



International Civil Aviation Organization

# Global Tracking of Aircraft

from a Frequency Spectrum perspective

**Aeronautical Spectrum Workshop**

**Preparation for WRC-15**

**Cairo, Egypt, 16 – 17 February 2015**

Loftur Jónasson  
ICAO

# Recent tragic events in aviation

## Recent accidents have resulted in the loss of aircraft in oceanic or remote areas

- AF-447, Rio de Janeiro to Paris, 2009. Lost in the North Atlantic. Location and identification of the event area was delayed due to lack of last known position information from the aircraft
- MH 370, Kuala Lumpur to Beijing, 2014. Event area is not known with certainty
- AH-5017, Ouagadougou to Algiers, 2014. Took some time until realization that the flight was lost.
- QZ-8501, Surabaya to Singapore, 2014. No ELT signal.

# Special Multi-disciplinary meeting on Global Airline flight Tracking in May 2014



- Consensus among States and the international air transport industry sector on the near-term priority to track airline flights, no matter their global location or destination
- Global tracking of airline flights will be pursued as a matter of priority to provide early notice of and response to abnormal flight behaviour
- Airlines will be encouraged to use existing equipment and procedures to the extent possible to support flight tracking

# Special Multi-disciplinary meeting on Global Airline flight Tracking in May 2014



## Recommendations

- Short term:
  - A number of recommendations to leverage existing radio communications capabilities to provide global tracking in the near term.
  - Develop “Concept of Operations” for the “Global Aeronautical Distress and Safety System” to provide a clear definition of the objectives of flight tracking.
  - Initiate a parallel industry led activity, Aircraft Tracking Task Force.
  - Output of both to be addressed by ICAO High Level Safety Conference in early 2015

# Special Multi-disciplinary meeting on Global Airline flight Tracking in May 2014



## Recommendations

- Medium term:
  - Develop performance based provisions (SARPs) using a multidisciplinary approach, on flight tracking to support the location of an accident site in a timely manner for the purpose of search and rescue and accident investigation
  - Encourage States and International Telecommunication Union (ITU) to take action, at the earliest opportunity, to provide the necessary spectrum allocations as emerging aviation needs are identified. This includes spectrum for satellite and radio services used for safety of life aviation services. ICAO encourages ITU to place this on the Agenda for the upcoming ITU World Radio Conference 2015;
  - ...

# Special Multi-disciplinary meeting on Global Airline flight Tracking in May 2014



## Recommendations

- Long Term:
  - ICAO should work in coordination with ITU to develop aviation requirements for network communications associated with remote storage of flight information.

# ITU Plenipotentiary 2014 (PP-14)

(The ITU equivalent to ICAO Assembly)



- Resolution 185

...

resolves

to instruct WRC-15 , pursuant to No. 119 of the ITU convention, to include in its agenda, as a matter of urgency, the consideration of global flight tracking, including, if appropriate, and consistent with ITU practices, various aspects of the matter, taking into account ITU-R studies.

...

# GADSS CONOPS Outcome, Overview



## Aircraft Tracking

### Normal Operations

- Possible Subset of ATS Surveillance
- Used for Airline Operational Functions
- Controllable by Flight Crew
- multiple solutions

## Aircraft Tracking

### Abnormal Operations

- Triggered by abnormal events
- Provides flight location data at least once per minute
- Controllable by flight crew
- multiple solutions

## Autonomous Distress Tracking (ADT)

- A Distress Signal
- Auto Triggered by very specific events
- May be manually activated
- Can not be isolated

