HawkEye 360 Constellation

Commercial Radio-Frequency Geolocation Services through Formation Flight

The HawkEye 360 Constellation mission leverages the great success of the HawkEye 360 Pathfinder mission launched in 2018. It consists of 15 small microsatellites (in addition to the three Pathfinder satellites) built by the Space Flight Laboratory (SFL) for HawkEye 360 Inc. Each constellation satellite is based on SFL's DEFIANT platform. The satellites work in clusters of three to deliver HawkEye 360 Inc.'s worldwide space-based radio frequency (RF) detection and geolocation services. HawkEye 360 Pathfinder was launched on 3 December 2018 on board a Falcon 9 launch vehicle, and has been successfully operating on-orbit. The constellation mission is intended to expand coverage and performance for global commercial service. The mission is enabled by SFL's low-cost formation flying technology and the DEFIANT platform specificially designed for commercial constellation missions and mass production.

SFL has incorporated several technologies that make on-orbit formation flying possible for commercial missions:

- High-performance attitude control system developed by SFL to maintain precise microsatellite pointing.
- High-efficiency commercial electric propulsion.
- Navigation based upon commercial GPS receivers.
- SFL proprietary formation determination and control algorithms.

"By leveraging SFL's highly successful formation flying technology demonstrated on orbit, along with next-generation electric propulsion systems, the mission is delivering unparalleled performance in smaller, affordable satellites," said SFL Director Dr. Robert E. Zee. "This is enabling companies like HawkEye 360 to leverage SFL quality at costs that make business models work."

SFL was selected for this mission based on the success of the Pathfinder mission and the importance of tight formation flying by multiple satellites for successful RF signal geolocation and analysis. SFL offers compact, low-cost formation flying technology at a maturity and cost unmatched by any other small satellite developer. Precise formation control was initially demonstrated on-orbit by SFL in the highly successful CanX-4/CanX-5 mission (2014). The main innovation of CanX-4 and CanX-5 was to bring the cost of precise formation flying within the reach of commercial business models.

Relative position knowledge of each satellite in the constellation is critical to the HawkEye 360 RF system because it relies on triangulation of radio signals from Earth by at least three satellites to accurately geolocate transmission sources. For the triangulation to be calculated correctly, each satellite must be located with sufficient precision in space and relative to one another.

The HawkEye 360 space-based RF sensing technology and proprietary analytics enable a variety of commercial applications for government and corporate customers that are not possible with terrestrial detection methods. Primary applications are in the communications, transportation and data analysis markets.

The ability to locate and characterize RF signals across many bands from space, for example, will allow regulators, telecommunications companies and broadcasters to monitor wireless usage to identify areas of interference. In the field of transportation, RF signals transmitted from the air, ground or sea can be monitored. The system can also be used to expedite search and rescue operations by quickly pinpointing activated emergency beacons.

For more information please visit www.he360.com