Global Aeronautical Distress and Safety System

GADSS Overview and FAA Position

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Federal Aviation Administration

Overview

- **ICAO Global Aeronautical Distress and Safety System (GADSS) Concept**
- **Current Aircraft Tracking Capabilities**
- **Proposed Standards and Recommendations**
- **FAA Policy on Global Tracking**

ICAO GADSS Concept

- **Global Aeronautical Distress and Safety System**
  - Developed in response to MH370, AF447
  - Response to question from public: "How can we lose an airplane in the 21st century?"
- **Four phase concept of operations for tracking aircraft and retrieving flight data**
  - Normal tracking phase (routine flight)
  - Abnormal tracking phase (deviations from flight plan)
  - Distress tracking phase (accident is imminent)
  - Emergency phase (accident has occurred)

Normal Tracking

- **Tracks aircraft during routine operations**
    - IATA led Aircraft Tracking Task Force (ATTF) to propose short-term solutions
    - ICAO State Letter 15-12, February 2015, Annex 6 Part I
    - Standard is performance-based, and allows use of any number of systems, which may already be installed aboard aircraft.
    - Not a challenge for most operators.
    - May require installation of additional equipment on some aircraft.

Normal Tracking

- **Annex 6 Part I – Air Transport proposed standard**
  - Proposed standard requires air transport operator "…establish tracking capability to track aeroplanes throughout its area of operations"
  - **Shall** track the position of an aircraft "…at least every fifteen minutes when operating in *oceanic* area(s) if:
  - **Should** track the position of an aircraft in remote area(s) if:
    - max certificated T/O gross weight over 27,000 kgs (59,528 lbs) and a seating capacity greater than 19; and
    - ATC obtains aeroplane position at greater than 15 minute interval
  - **Shall** establish procedures, *approved* by the State of the Operator, for retention of tracking data…"

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FAA Position on Normal Tracking

- **U.S. "agreed with comment"**
- **Certain specific areas of the proposed SARPs must be addressed. For example:**
  - "Situations where elements required for normal aircraft tracking become unavailable which are beyond the control of the operator (e.g. communication service provider outage) need to be reviewed to assess how they should be addressed in minimum equipment lists".
- **Guidance is being developed by multi-national, multi-disciplinary Normal Aircraft Tracking Implementation Initiative (NATII) team.**

Abnormal Tracking

- **Intended to track aircraft that have experienced an "abnormal event".**
  - According to ICAO, an abnormal event is "An event during flight which may trigger an emergency phase."
  - Technically includes Distress Tracking, but Distress Tracking is discussed separately
  - Requires aircraft to report position once per minute.
  - More technologically challenging than normal tracking.
  - May require additional aircraft equipment for some operators.
  - Many operators are already able to do this through use of contracted services.

FAA Position on Abnormal Tracking

- **ICAO has issued no proposed SARPs specific to Abnormal Tracking other than those related to Distress Tracking**

- **Concept seems to favor use of ADS-C**

- **While effective, ADS-C requires a service contract , thus imposes recurring expense on operators**

- **ADS-C is subject to satellite availability**

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Distress Tracking

- **Intended to track an aircraft in which an accident is imminent**
    - ICAO State Letter 15-15, May 2015
    - Requires new, developing technology.
    - Determination to automatically transmit distress signal made by on-board system that continually monitors aircraft flight regime.
    - When predetermined criteria are met indicating loss of aircraft control, system will trigger a transmission containing aircraft position once per minute.
    - Greatly aids in determining location of an accident.
    - Proposed SARPs included installation of Automatic Deployable Flight Recorders and 25 Hour Cockpit Voice Recorders

FAA Position on Distress Tracking

- **FAA is generally supportive of the concept, but U.S. "disagreed with comments" to the State letter**

- **Unlike the first two phases, there are currently no available technical solutions**

- **SC-229/WG-98**
  - Developing 2nd Generation ELT MOPS
  - Developing In-Flight Triggering Criteria

- **Changes to proposed SARPs resulting from comments to State Letter. For example:**
  - Activation from the ground
  - Installation of ADFR

Emergency (Data Retrieval) Phase

- **Post-accident phase**
  - Search and Rescue mission initiated
  - Recovery of survivors
  - Location and possible retrieval of wreckage
  - Retrieval of flight data for accident investigation
 - Included in ICAO State Letter 15-15

FAA Position on Data Retrieval cont.

