



Inmarsat ICAO Tracking & Real-Time Data

NTSB Forum

Emerging Flight Data & Locator Technology

October 7, 2014 – Washington DC



Objectives – “Food for Thought”

> Identify the Problem Statement

- What is it that we are trying to solve?
 - Where & Time to locate/retrieve FDR – void of any information

> Solution(s) may be “hiding in plain sight”

- Have we effectively used what is already installed on aircraft?
- What else is being installed “for other financial/operational reasons”
- Waiting for the holy grail of technology

> Specify “end-game” not a one off technology

- Accidents are result of complex/cascading events
- Multitude means of compliance/satisfying requirements
- Does not mean new hardware, decades of installation ramp up

> **Don't Wait... Use what you have more effectively**

#1: Tracking (ICAO ADS-C & Others)

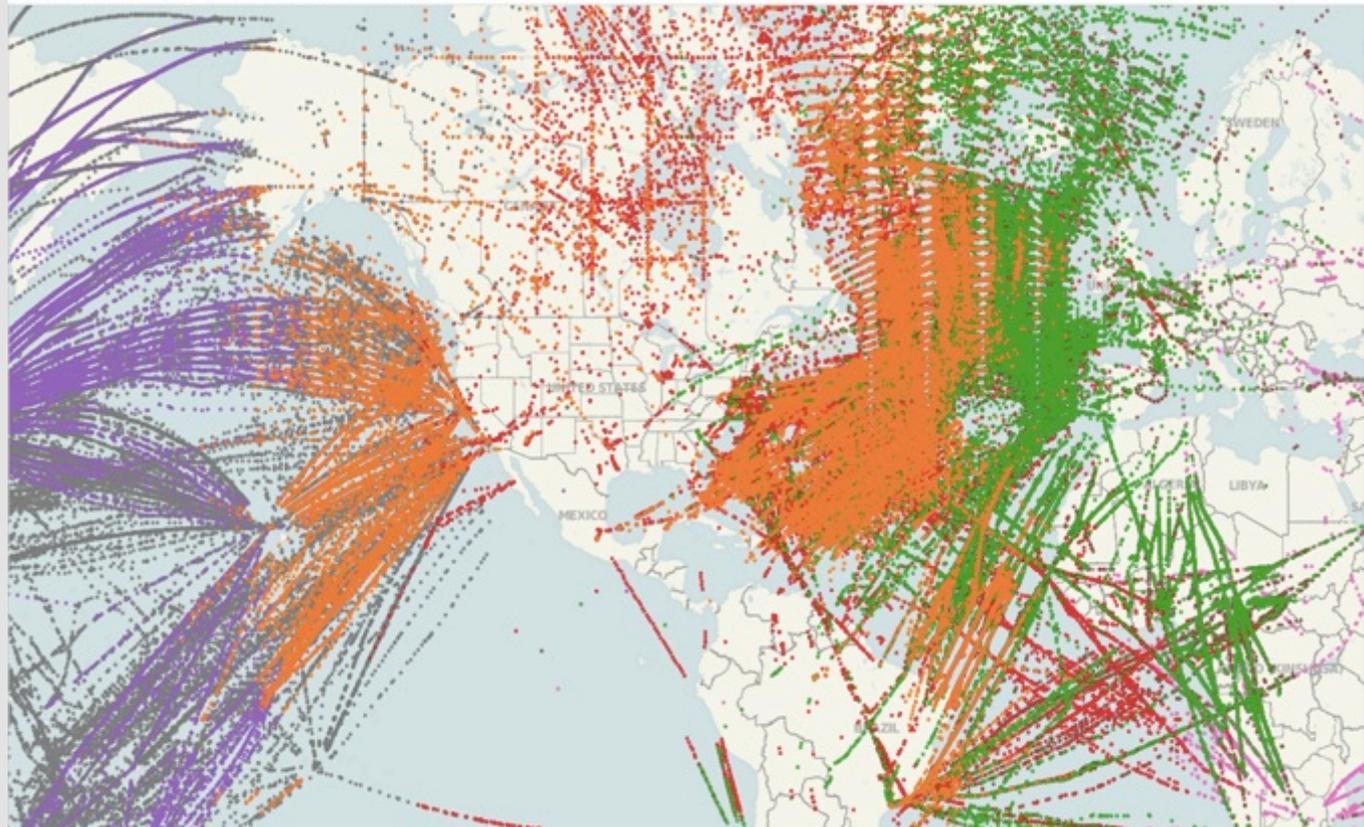
Free Tracking ICAO Approved ADS-C

15 min Reporting
Intervals

(independent of ATC Transponder)