## ADFR

- Automatically deployed
- Floatable
- Contains ELT to aid location



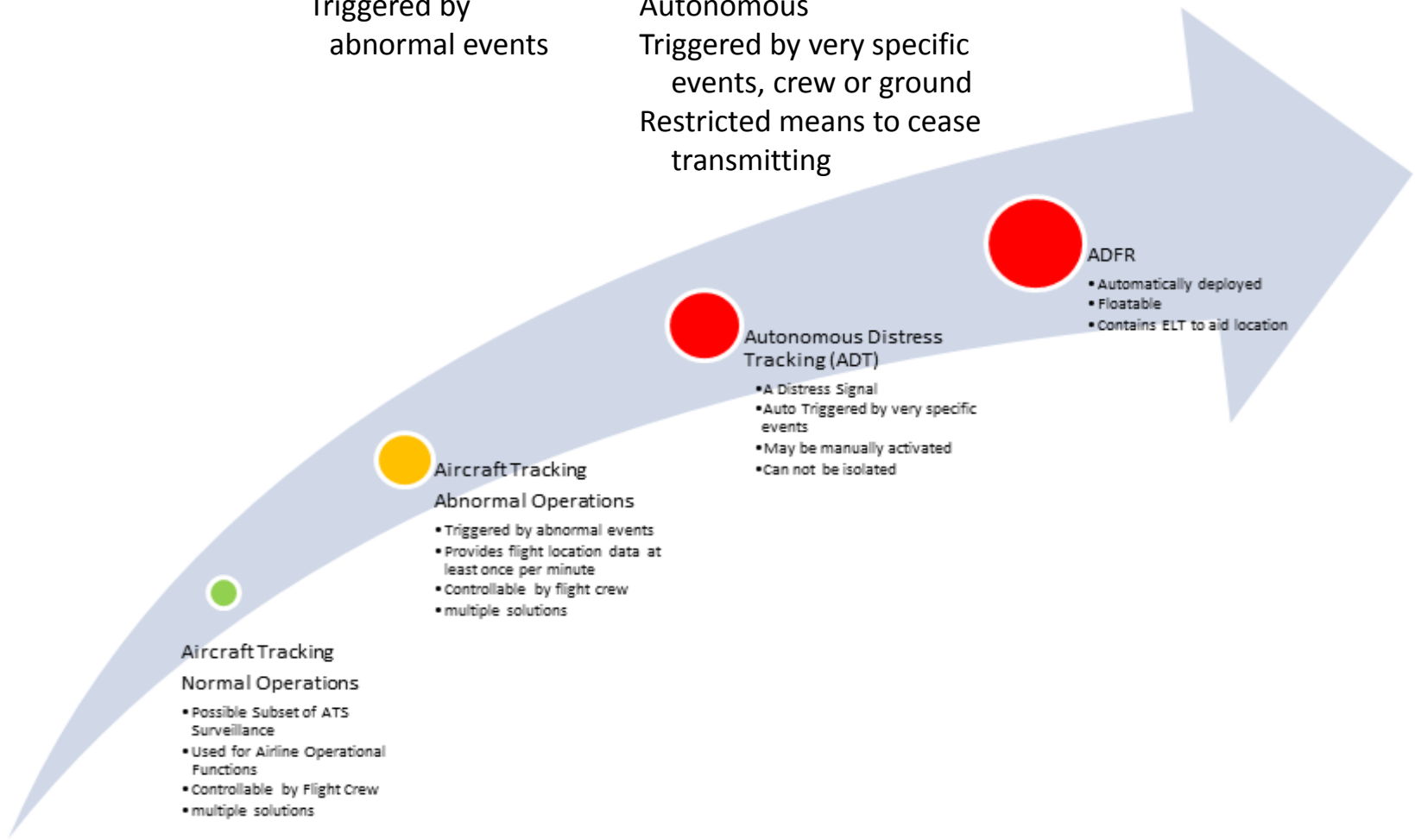


15 minute

1 minute  
Triggered by  
abnormal events

1 minute  
Autonomous  
Triggered by very specific  
events, crew or ground  
Restricted means to cease  
transmitting

Timely access to data



**Aircraft Tracking  
Normal Operations**

- Possible Subset of ATS Surveillance
- Used for Airline Operational Functions
- Controllable by Flight Crew
- multiple solutions