- **Typically, flight recorders recovered within a couple of days once wreckage is located**
  - ICAO standards revised to include low frequency airframe-mounted Underwater Locator Beacons (ULB) in 2018
  - ICAO standards revised in 2012 to increase Flight Recorder ULB battery life from 30 days to 90 days

Normal vs Distress Tracking

Distress Tracking = 1 report at least each minute. Aircraft location within roughly 6NM radius

Normal Tracking = 1 report at least every 15 minutes. Aircraft location within roughly 90NM radius
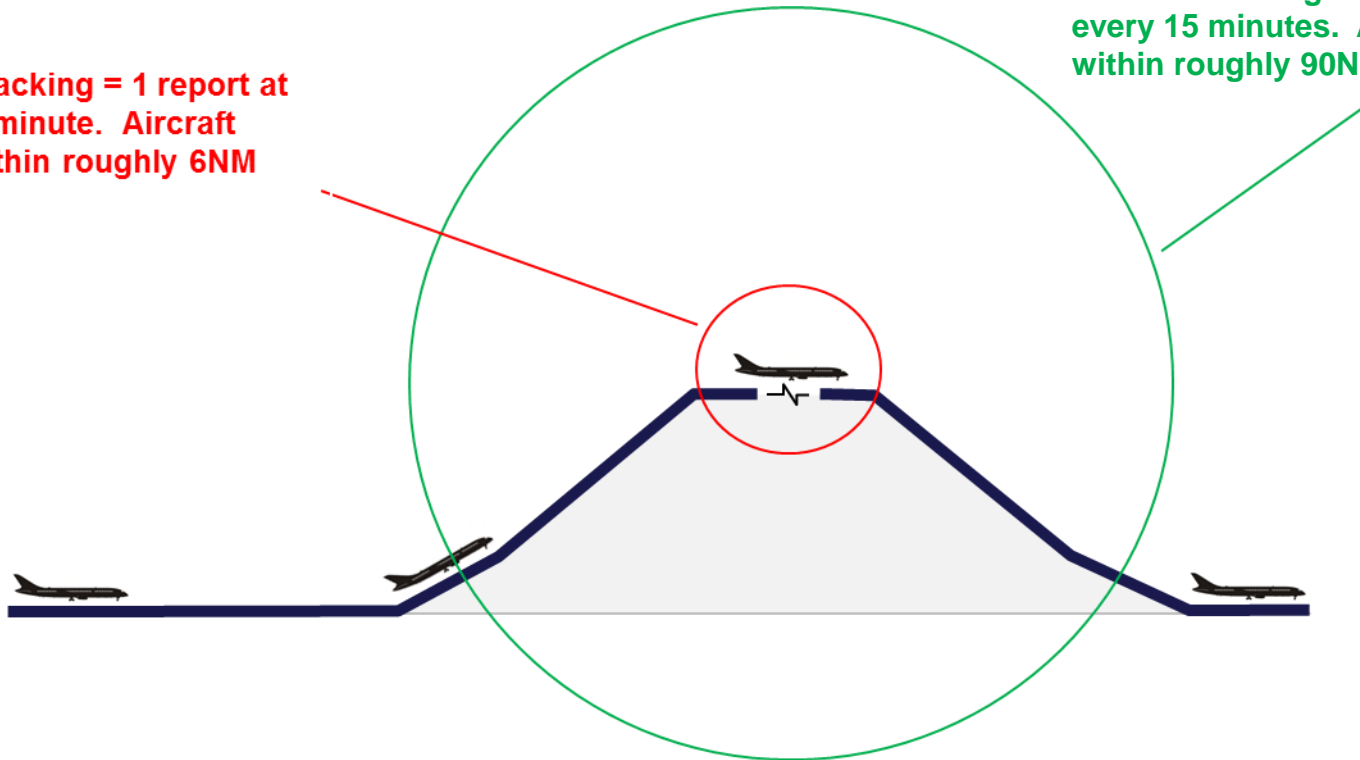
Current Aircraft Tracking Capabilities

