# Airlines Get Jump On Tracking Mandates

*Aviation Week & Space Technology*

John Croft

Tue, 2016-01-05 04:00

Options increase for airline tracking solutions

European mandates for aircraft tracking and crash site identification are driving an evolution in legacy surveillance technologies and creating new solutions. But both approaches will have to pass airlines' cost-benefit muster.

Among the innovations are Rockwell Collins's MultiLink flight-tracking service, which fuses legacy surveillance technologies already onboard for more frequent tracking updates, and Thompson Aerospace's Secure Aircraft Tracking Module (SATM), an independent, tamperproof add-on designed to meet upcoming mandates at minimum cost and with maximum return.

The new rules, approved by the European Commission in mid-December, generally follow the design and implementation schedule of International Civil Aviation Organization (ICAO)-proposed standards for tracking and alerting, developed in response to the disappearance of Malaysia Airlines Flight 370 (MH370) in March 2014. While Europe may have been first to roll out new rules to codify the recommendations, other countries are likely to follow suit once the ICAO proposals are finalized, most likely this year.

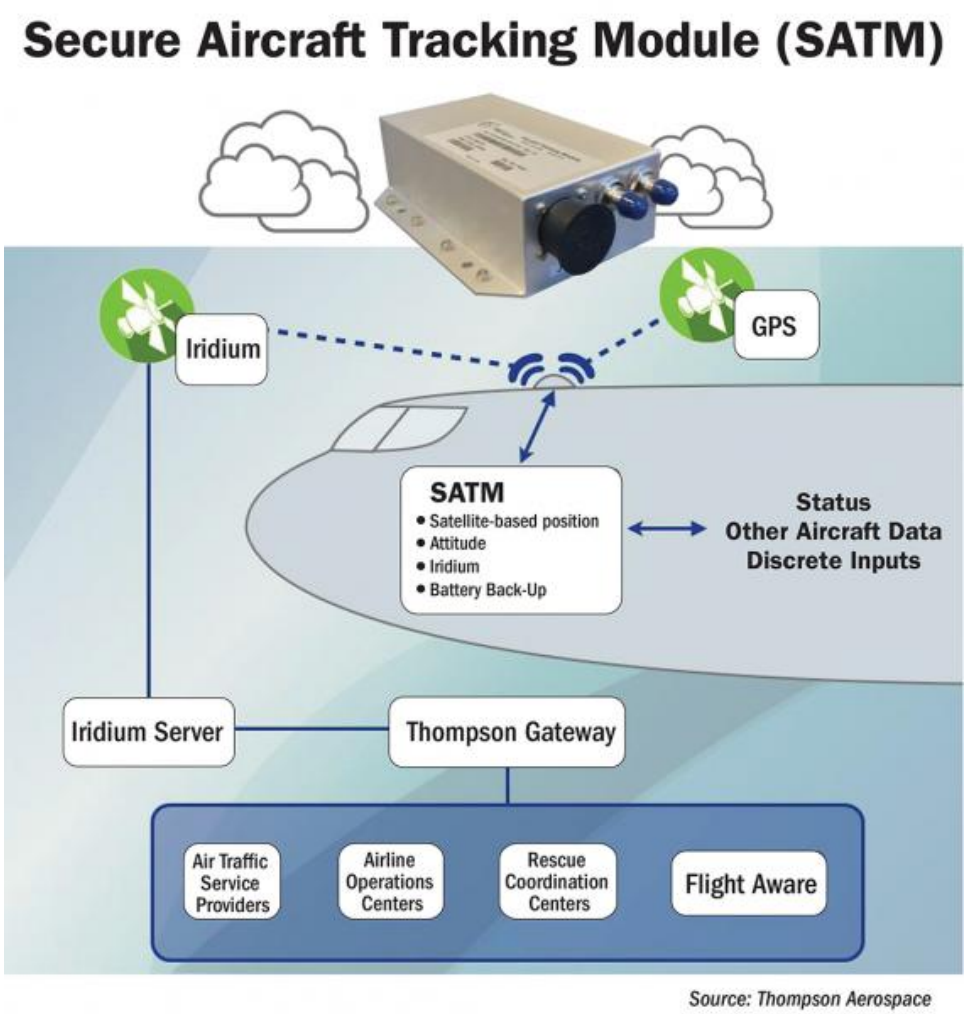
Included in the multitiered ICAO global aeronautical distress safety system will be normal mode tracking updates every 15 min.; an abnormal mode with 1-min. updates; a distress mode with 1-min. intervals that is automatically triggered by "very specific events" (including unusual attitudes or unusual speeds), and methods for flight data recovery—via a deployable box or streaming data—before a crash occurs. The 1-min. reporting interval is meant to limit the search radius to 6 nm. Basic tracking will likely be required of airlines by 2018, with new aircraft equipped from the factory for distress mode and data recorder retrieval starting in 2021.