Aircraft that have
FANS1/A

ADS-C derived aircraft positions, colour coded by [Ocean Region / ATSP]



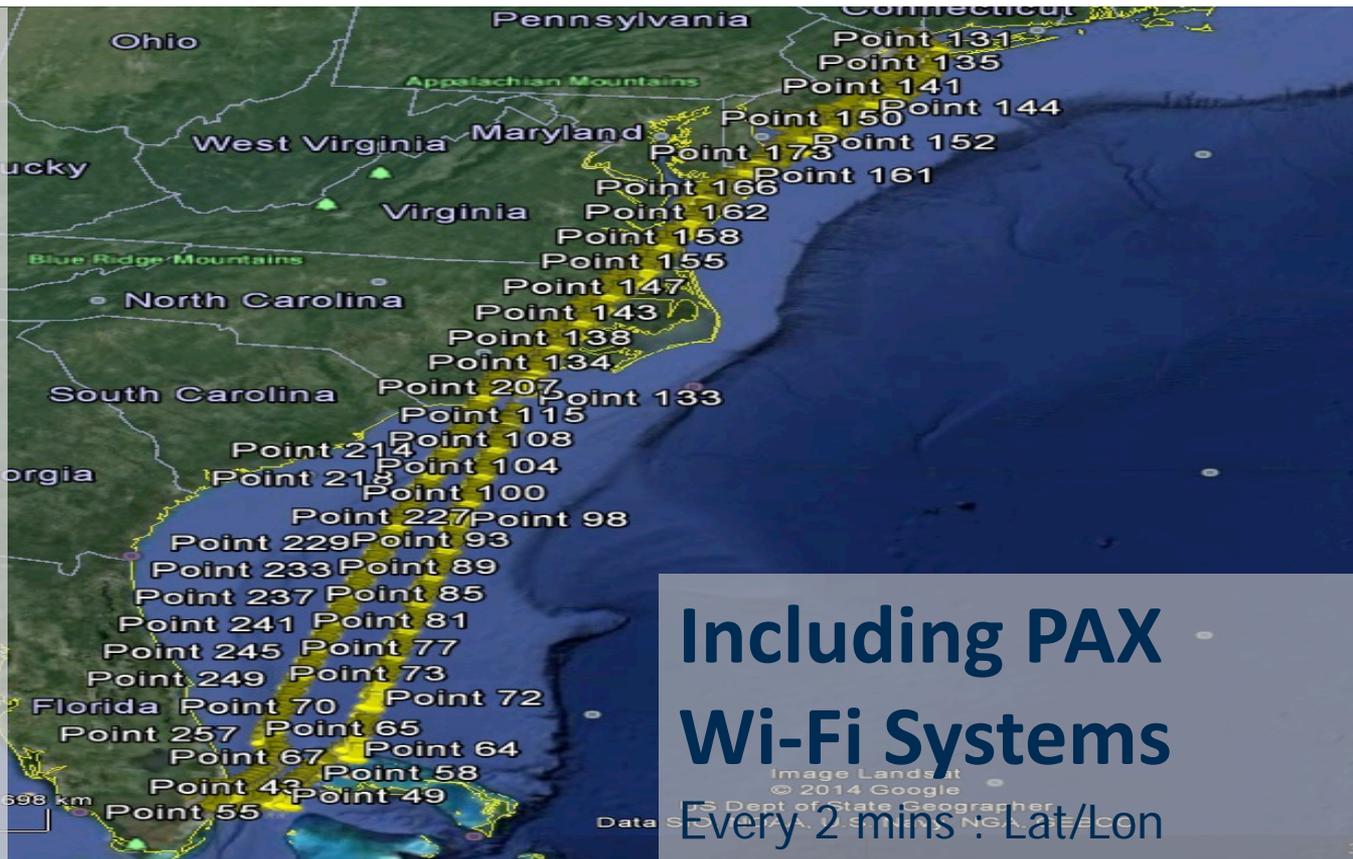
ADS-C is used extensively on long haul fleets and are part of future mandates. Active fleet upgrades with these systems are fully underway.
Performance Requirement: "Aircraft must send at least Lat/Lon via approved or other suitable means on a regular basis"

