PLANET Return from Experience

HAIC-HIWC-EASA-HighIWC Flight Experiment Campaign

EASA Workshop – Weather Information Provided To Pilots

29th of October 2015

www.haic.eu

Presenter :
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ATMOSPHERE

ATMOSPHERE: Satellite Solutions

Whatever flies..

IAGOS
Continuous Measurement of Atmosphere Chemistry

AIRBUS
Test Flight Department
Inmarsat Cockpit Router

Lufthansa METEO FRANCE

Real time reporting via Inmarsat

SAFIRE
Measurement Campaigns
HYMEX , BAMED , CHARMEX

Iridium SBD

AIRBUS SAFIRE
HAIC Campaign

Iridium RUDICS

eurocopter
Test Flight Department
Track & Weather via Iridium

NRC CNRC
HAIC Campaign

Iridium RUDICS

cnes

Inmarsat

ATMOSPHERE

Satellite Solutions for Flight Operations

Inmarsat Global Xpress
Valisation Campaign

Honeywell

Inmarsat

esa
UAV Concept Study

Control & Command via Satellite

DLR
HALO Experiments Campaigns

Inmarsat

Diamond
First Responders Service

Viasat

DLR
Nowcast Service Campaign
Institute of Atmospheric Physics

Iridium SBD

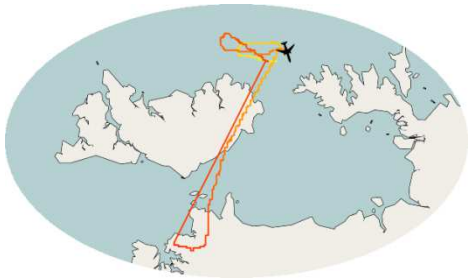
DLR
Survey Campaign

Iridium SBD

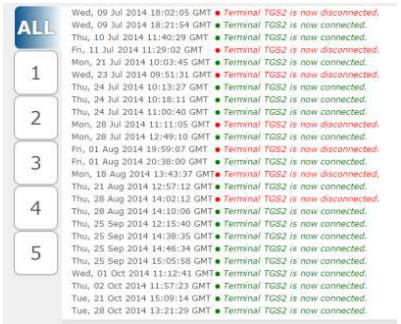
PLANET : a collaborative air platform

Mission Management

