YORK SPACE SYSTEMS

NEWS RELEASE

# Why the Pentagon Thinks Small Satellites Can Solve Big Problems

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BlackSky

The U.S. military's old way of thinking about satellites goes something like this: Pack as much technology as humanly possible onto every spacecraft because they are so expensive. Strap that big satellite onto a rocket. Once the satellite reaches orbit, the dangerous part is over.

“It was assumed when you put a satellite up there, it was not going to be contested,” says Gen. Ellen Pawlikowski, commander of Air Force Materiel Command. “That is no longer the situation.”

As China and Russia develop weapons that can threaten satellites, defending space has suddenly become hugely important to the United States, which has led to an overhaul in America's strategic thinking. Suddenly, small satellites are all the rage in military circles.

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Civilians have been in the lead on small sats, launching them by the handful from rockets and even the International Space Station. Companies have plans for constellations numbering nearly 1,000 sats strong. But now, four-star generals name them as solutions to enduring problems, while Pentagon-run labs test small sensors and defense research officials cite them as high-priority game-changers. And that was just last week.

In a network of smaller satellites, each sat is less powerful and carriers fewer sensors, making them harder to hit with weapons and less worthwhile as targets for foreign weaponry. Also, the commercial development of small sats —and a new generation of launch vehicles to send them to orbit—has created an opportunity for the Pentagon to

exploit. “We're able to pack an incredible amount of memory and computer capacity into a relatively small package at a very economical price,” says Chuck Beames, of the small sat maker **York Space Systems** and the chairman of the Small Sat Alliance. “And that's changing the whole world's utilization of space.”

The commercial industry will change as the military embraces small sats, and not necessarily in obvious ways.

## FASTER TO ORBIT

For all their sophistication and urgency, military weapons take so long to develop that they can be outdated by the time they reach the battlefield.

"In the military we tend to identify, design, build, and deploy pretty much everything the same way we do an aircraft carrier,” says Bruce Lyman, CEO of Enterprise Information Management, Inc. and a colonel in the Air Force Reserve. "And it doesn't really lend itself to information-age technology.”

Smaller satellites hold the promise to alleviate the problem. Each satellite is cheaper to launch, and launching a new sat with an upgrade on board helps to guarantee the latest, greatest tech is overhead when a soldier or sailor needs it. The new dream of small sat manufacturers like York Space Systems is that using a common body (called a bus) that can work with multiple launch vehicles and has enough power to operate a wide variety of sensors and onboard processors.

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Those small satellite launches might come not from big legendary launchpads, but from airports that have become federally licensed spaceports and plan to operate airplanes that will carry space rockets to altitude. They take off, fly to a safe distance away from the airport, and launch to low-earth orbit. These air-launch systems mesh well with the satellites-on-demand approach the military wants. As a sure sign of this interest, the U.S. Air Force recently contracted Virgin Orbit to launch several small sat payloads. “The size of satellites will change,” Pawlikowski said. “The mobility of satellites will change.”

Using air-launch means the Pentagon can send a surge of space-based assets not only where they are needed, but also when they are needed. In March, DARPA director Steven Walker listed “very capable low-Earth-orbit satellites” as a way to enhance intelligence, surveillance, and reconnaissance when troops are deployed.

All of this is easier said than done. “It's one thing to say you can do it, and it's one thing to demonstrate it commercially,” says Beames, whose resume includes heading the **Stratolaunch** air-launch system for Paul Allen. “It’s a different kind of challenge to be able to be responsive to military sort of way of doing things.” Doing launches

for the Pentagon could also mean using military airbases, handling classified satellites under strict controls, and other things small sat operators still need to “demonstrate that during peace times, before the shooting starts,” Beames says.

## TALKING WITH LASERS

Forget Star Wars. The best use of space lasers is to contact other spacecraft, not to destroy them. “As soon as there is no atmosphere, [lasers] are highly reliable,” Beames says. “They last a long time, and they use very low power.”

Laser communications represent an opportunity for small sats, which become more effective while working as a team. Members of a satellite constellation could detect if a member is lost or malfunctions and others will take on its functions. They can also serve as communication relays.

NASA
Launching small sats from the ISS.
“Look at some of these mega constellations that are planned to go up, One World and SpaceX’s programs,” Beames said. “They haven't really given a full public disclosure on how they do that. But I know that lasers are a key part.”

With commercial companies paving the way, the Pentagon will have real-world experience to tap into. “I think it only makes sense for the military to start thinking about how to leverage that commercial technology for its use,” Beames argues.

Other small sensors will arise to fit in small spaces. Just as GPS hardware has shrunk to microchip size over the decades, the Pentagon is also looking at miniaturizing other sensors. The Pentagon is funding companies what could develop small radar satellites and satellites that use “machine-learning” to adapt to changing conditions.