#2: Enhanced Handshakes

Enhanced Handshakes Search & Rescue

Example: 30 sec to minimize search radius via SBB

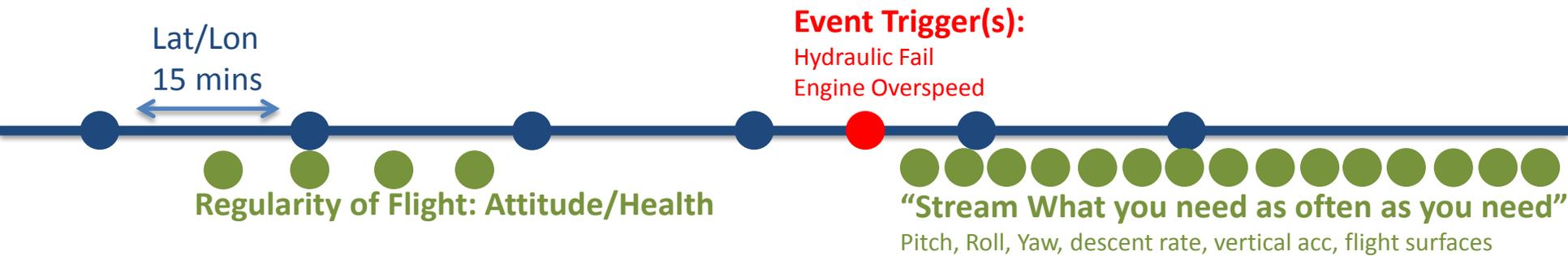
Lat/Lon, Heading, Speed, Altitude



Non-ACARS, Non-Transponder, difficult/complex to disable everything to include Passenger Wi-Fi systems

Performance Requirement: "Aircraft must have multiple means of location capabilities and aircraft intent."

#3: Real-Time Data Options: FDR



Real-Time Affordable Data

Stream ACARS, Health Management, FDR, CVR data efficiently

Know what happened before an emergency

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ACARS/ACMS

Streaming via SATCOM ACARS or

IP

System Status

(On Demand)

Hydraulics, Electrical
Master Warning Caution Alerts
Cabin & Oxygen Depressurization
Engine Overspeed, Loss, Fire,
Stall Warning, Stick Shaker
Others...

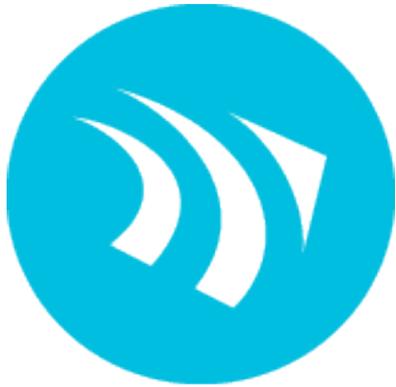
Aircraft Attitude

(Live)

Pitch, Roll, Yaw (+rates)
AOA, Track, Heading, Pitot Static Pressure,
Temperature, Airspeed, Altitude, Lat/Lon,
Flight Surface, Landing Gear Positions, Pilot
Control Input, Autopilot Disconnect
Vertical Acceleration, GPWS Events

Performance Requirement: "Aircraft must report health status & attitude regularly"





Summary Definitive Actions & Momentum

- Problem that we are trying to solve
 - Unable or too long to retrieve/locate FDR
 - No data until then
- Several/Many Solutions
 - Exist today
 - Being installed for other reasons
- Don't Wait
 - "Not acceptable in this day & age"
 - Specify Performance, "not specific products"
- Working Group
 - Performance Requirements
 - Define Real-Time Data... "Only what you need, when you need"... but not nothing

Backup Slides



Free Tracking

ICAO Formatted
ADS-C

15 min Reporting
Intervals

Aircraft that have
FANS1/A

Enhanced Handshakes Search & Rescue

Upon Request 2 min
location search radius
via SBB

Lat/Lon, Heading,
Speed, Altitude

Real-Time Affordable Data

Stream ACARS, Health
Management, FDR, CVR
data efficiently

Know what
happened before
an emergency

I-4 Classic Aero & SwiftBroadband Coverage Map (L-Band)



Data & Connectivity Today



FOQA

Flight Operations Quality Assurance

MOQA

Maintenance Operations Quality Assurance

FDR/CVR

Flight Data Recorder/ Cockpit Voice Recorder

EHM

Engine Health Monitoring



ACARS

Aircraft Communications Addressing & Reporting System

Via SATCOM, VHF, HF – Includes MIAM-ACARS over IP (SBB/Ku/Ka/ATG)



Is This The Best We Can Do?