- Flight Following & Guidance

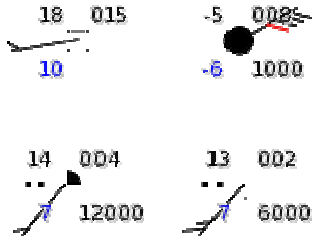


- Multi-Aircraft & Multi-Channel Chat

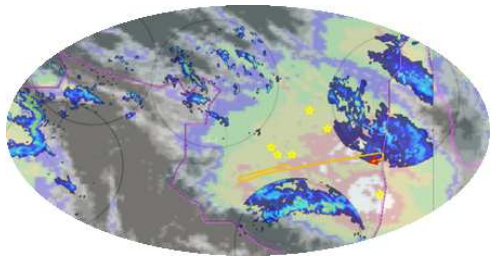


In-flight Weather Update

- METAR/TAF



- RAD & SAT

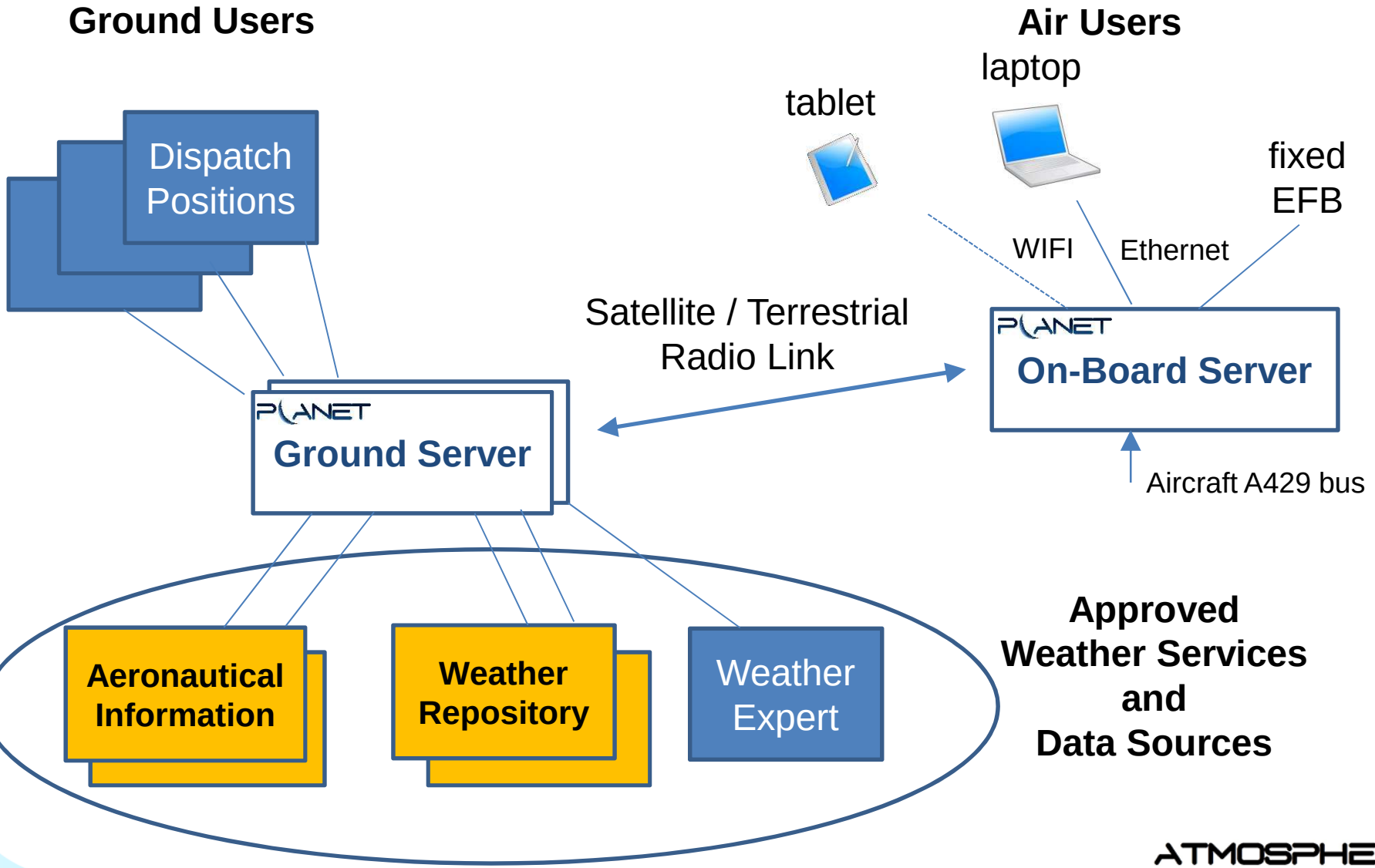


- WINTEM & SIGWx
- NOTAMS

Flexible Data Transfer

- PDF files
- Images
- Text files
- Binary data (e.g. sensor data, health monitoring)

High Level Architecture



PLANET

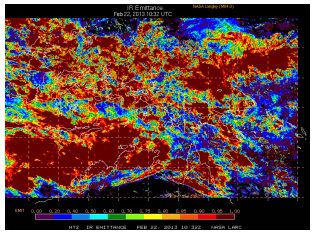
BY ATMOSPHERE

HAIC-HIWC-EASA HighIWC

Operational Use Case

HAIC/HIWC/EASA-HighIWC Campaigns

HAIC is a large project led by AIRBUS with experimental flight trials to gather High Altitude Ice Crystal data (2012 - 2016) - in collaboration with the EASA-HighIWC and US lead HIWC projects and with the additional support of ICC (Ice Crystals Consortium). 3 flight campaigns (Australia, French Guyana, Indonesia)



Satellite & Radar

Satcom

On-Board Server

User Interface
(Principal Investigator Position)

ATMOSPHERE delivers
real-time satellite,
radar images and other products
in-flight for mission guidance

Cayenne Campaign (May 2015)

- Weather Products available
  - Infrared Imagery
  - Kourou Radar
  - Lightning
  - Rapid Development Thunderstorm

