

Technology Watch



SkyForce in the Air: For testing at Yuma in December, Proxy flew its SkyWatcher, right, and SkyRaider aircraft to test the SkyForce system's ability to offer troops a bigger picture of operations from above.

Proxy Aviation Systems Photo

A 'Spherical View' of the Battlefield

Networked UAV Constellation Creates Composite Images

By **MARK A. KELLNER**

If having one unmanned air vehicle is a good idea, what's the advantage of fielding a cluster of UAVs, each able to take a different look at a particular object or area?

According to the U.S. Air Force's UAV Battle Lab at Creech Air Force Base, Nev., it's the ability to help get that "spherical view" of a battlefield that Air Force Secretary Michael Wynne described in a September speech to cadets at the U.S. Military Academy at West Point.

Wynne defined spherical situational awareness as "the habit of taking a comprehensive, spherical view, at once vertical and horizontal, real-time and predictive, penetrating and yet defended" of a battlefield.

One useful tool will be the Battle Lab's nascent Cooperative Rules-Based Reconnaissance Unmanned Aerial System (CRBRUS), Air Force Capt. Ryan White said.

CRBRUS will use sensors in a constellation of aircraft, he said, to provide "a spherical view of the battlefield through multiship, autonomous flight and cross-cueing of sensors."

The constellation can be made to see different sides of a given area, with the data linked together to provide a larger picture.

That larger picture comes from SkyForce, a distributed management system created by Proxy Aviation Systems, a contractor in Germantown, Md.

SkyForce consists of mission-oriented software, a ground control station and mobile ground control user terminals.

"It's a rules-based expert system," Proxy Chief Executive Don Ryan said. "This is not being done by anyone [else] now."

The SkyForce system now can use up to 12 UAVs and 20 ground stations "in concurrent, cooperative flight" whose sensors feed into the spherical view, a Proxy announcement said.

"The constellation of aircraft can fly autonomously and do a rules-based program; they can fly to points



PROXY AVIATION SYSTEMS PHOTO

... **And on the Ground:** The SkyForce system combines data from up to 12 unmanned aircraft and 20 ground control stations, above, to give troops a spherical view of the field.

preprogrammed, or you can change them as the operator sees fit for targets of interest," White said. "Basically, one operator can manage multiple aircraft, [and] people on the ground can have access to this, such as the war fighter."

UAV Battle Lab technical director Greg Pierce said, "The most important thing, from a technical perspective, is the distributed management methodology that's incorporated into the Proxy system. Current methodologies use what we characterize as 'one pilot, one stick, one screen, one plane.' It's somewhat adequate now, but very inadequate for the future."

An 'Orchestration of Multiple Aircraft'

Another plus of the Proxy product, which is expected to be the subject of a new demonstration at Florida's Eglin Air Force Base in February, is that flying patterns can be either preprogrammed or — by exchanging location data — the aircraft in a constellation can deconflict while in flight.

"If you have four aircraft flying around using current capabilities to look at a singular point, you'd have to have pilots constantly working to avoid a collision;

the DMS [distributed management] system does this for you in an automated fashion," Pierce explained. "It's like an orchestration of multiple aircraft. It's a lot less manpower-intensive than trying to maintain situational awareness for a particular point."

Decision making and deconfliction are performed via real-time on-board processing utilizing a rule based expert system, said Proxy engineering VP Jerry Carbone. Control from the ground can be done via a mobile control center built into a commercial van chassis or from a stand-alone unit which a war fighter might use in the field.

Flying without a pilot on board has its challenges. In a December demonstration at the Yuma, Ariz., proving ground, Proxy showed its SkyRaider aircraft taking off and landing via remote control. While there's no automatic starting of the UAV for safety reasons, among other concerns, the aircraft switches over to a sensor when it gets to the end of a runway and can detect where to fly the airplane.

From there, "the customer dictates where the data is needed, and the plane goes and gets it," Ryan said.

He said the SkyRaider's technology is better at takeoffs and landings, noting that many Predator UAV accidents occur during landing.

The software behind the take-off and landing is based on Microsoft Windows XP, giving users a familiar interface. Control software for the aircraft is embedded in avionics boxes Proxy makes for the aircraft.

How much does all this cost? A system might go for "about half" the \$25 million an orbit the Predator A was said to cost, Ryan said. Asked how Proxy was able to do what seems to be more for less money, he said the firm "had the luxury of good funding and a clean sheet of paper" on which to design the product.

The UAV Battle Lab's Pierce seems enthusiastic: "This is the only product we've found that, in the near term, can establish a qualified rule-set to demonstrate this capability." ■

E-mail: mkellner@defensenews.com