Flight testing validates waveform capability

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MIT Lincoln Laboratory personnel Joseph Zurkus, left, and Jacob Huang, right, operate a protected tactical waveform modem and collect data while Ted O'Connell, also from Lincoln Lab, monitors terminal equipment to ensure everything is working properly during flight testing Oct. 5. A team from Hanscom AFB, MIT Lincoln Laboratory and the MITRE Corp. are working to ensure that the PTW, a government-owned waveform that provides resilient, anti-jam communications, will work in flight. Credit: MIT Lincoln Laboratory

The Air Force is moving forward to demonstrate the capabilities of the protected tactical waveform through recent flight tests.

The PTW is a government-owned waveform that provides resilient, anti-jam satellite communications. Although the Air Force's Space and Missile Systems Center, SMC, leads the PTW effort, Hanscom, in collaboration with MIT Lincoln Laboratory and the MITRE Corp., is leading the Air Force ground and airborne terminal work.

On Oct. 5, researchers from MIT Lincoln Laboratory used their Boeing 707 test aircraft, the Paul Revere, to demonstrate the waveform performs as planned in flight. During a 2.5-hour flight using a commercial satellite and a reference implementation of the waveform, various aspects of the waveform were tested. The team also gathered additional data to ensure the waveform could operate under more realistic flight conditions.

"We know this capability is something that would help our warfighters tremendously, as it will not only provide anti-jam communications, but also a low probability of detection and intercept," said Bill Lyons, Advanced Development program manager and PTW lead at Hanscom.

There were three main objectives to accomplish with the flight testing. First, that the PTW modes complete satisfactory test performance with a terminal mounted on the representative aircraft in flight. Next, to check that the PTW still performs items such as tracking properties, compensation techniques and link timing correctly in a highly mobile environment. The last is that the system's resource allocation algorithms work as anticipated under realistic mobile scenarios.

"Everything worked and we got the objectives accomplished successfully," said Dr. Ken Hetling, Advanced Satcom Systems and Operations associate group leader at Lincoln Laboratory. "We're

engineers and we wanted to stress it, break it (the waveform), but couldn't push it enough (to do that); the waveform worked."

Oct. 2 to 3, the team completed ground testing to verify all test plans and procedures prior to the aircraft leaving the ground. On Oct. 5, the airplane and system were confirmed ready for the test and took off for the flight over eastern Maine. The team chose that area because it provided good visibility to the satellite and allowed a flight path that could satisfy the three test objectives. According to Hetling, the team was "extremely satisfied" with the successful testing and resulting data.

Lyons said that in addition to the Air Force work, they are also looking at connectivity with the Navy's Multiband Terminal, or NMT, and Army terminals, including the Warfighter Information Network, or WIN-T.

SMC's Advanced Development Division is the lead for overall PTW technology and development efforts. Their chief once again highlighted what the team operating out of Hanscom brings to those efforts.

"The Hanscom team brings valuable SATCOM terminal expertise to this enterprise solution," said Col. Timothy McKenzie.

Last year, the team proved that a third-party PTW modem could integrate with an existing airborne communications terminal and connect through a commercial satellite. Since then, they have been working on additional risk reduction efforts.

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