- Multi-aircraft Mission
  - Boeing B757 (Honeywell)
  - Convair 580 (NRC + Env. Canada contribution)
  - Falcon 20 (Safire)

Honeywell B757 Setup (1/2)

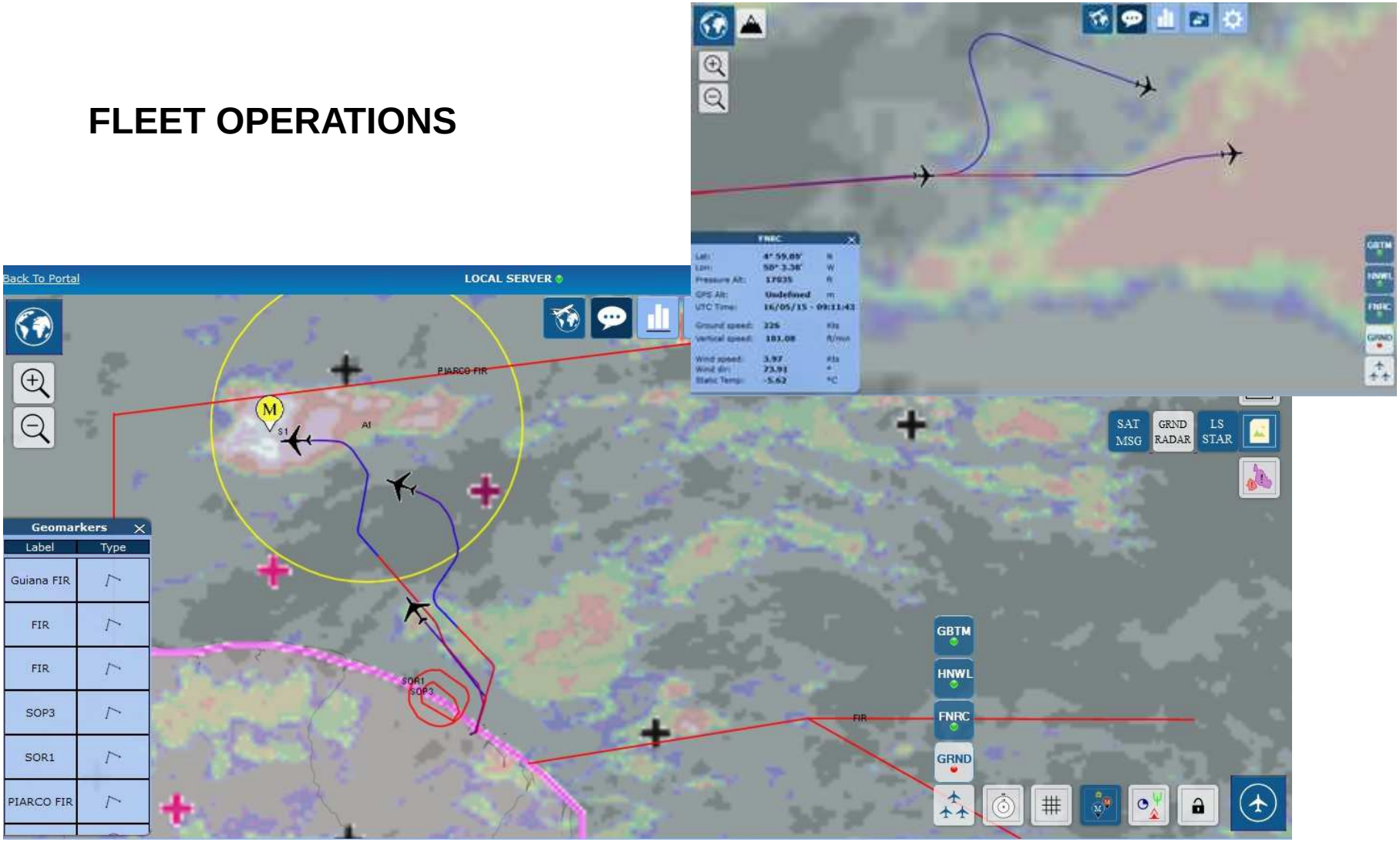
Courtesy Honeywell

Honeywell B757 Setup (2/2)

Courtesy Honeywell

Cayenne Snapshot 1

FLEET OPERATIONS



Cayenne Snapshot 2

RDT & Infrared Imagery (Falcon flight 29.05.2015)

