

From close air support to fire suppression

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Fire Line Advanced Situational Awareness for Handhelds (FLASH) is a prototype technology system designed to improve firefighter effectiveness and safety by providing real-time situational awareness to every firefighter and firefighting aircraft in expansive fire zones. Adapted from DARPA's Persistent Close Air Support (PCAS) technology, FLASH overlays multiple streams of information from airborne sensors, firefighters and fire command posts onto a shared digital map visible via tablet computers.

In the heat of battle, lives can depend on being able to coordinate troop positions safely while directing aircraft to provide close air support for

ground forces. DARPA's Persistent Close Air Support (PCAS) program aims to help overcome those challenges by providing warfighters with advanced digital tools for situational awareness and targeting in place of legacy communications systems and traditional paper maps.

Firefighters battling wildfires face challenges very similar to those that troops face in battle—the need for [situational awareness](#), precise coordination of airborne water drops and ensuring fellow [firefighters](#) are kept safe from rapidly moving and shifting flames. Unfortunately, advanced technology to overcome these hurdles has not been readily available to the firefighting community.

On May 27, DARPA personnel traveled to Prescott, Arizona to collaborate with firefighters to test the potential value of PCAS technology for these public servants. Called Fire Line Advanced Situational Awareness for Handhelds (FLASH), the prototype system includes tablet computers, aircraft-mounted sensors and radios designed to identify the location of every firefighter and firefighting aircraft in expansive fire zones. The system overlays multiple streams of information from airborne sensors, firefighters and fire command posts onto a shared digital map visible via tablet computers.

Using these technology tools during the three-day training demonstration, the firefighters were able to track each other's positions in real time. They monitored the position of an observation aircraft overhead and watched a live-video feed from the aircraft providing a bird's-eye view of the terrain. Participants in a command post in Prescott—as well as observers at DARPA's offices in Arlington, Virginia—viewed the same live video feeds from the aircraft and could communicate in real time with firefighters in the field.

The FLASH system relies in part on Mobile Ad Hoc Networking (MANET) radio technology—a technology with roots in seminal

DARPA investments and now at the core of today's advanced wireless industry.

"This training demonstrated the potential of MANETs and tactical tablet computing to provide powerful, flexible shared situational awareness for the fire community," said Dan Patt, DARPA program manager. "We're leveraging ongoing DARPA investments initially aimed at warfighters to help firefighters coordinate their efforts in ways we believe can increase firefighting effectiveness, as well as firefighter safety."

The demonstration took place near where 19 firefighters from the Prescott Fire Department's Granite Mountain Hot Shots unit gave their lives on June 30, 2013, battling the Yarnell Hill wildfire.

"We chose Prescott for the demo to honor the memory of the firefighters who gave their lives serving others," said Chuck Wolf, deputy director of DARPA's Adaptive Execution Office, which helped modify PCAS technology to fight wildfires. "We want to get this technology into the hands of firefighters already battling wildfires this year, to hopefully prevent a tragedy like Yarnell Hill from ever happening again."

Participants in the exercise were quite impressed with the FLASH prototype's capabilities. "This technology has great potential to increase situational awareness as well as personnel accountability, two things paramount to a successful and safe wildfire operation," said Kevin Keith, fire captain in the Prescott Fire Department.

Mike Worrell, fire captain in the City of Phoenix Fire Department and member of the Federal Emergency Management Agency's Incident Support Team/Arizona Task Force-1, attended the training and agreed that FLASH could have a big impact on fire ground safety and efficiency.

"The ability for incident commanders to have voice communications, monitor position and mission progress, and exchange data in [real time](#) has been non-existent," Worrell said. "For the first time, we were able to do wide-area searches and send search data immediately, instead of taking hours to collect and process data from the field before returning it to the people who need it."

FLASH could help address smaller-scale incidents as well, such as search and rescue in difficult terrain. A separate but related demonstration included a live simulation of finding and retrieving an injured hiker in the nearby mountains. Triangulating from the person's 911 call, the FLASH-equipped team found the person within 15 minutes—a task that currently can take hours or even days.



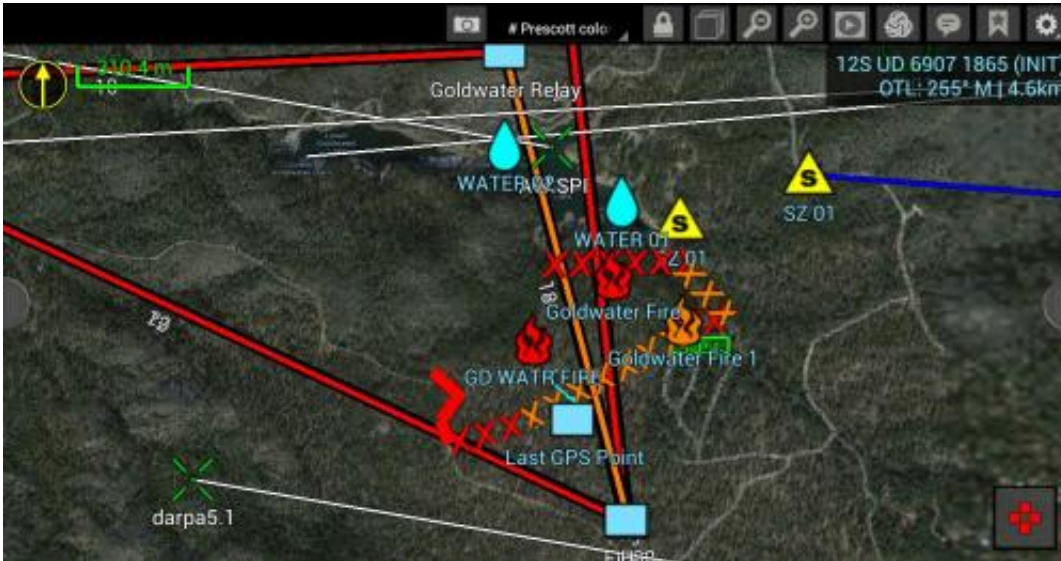
The FLASH prototype system includes a ruggedized tablet computer and MANET-capable radio that firefighters and other responders can wear, freeing

their hands for other tasks in the field.

"I can only imagine the usefulness of equipment like this, from simple emergencies all the way to large-scale wildfires and other all-risk incidents," said Ralph Lucas III, battalion chief for the City of Prescott Fire/Medical Department, whose team participated in the rescue demonstration.

Several DARPA performers participated and made the demonstration and training possible:

- Persistent Systems LLC developed the tactical radio
- Juggernaut Defense developed the case for the tablet, radio/tablet cabling and vest to hold the equipment
- AvWatch provided the aircraft with mounted sensors for the training
- The Digital Precision Strike Suite team from Naval Air Warfare Center Weapons Division at China Lake, California, provided the FLASH software and integrated the various systems



The FLASH software supports standard firefighter and first-responder icons for sharing real-time situational awareness updates about local conditions and the location and status of colleagues and available resources. The software incorporates Global Positioning System (GPS) data and aerial visual and thermal maps, as well as the strength of network connections among users.

The Prescott Fire Department plans to continue testing the FLASH prototype systems. DARPA is producing training materials on how to use the equipment, so additional firefighters can continue evaluating its usefulness.

Provided by DARPA

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