**Aircraft Tracking  
Abnormal Operations**

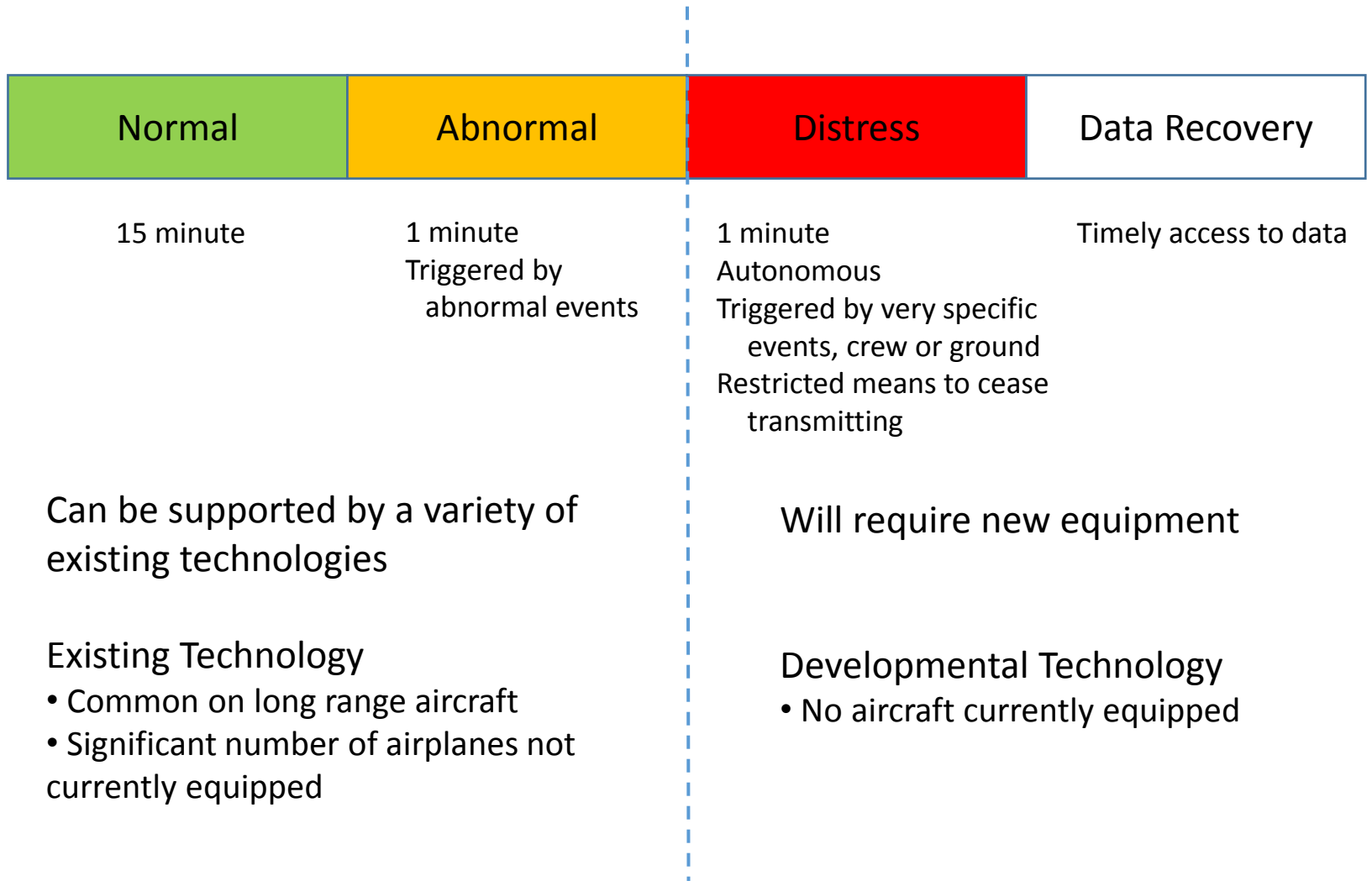
- Triggered by abnormal events
- Provides flight location data at least once per minute
- Controllable by flight crew
- multiple solutions

**Autonomous Distress  
Tracking (ADT)**

- A Distress Signal
- Auto Triggered by very specific events
- May be manually activated
- Can not be isolated

**ADFR**

- Automatically deployed
- Floatable
- Contains ELT to aid location



← May be supported by a variety of solutions →

## Annex 6 proposals:

- Short term:
  - Tracking by aircraft operator (airline)
    - Position reports every 15 minutes in oceanic and remote areas
    - Applicable to all aircraft with takeoff weight of >27 tons or 19+ persons
    - Aircraft operators responsible for the tracking their own aircraft
- Mid and long term:
  - 1 minute tracking, triggered by abnormal events
  - 1 minute tracking, autonomous, triggered by very specific events, crew or ground. Restricted means to cease transmitting
  - Data recovery, Automatically deployable flight recorders

# Second High-Level Safety Conference (HLSC) 2 – 5 February 2015



## Planning for global aviation safety improvement

- Directors General of Civil Aviation and strategic decision-makers build consensus, obtain commitments and formulate recommendations deemed necessary for the effective and efficient progress of key aviation safety activities.
- Large event, 710 delegates from 120 Member States and 35 Observer Delegations
- Three major themes: reviewing the current situation, the future approach to manage aviation safety and facilitating increased regional cooperation.
- Emerging safety issues: Global Tracking of Aircraft and risks to civil aviation arising from conflict zones.