PLANET Feedback

- **Tracking** used on-board for multi-aircraft coordination in addition to VHF voice. Constant distance following.
- **Infrared Satellite Imagery** used by Pilots and flight test engineers
  - Known and Trusted product
  - Unique information in Oceanic Airspace
  - Essential for flight operations within / around convective clouds
  - New perspectives with more synthetic objects like RDT/CPP-HIWC however pilots likely to require both raw imagery and objects
- **Chat** heavily used for flight guidance and collaborative decision making between ground and air
- **Geomarkers** tool efficient for :
  - Trajectory definition and following
  - Mission area delineation
  - PIREPS to trace severe turbulence situations and to target active areas
- **Overall : Significant contribution to Flight Campaign Success**

PLANET Services Summary

- In Flight Weather
  - Get weather update in-flight : METAR, TAF, Significant Weather Charts, Wind Grids, Satellite Images, Storm Cells, Lightning, … available worldwide
  - Report observations (AMDAR, PIREPS)
- Flight Following & Guidance
  - Report aircraft position from anywhere at high frequency
  - Upload routes, waypoints, and mission area definition
- Extended Monitoring / Remote Control
  - Download and monitor aircraft systems data
  - Control on-board systems remotely
- Chat / File Transfer
  - Exchange live between air and ground to optimise mission efficiency

PLANET Service Roadmap

- Special Flight Operations
  - Consolidation on various niche segments (flight tests, atmospheric research, airwork, surveillance missions, rotorcraft)
  - Broaden offer with low end (PLANET GO) and high end offers (PLANET HTS)

- Commercial Air Transport
  - PLANET solution can be used in regular commercial air transport operations with little adaptations
  - Further steps to adress commercial air transport segment
    - Weather data package / service consolidation (products and coverage)
    - Integration within airlines flight operations workflow and interfaces
    - Airlines operations approval according to EASA rules
    - Operational Trials / Gradual deployment

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EASA Work-Shop Input

- Weather Information Provided to Pilots
  - Weather is just part of the global picture (aeronautical info, traffic, ..)
  - Uplink and Cross-Link information to be used as complement to in-situ data (radar)
  - Collaborative Decision Making / Automated exchanges to contribute to better safety and efficiency

- EASA Expected Contribution
  - Enable early experimentations with the objective to better define regulatory framework applicable to weather data exchange and use
  - Support/ease operations approval process through clearer guidance

Thank You

Acknowledgement

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Glossary

- ACARS : Aircraft Communications Addressing and Reporting System
- AIS : Aeronautical Information Service
- AIXM : Aeronautical Information Exchange Model
- AMDAR : Aircraft Meteorological Data Relay
- FIXM : Flight Information Exchange Model
- FL : Flight Level
- IP : Internet Protocol
- IT : Information Technology
- METAR : METeorological Aerodrome Report
- NOTAMS : Notice to Airmen
- PIREPS : PIlot REPorts
- SATCOM : Satellite Communication
- SIGWX : Significant Weather
- SWIM : System Wide Information Management
- TAF : Terminal Aerodrome Forecast
- VM : Virtual Machine
- WAFC : World Area Forecast Centre
- WXXM : Weather Information Exchange Model

