



Flight Upgrades

CTSi's MUDBUCKET TECHNOLOGY ENABLES FASTER, SAFER AVIONICS UPDATES



LCPL John McGarity

As anyone who's experienced a major computer update can attest, a change to one system or program can easily render it incompatible with other programs. But what is typically a minor annoyance for consumers is a critical safety and operational problem for military vehicles such as fighter jets: With today's complex digital flight systems, any change to a system brings a new need to ensure all of a plane's systems communicate with each other as expected.

And the increasingly rapid proliferation of new advancements in flight systems (as well as in onboard systems on other military vehicles) means more frequent demands to integrate upgrades into existing systems—a process that formerly required years of time as well as costly and potentially dangerous flight testing.

Thanks to SBIR-funded technology developed by Maryland-based Coherent Technical Services, Inc. (CTSi), upgrades to vehicle systems can now be added quickly and inexpensively—and tested on the ground

without the risk and expense of flight testing. CTSi's Mudbucket technology (for Multiplex Data Bus Controller/Translator Transmitter) streamlines the upgrade process by modifying data from new systems to enable it to communicate seamlessly with existing systems.

“What it does is it allows you to change the data on the bus [the apparatus that connects different systems] without the other systems on that bus realizing you've made a change,” explained Tom Sanders, managing director of CTSi. “So if you have a system you want to replace or upgrade with a more modern system, then instead of making changes to the software that's already on the platform, you're able to make changes to the data going across the data bus. To the rest of the aircraft, it looks like the old system, while in fact it's a new system.”

An example of Mudbucket's functionality is updating the radar on a fighter jet. “If you want to put new radar on an aircraft like the F-18 or F-16, and you want to avoid the time and cost of making the changes to

the software inside the mission computer, by using the Mudbucket, you can do the integration much, much faster and much more cheaply,” Sanders said.

Mudbucket also allows more ambitious integration of new components into existing systems.

“We’ve got a project right now where we’re going to put a new data link, a new helmet, new radar, a new display, and a new data recorder on an old platform, and we’re going to do it without having to make changes to all the legacy systems on the platform,” Sanders said. “So we’re going to do all that stuff in less than a year and for less than \$10 million dollars.”

Previously, Sanders explained, implementing such upgrades would have taken several years and significantly greater cost, and would have required reprogramming the plane’s mission computer software. Furthermore, updates could only be done during the plane’s regular upgrade cycle, which could require waiting for years, Sanders said.

“For example, the F-18 is already locked down for the next several years, and so you would have to wait until you could get into the upgrade cycle to do something like this. And it would take a lot more money, there would be a lot more testing involved. So with our approach, you can have something like this done in less than a year. And you can do it when you need to, when it’s convenient.”

Mudbucket also provides a safe, inexpensive way to test flight systems. “If you’ve got a new avionics box, a new data link or something like that, you can make the Mudbucket represent the rest of the aircraft if you want to test out just that one box and see what it would be like to integrate it with the full aircraft,” Sanders said. “So we’re able to do a full integration test for that box before ever getting onto an aircraft. Anytime you can avoid having to touch an airplane or a weapons system or something like that and do your testing early in the development envi-

ronment, it saves a lot of time and money.”


The Army, Navy, and Air Force are all using Mudbucket, Sanders said. “They’re still finding new uses for it. So for example, our Air Force customer is now using Mudbucket as a cybertest tool, and we’re seeing more and more new applications like that—they’re not even ideas that CTSi comes up with, they’re coming from our customers. Once our customers understand the technology, they’re able to bring applications that will have a very significant impact on their operations.”

CTSi has also been exploring potential civilian applications for their technology, Sanders added. “We actually did some work for FedEx as they were looking to reduce the crew requirement for one of their aircraft.

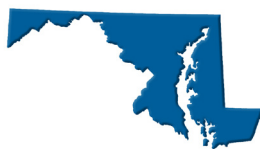
We think we may have other opportunities for work like that on the civilian side in the future.”

Because Mudbucket allows systems upgrades to be integrated quickly and inexpensively, it has also opened the door to other opportunities for innovation. “Now, instead of having to go to the original manufacturer that built the

platform [to make upgrades], third-party vendors can come in and make changes to an aircraft that was previously locked up by proprietary data from the manufacturers. So it truly is an open-architecture solution that opens legacy platforms to third-party applications.”

The SBIR program was a critical part of CTSi’s growth, Sanders said. “The SBIR program is what allowed us to get our start, and this would have never happened without the funding and the opportunities that they provided. It’s led to a lot of new opportunities and capabilities for CTSi. It’s opened up doors for us with all the Services and NASA to use Mudbucket as a tool to bring new capabilities to their aircraft or tanks or ships or whatever, which has led to other opportunities for developing our capabilities.” 

Sanders said, “The SBIR program is what allowed us to get our start, and this would have never happened without the funding and the opportunities that they provided.”



Coherent Technical Services, Inc.

Modernization Priority: Cybersecurity

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