More Data: The Connected Aircraft

FOQA/MOQA

1 MB

Per Flight Hour

EHM

4 MB

Per Flight

Real-Time

0.5 MB

Per Flight Hour



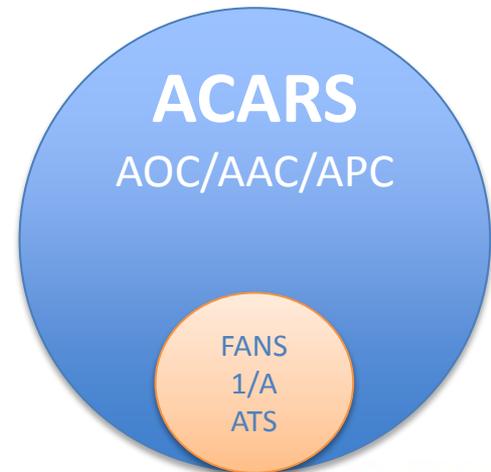
What does this mean?

Speed, Performance, Capacity,

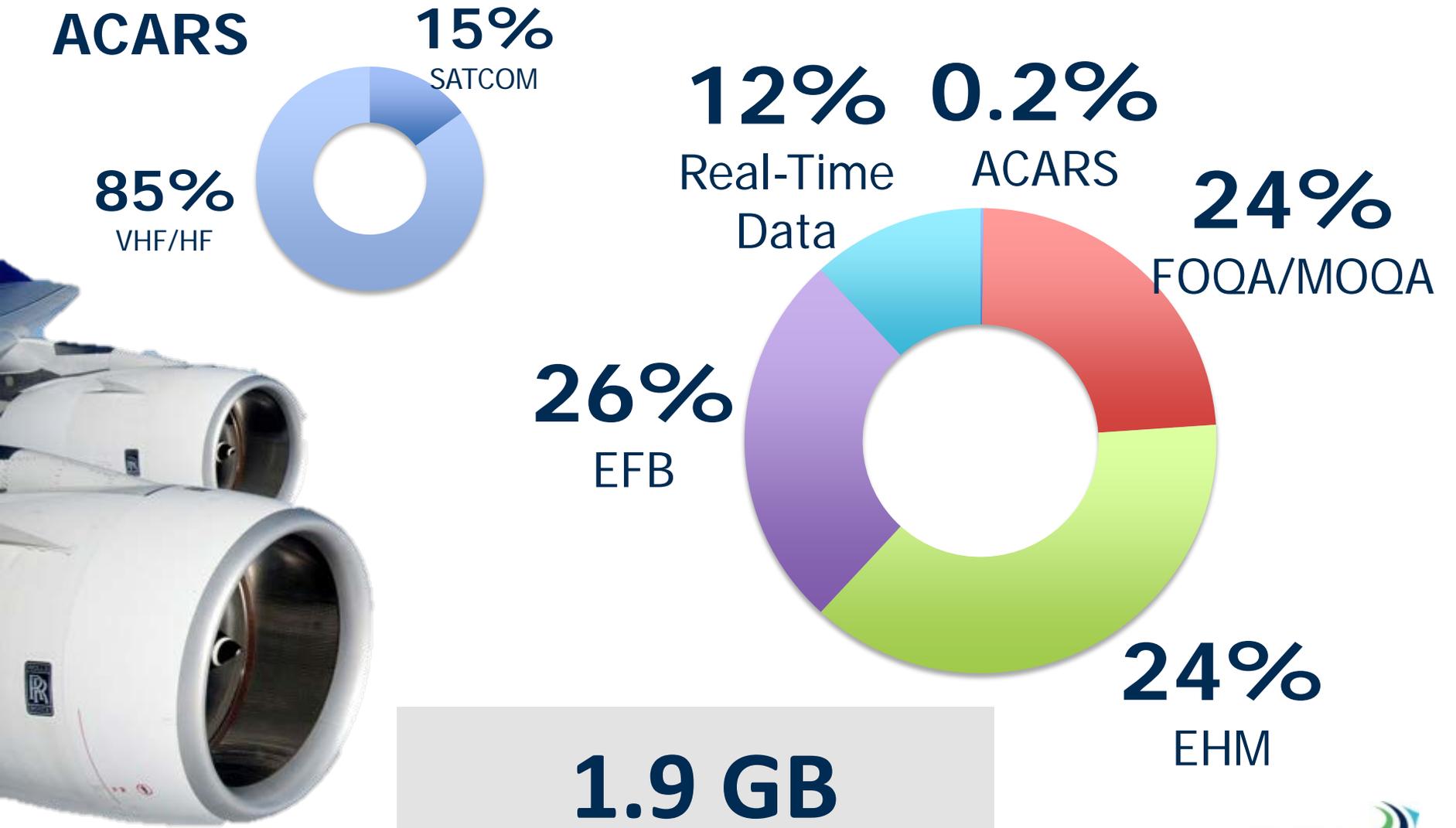
ACARS

4 MB

Per Month



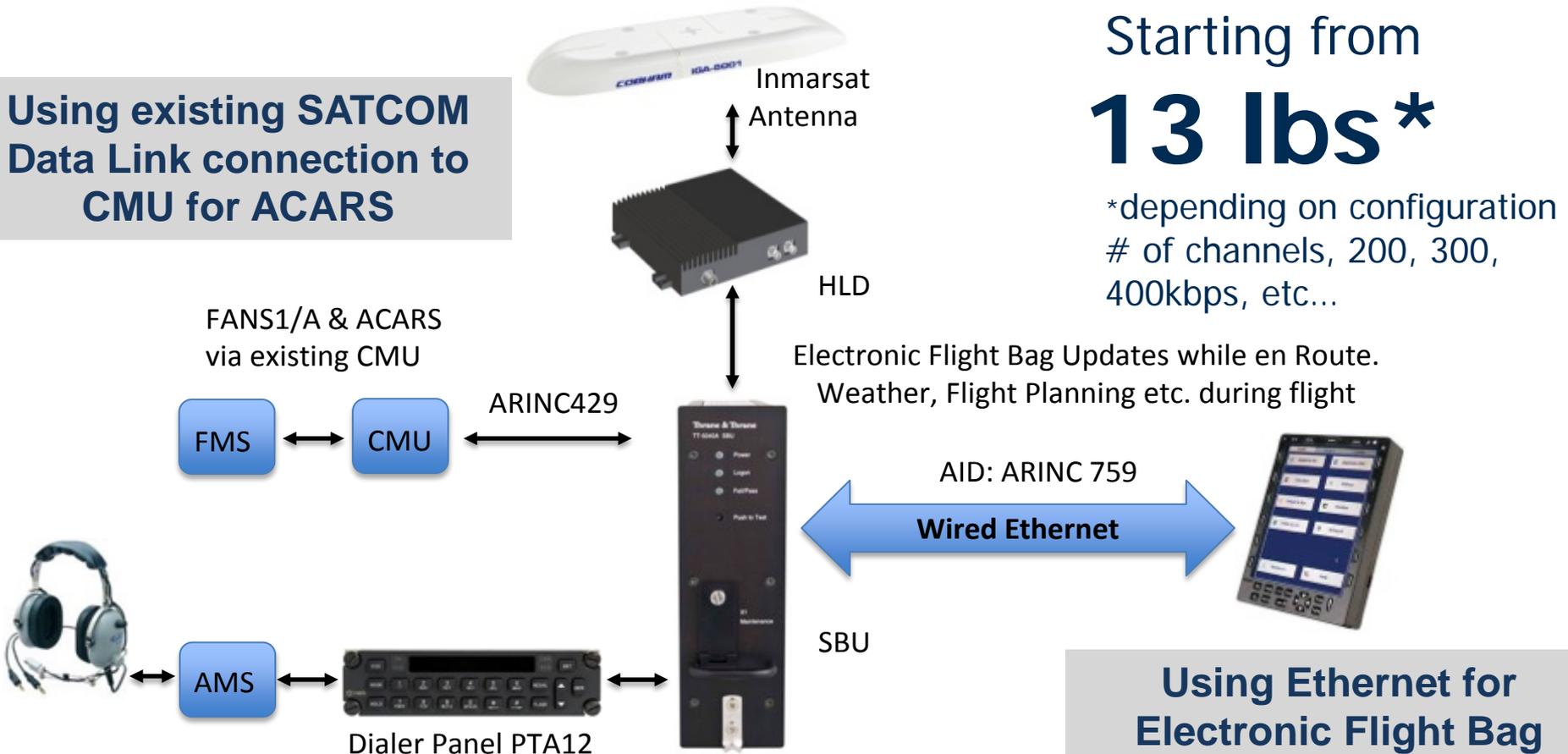
Infographic: Connected Aircraft



FANS1/A over SB-Safety Configuration

ACARS over SBB & IP Data For EFB for HAL 767

Using existing SATCOM Data Link connection to CMU for ACARS



Using Ethernet for Electronic Flight Bag

Transponder



This is how you turn off ADS-B.
“Stby or Off or Deact”

Pictures courtesy of the internet

Global ICAO ADS-C Reports

One week's worth (September 2014): Aircraft use ADS-C "Space-based" today, then revert to ADS-B via terrestrial towers when over land. There are even more aircraft than below capable of this, but there is no real requirement to use this feature in all airspaces, so some airlines/aircraft do without and don't make the most of technology already installed on aircraft. **Note: Some ADS-C reports register as high as 84deg N.** The below is fed by the FMC/GPS, not via the Transponder!