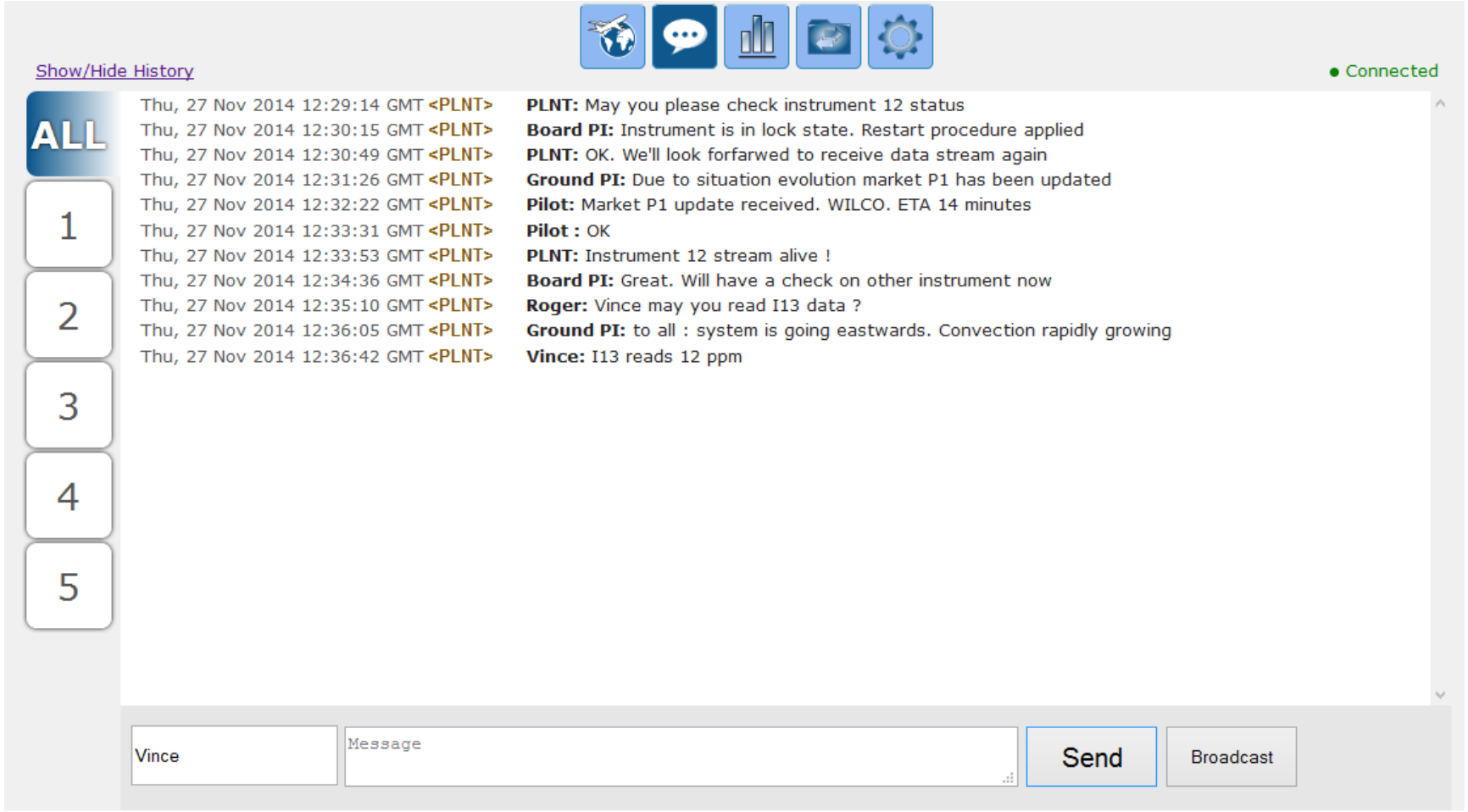
PLANET DCS

PLANET DATA COMMUNICATION SERVER

1.5kg, 15W, 28VDC
IRIDIUM and LTE Communications
Avionics Panel Mount Form Factor (5,5 inches)