# Second High-Level Safety Conference (HLSC)

## 2 – 5 February 2015



### Flight Tracking and Spectrum related outcomes

#### 1.1 Global flight tracking

[...]

1.1.5 With regards to the flight tracking technology, the conference noted the ATTF Report which detailed **existing technologies which are already installed on aircraft and which could be used to perform global aircraft tracking**. This range of technologies and related services will enable operators to take a performance-based approach when implementing aircraft tracking capabilities. The ATTF report contained a set of performance-based criteria that could be used to establish a baseline level of aircraft tracking capability. Additionally, the report also identified **future technologies that could support flight tracking in oceanic and remote airspace such as satellite-based automatic dependent surveillance – broadcast (ADS-B)**. In this regard, the conference supported that **ICAO should encourage States and the International Telecommunication Union (ITU) to discuss allocation requirements at the World Radiocommunication Conference in 2015 (WRC-15) to provide the necessary frequency spectrum allocations to enable global air traffic services (ATS) surveillance**. The conference strongly encouraged industry to begin implementing flight tracking on a voluntary basis.

[...]

# Second High-Level Safety Conference (HLSC) 2 – 5 February 2015



## 3. RECOMMENDATION 1/2

3.1 The conference agreed on the following recommendations:

*Global flight tracking*

[...]

f) ICAO should encourage States and the International Telecommunication Union (ITU) to discuss allocation requirements at the World Radio Communication Conference in 2015 (WRC 15) to provide the necessary spectrum allocations for global air traffic services surveillance as a matter of urgency;

[...]

# Second High-Level Safety Conference (HLSC)

## 2 – 5 February 2015



### **In Summary - Flight Tracking and Spectrum related outcomes**

- Endorse GADSS CONOPS Outcome
- Embrace methodology of the Annex 6 SARPs under development
- For one of the new technologies identified, satellite-based reception of ADS-B (1090 SSR ES), the Conference recommended that:

ICAO should encourage States and the International Telecommunication Union (ITU) to discuss allocation requirements at the World Radio Communication Conference in 2015 (WRC 15) to provide the necessary spectrum allocations for global air traffic services surveillance as a matter of urgency

Documentation for the 2<sup>nd</sup> HLSC (2-5 Feb 2015):

<http://www.icao.int/Meetings/HLSC2015/Pages/default.aspx>





- Region Published Material and Equipage Mandates
- Europe \* The European Commission has enacted an Implementing Regulation laying down requirements for the performance and the interoperability of surveillance for the Single European Sky ((EU) No 1207/2011). This was recently updated by Commission Implementing Regulation (EU) No 1028/2014 of 26 September 2014 amending Implementing Regulation (EU) No 1207/2011 which mandates specific ADS-B equipage after 7 June 2020.
- United States \* In 2010, the FAA issued a new rule contained in Title 14 of the Code of Federal Regulations (14 CFR) part 91, §§ 91.225 and 91.227. This rule requires ADS-B (Out) performance when operating in designated classes of airspace within the NAS after 1 January 2020.
- Canada \* Transport Canada Advisory Circular (AC) No. 700-009 \* Issue 2 EASA AMC 20-24
- Australia \* Guidance material: CAO 20.18, Amend Order No. 3, dated December 2009 \* Mandates ADS-B Out for upper airspace ( $\geq$ FL290) in December 2013
- Hong Kong \* After 31 December 2014 for aircraft flying within Hong Kong FIR between FL290 and FL410 \* Must meet DO-260 (Version 0) requirements of ICAO Annex 10 and ICAO Doc 9871 Chapter 2, or DO-260A (Version 1) requirements of ICAO Doc 9871 Chapter 3 \* Means of compliance per EASA AMC 20-24 or CASA CAO 20.18 Appendix XI
- Singapore \* Guidance material: CAAS AIC 14, 28 December 2010 \* Implement the use of ADS-B Out after 12 December 2013 within certain parts of the Singapore FIR ( $\geq$ FL290) \* EASA AMC 20-24 or CASA CAO 20.18 Appendix XI, otherwise must fly at <FL290
- Other Asia Pacific \* Expected to follow ADS-B Avionics Requirements template per APANPIRG Conclusion 21/39 \* EASA AMC 20-24 or CASA CAO 20.18 Appendix XI