Europe, through the European Aviation Safety Agency (EASA), by December 2018 will require airlines to have a tracking system in place for aircraft with more than 19 seats on routes more than 180 nm from shorelines. By January 2019 they will be required to equip those aircraft with an 8.8-kHz underwater locator device (ULD) to augment the existing 37.5-kHz "pingers" on the flight data recorder (FDR) and cockpit voice recorder. The more sensitive ULD, an improvement initiated after the Air France Flight 447 crash in 2009, increases the underwater range from which the pinger can be detected from approximately 0.8 nm for the 37.5-kHz pinger to 6 nm for the 8.8-kHz ULD.

EASA, however, will waive the ULD requirement if the aircraft is equipped with a "robust and automatic" distress mode that can pinpoint the end point of a crashed flight to within 6 nm, a number achievable only with position updates every 1 min. or more frequently.

While airlines had largely committed voluntarily to implementing a 15-min. position update rate through existing equipage after the MH370 disappearance, carriers are now analyzing how to deliver everyday value from the upgrades. "A lot of people are signed up for normal mode reporting through various channels, and now that EASA has published its rule, it's going to force something to happen," says Thompson Aerospace President and CEO Mark Thompson. "Our view is that if you pick the right technology, you'll get the tracking for free," he adds.

Thompson is banking on the fact that his company's SATM technology, for which he expects to receive first installation approvals in March, is roughly equivalent in cost to a ULD—about $10,000 per unit—but provides many more features and is therefore a better choice. Two unnamed small airline customers are signed up to equip their fleets with SATMs, beginning in March, to provide real-time monitoring of information in the flight data recorder stream over the Arinc 717 avionics bus—including engine performance—while also satisfying many, if not all, EASA and ICAO tracking needs.




*Source: Thompson Aerospace*

Weighing about 1 lb. and drawing 2 watts of power, the SATM is an Iridium radio mounted on the inside within 1 ft. of an Iridium antenna located on top of the aircraft. The unit has an internal 9-axis motion sensor, dual global-positioning system inputs and a battery pack that provides 14 hr. of operation. The system is tamperproof, in that as long as the antenna remains connected, data will continue to flow even if the aircraft loses power or circuit breakers are pulled.

Along with 15 min. position updates over Iridium, airlines can program SATM to send more frequent data for abnormal and distress modes to the same secure node in the Amazon Web Services cloud when certain thresholds are tripped, including path anomalies, or when engine or other operational issues occur. “The airline can go in and say, ‘Give me all the [exhaust gas temperature] data for the engines,’ and we start sending that data about 2-3 sec. delayed,” says Thompson. “Any data that goes through the FDR we can send to the airline, but we can’t send it all at once—we don’t have enough bandwidth over Iridium.”

In addition to the installation costs, airlines pay a monthly fee of $100-$150 for the basic ICAO 15-min. tracking outputs per aircraft, with fees increasing as trending or other data is sent.

Rather than adding new technologies, Rockwell Collins Information Management Services (IMS) is

focusing on diversification of position information of legacy links to meet the upcoming EASA and ICAO normal and abnormal mode tracking mandates.

“We’re trying to use information the airlines are already receiving,” says Yuri Maslov, principal program manager at Rockwell Collins IMS. “Any additional data they have to generate will bring additional costs.”

The company’s new MultiLink service, now in use by launch customer AeroMexico, combines surveillance information already carried over legacy Arinc networks—Automatic Dependent Surveillance-Contract (ADS-C) and ACARS position reports—with air navigation service provider radar feeds, Automatic Dependent Surveillance-Broadcast (ADS-B) from third-party providers and Rockwell Collins’s proprietary high-frequency data link-based (HFDL) position reports to give airlines multiple options for position reporting.

“If tracking is dependent on a single data source or a single piece of equipment, the likelihood that tracking could be disrupted is quite high,” says Rockwell Collins in its MultiLink sales materials. The company converts all tracking “feeds” to the same format and provides the information to airline customers either through a streaming data feed or as an integrated aircraft situational display with its WebASD or Hermes SkyView platforms. Approximately 30 airlines are customers for the two platforms.

For normal reporting (15 min. or more frequent intervals) in oceanic areas, the lowest-cost option for airlines is typically the HFDL “diagnostics” mode, a feature Rockwell Collins previously used to monitor the health of the HFDL network, but is now added at no cost into the data feeds to airlines to provide position reports as frequently as every 5 min. For oceanic flights, radar tracking and ADS-B feeds are typically not available.

Although more expensive, airlines will also obtain period position reports through ADS-C over Inmarsat or Iridium satellite links, which can also be set up to automatically send higher-frequency position reports when unexpected altitude or waypoint changes occur. ACARS over satellite or HFDL links can also be used for position reports, and in some cases the avionics can also be set up to automatically report at higher rates when certain thresholds are crossed.

To help airlines monitor their flights, MultiLink has a built-in “mute” alert that notifies the operations center when an aircraft has not sent or received communications for a certain time period, and Rockwell Collins IMS engineers are also developing a course deviation alert. In both cases, the likely reaction will be to increase the position reporting rate of ADS-C or ACARS messages, either automatically or through uplinked commands from the airline or Rockwell Collins IMS.

Maslov says if ACARS is not equipped with the logic to automatically increase rates in certain failure conditions, the equivalent can be done from the ground. For a portion of its fleet, Emirates, which uses the SkyView aircraft situational display, will send an uplink request for position data every 60 sec. in distress situations.

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