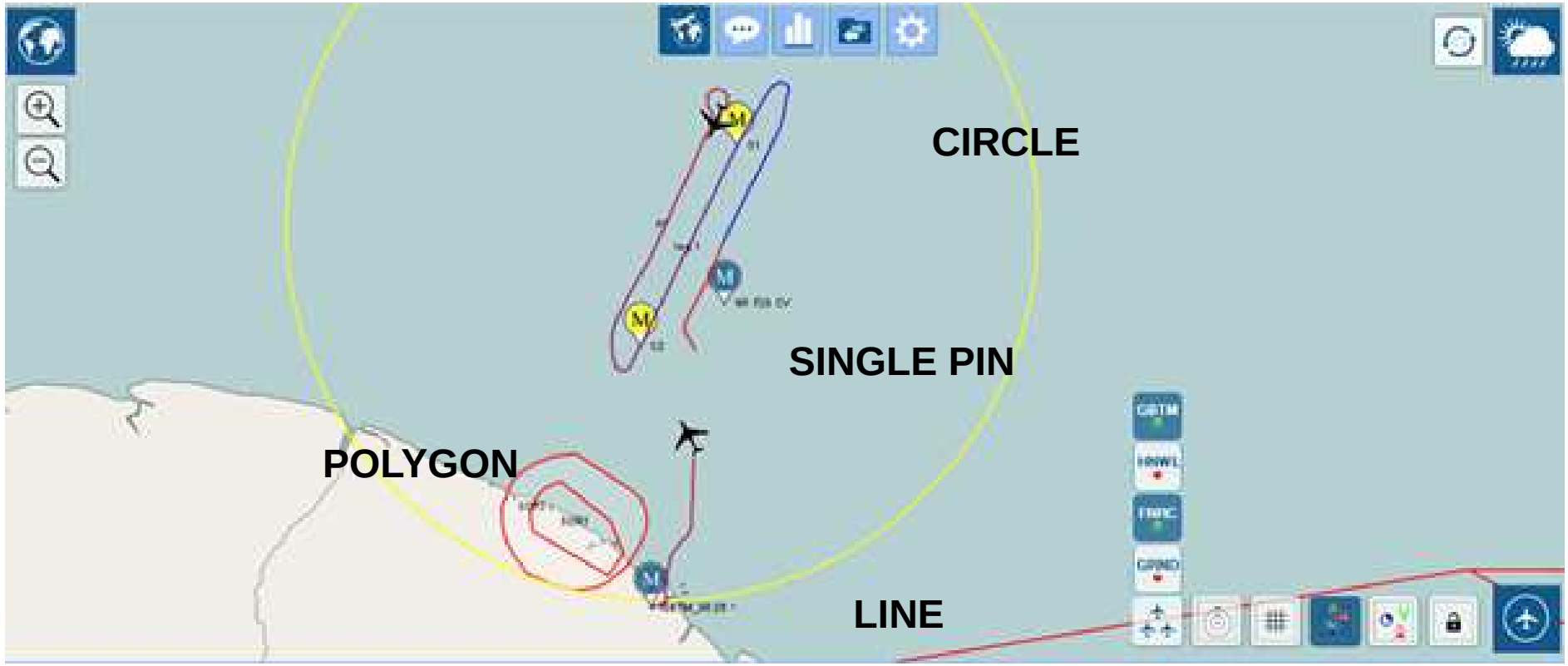
ATMOSPHERE

PLANET MULTI CHANNEL CHAT



Cayenne Snapshot

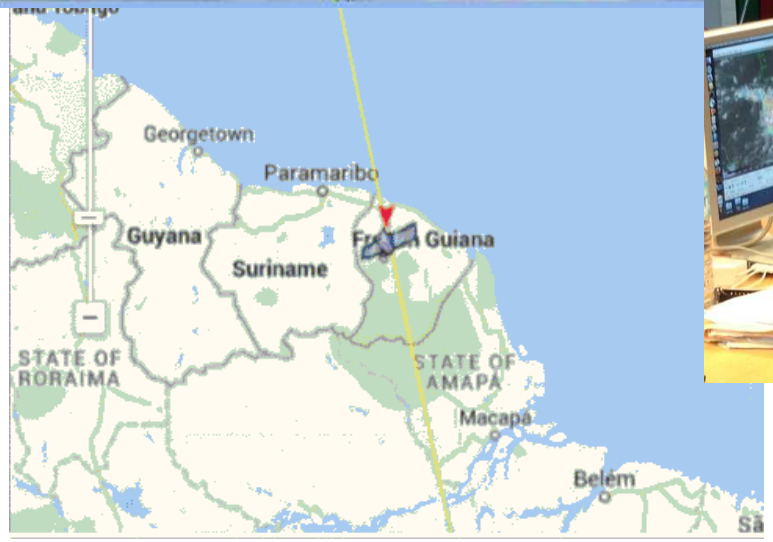
FLIGHT GUIDANCE USING GEOMARKERS



GEOMARKERS ARE :
STATIC OR DYNAMIC, FLEET SYNCHRONISED, REMOVABLE, MODIFIABLE FROM GROUND AND FROM AIR

Cayenne Snapshot

SYNCHRONISATION WITH CLOUDSAT PASS ON 16th of May 2015 ! ! !



PLANET Operations Cayenne

Radar & Infrared Imagery