Industry is] doing a lot of clever things to refine that resolution.”**

Tom Pfeifer, Senior Vice President and Lead, Positioning, Navigation, and Timing (PNT), Strategic Innovation Group, Booz Allen Hamilton

If GPS goes down, the quality of a soldier's operations also takes a hit. Coggins said it's essential that the Army adapt training and upgrade software and hardware capabilities to ensure that, even in the direst situations, soldiers have what they need.

“This is one aspect where industry and DoD are leapfrogging each other,” Pfeifer said. A defense organization was the original genius behind GPS technology, but the capability has been built upon and improved several times over by industry leaders like Google and Apple.

“Now, if you lose GPS, you might be able to continue for 20 or 30 minutes,” Pfeifer said. “[Industry is] doing

clever things to refine that resolution.” And Coggins said this kind of innovation is the Army's second priority, turning to providers who've developed high-quality technologies that bridge the gap between civilian tech and defense tech. Moving forward, Coggins said the Army will be looking for an architecture that is not only resilient but flexible—something that can be changed and updated as needed.

Finally, the Army is focused on collaboration within DoD, ultimately striving to achieve PNT synchronicity. Collaboration helps defense organizations take advantage of one another's capabilities through sharing data. “We don't fight by ourselves. We fight with many other services and capabilities across the department,” Coggins said.

Pfeifer said his work at Booz Allen deals with deriving solutions for disparate clients across defense—a task he agreed was essential but no short order. “There's a lot to work with,” he said, “but you have to be creative.”

## Optimizing PNT is not a tech challenge

Ultimately, the solutions that DoD will implement to solve its PNT problems will be new technology—but that doesn't mean there aren't bigger challenges.

According to Coggins, there are two barriers to the implementation of resilient PNT capabilities.

First, leaders must solve system architecture problems. Some organizations have single platforms running multiple GPS systems, meaning multiple pieces of hardware. This creates operational strain. “I've got to get down to one, good PNT device where I can focus that upgrade,” Coggins said.

Coggins and Pfeifer agreed that there is no dearth of technology available for DoD to leverage in its PNT endeavors. Once an organization architects the way it can take advantage of new solutions, the second order of business becomes getting the right solutions into the mix.

“It's a programmatic challenge; it's an acquisition challenge; it's a policy challenge,” Pfeifer said. “But it's solvable, and we need to solve it.”

## Sources

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1 <http://oceanservice.noaa.gov/facts/remotesensing.html>

2 <http://www.gsa.gov/portal/content/105299>

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