- **Aircraft systems provide aircraft position information to air traffic control or other aircraft to enhance safety**
  - Air traffic control transponders (ATC) and traffic and collision avoidance systems (TCAS) identify and provide location information of aircraft.
  - Automatic dependent surveillance broadcast (ADS-B) systems provide much greater detailed information to allow better coordination of aircraft in the airspace and with each other.
  - Following chart illustrates systems that may be used to track an aircraft.

Technology Option	Tracking	6nm Radius of Accident Site	Search and Rescue Alerting	Preliminary Accident Investigation	Current Providers	Remarks
ACARS to Airlines (via SATCOM)	Yes	No, at 15 Min reporting interval as offered by ACARS	Not directly	Limited.	Several, ARINC, SITA, etc.	Currently on aircraft. Would require 1 min reporting intervals to meet 6 nm radius of accident site
ADS-C to ATC (periodic reporting)	Yes	Not typical, but possible if sent at 1 minute intervals	Not directly	No	ARINC or SITA	Currently on aircraft. Would require 1 min reporting intervals to meet 6 nm radius of accident site
ADS-B Out (satellite-based reception)	Yes	Yes	Not directly	Yes, current ADS-B parameter could support some reconstruction	Aireon (Iridium, Nav Canada), GlobalStar ALAS	ADS-B required in 2020. GlobalStar system currently in certification. Iridum subscription service planned to start 2018
Deployable Recorder (CVR/FDR/ELT)	Yes, but only after an accident	Yes, via ELT alerting, on impact with ground/water	Yes via COSPAS SARSAT system	Yes, once recovered	DRS Technologies, Cassidian, Hr Smith	Independently powered, and deployment is not dependent on flight crew action.
Current 406 MHz ELT	Yes, but only after an accident	Maybe, not as dependably using Doppler processing	Yes via COSPAS SARSAT system	No, position and aircraft registration information only	Several	Has proven ineffective on large, commercial transport aircraft.
2nd Generation 406 MHz ELT with "Events" Driven ability (In Development)	Yes, improved satellite constellation constant coverage and positioning techniques	Yes, improved satellite constellation constant coverage and positioning techniques	Yes via COSPAS SARSAT system	No, position and aircraft registration information only at this time	Standards currently being worked in RTCA SC-229 and Eurocae WG-98	Would require tamper proof aircraft triggering logic. ELT has independent battery and is installed in inaccessible location.
Commercial GPS Tracking Solutions	Yes	Depending on the update rate	Not directly	Basic track, speed, altitude and forces derived from GPS data	Spidertracks, Guardian, Bluesky, DTS Services, SkyTrac, etc.	Would require tamper proof location and electrical power

FAA Policy on Global Tracking

- **The FAA is developing policy.**

  – Harmonization is essential; ICAO standards are still being developed.

- **FAA and Industry are evaluating emerging technologies.**

  – Technical solutions should be performance based

    • Prescriptive solutions aren't the best fit for everyone, and are often outpaced by evolving technology. Revising regulations is costly.

  – Take into account safety *and* economic impact

    • While cost-relieving for States, implementation of new tracking and reporting systems may be economically burdensome to manufacturers and operators who realize little or no return on investment. This makes justifying rule making difficult, and presents a risk of resulting in a high non-compliance rate.

Questions?