The Twenty-Second Meeting of the
Informal South Pacific ATS Coordinating Group (ISPACG/22)
FANS Interoperability Team Meeting (FIT/15)

Papeete, Tahiti, 12-14 March 2008

Agenda Item 8: Iridium SATCOM

Performance-Based Operations Aviation Rulemaking Committee Communications Working Group FANS 1/A over Iridium Project

(Presented by the Federal Aviation Administration)

SUMMARY

This information paper provides the draft FANS 1/A over iridium project plan, which is being administered by the FAA-sponsored Performance-Based Operations Aviation Rulemaking Committee's Communications Working Group (PARC CWG).

1. Introduction

1.1 A number of operators, aircraft manufacturers, and equipment suppliers have expressed the desire to investigate Iridium as a viable data link for FANS 1/A operations.

1.2 The FAA-sponsored Performance-Based Operations Aviation Rulemaking Committee's Communications Working Group (PARC CWG) has initiated a draft FANS 1/A over Iridium project plan, which is provided in the Attachment to this information paper.

1.3 The PARC CWG is meeting on 18-20 March 2008 in the Seattle area to review the attached plan.

2. Recommendation

2.1 The meeting is invited to:

a) Note the information in this information paper.

b) Contact the PARC CWG co-chairs, Tom Kraft (tom.kraft@faa.gov) or Arnold Oldach (aoldach@rockwellcollins.com), for further information.

Attachment

- END –

Performance-based operations Aviation Rulemaking Committee (PARC)

Communications Working Group (CWG)

FANS 1/A Over Iridium Project Plan
(Version 0.5, dated 8-Feb-08)

Background

Over the last three years use of the Iridium satellite voice and data communications service to support the aviation community has grown dramatically. Initial installations were geared more toward the business aviation market. As new avionics were developed more than 10 commercial operators have installed Iridium systems for voice and data Airline Operational Control communications. However the recent approval by the International Civil Aviation Organization for use of Iridium for provision of safety services and the recent announcement that both ARINC and SITA, the two main data link service providers, would offer ACARS Over Iridium as a new sub-network service has generated a lot of interest from commercial operators to pursue safety service certification.

Toward the end of last year some preliminary “FANS 1/A over Iridium” scoping tests were run to assess the feasibility of using Iridium as an ACARS sub-network to support FANS 1/A ATC data link applications. . After several successful live end to end FANS over Iridium (FOI) informal tests it is time to move forward toward more formal testing.

Goal of this project plan

This document defines the process that will be used to evaluate the Iridium sub-network with a goal of achieving approval as a viable sub-network for aeronautical safety services.

The near term objective is to obtain approval to use Iridium as a viable sub-network for FANS 1/A applications supporting operations in different oceanic separation standards. Some examples of the different separation standards are; reduced separation to 50nmi longitudinal in RNP 10 airspace, 30nmi lateral / 30nmi longitudinal, and 25nmi lat / 30nmi long (½ deg tracks being considered in the NAT.

A second mid term objective is to obtain approval of Iridium voice communications and data communications as a long range communication system equivalent to today's HF radios enabling MEL relief and eventually removal of one of the two existing HF radio systems required for operations outside of VHF coverage.

And a third longer term objective, given Iridium proves viable, is to evaluate architectures that use dissimilar subnetworks, e.g., VHF, Iridium, Inmarsat, HFDL, to meet performance criteria required to support longer term oceanic/remote operations and regressed HF voice operations.

Prerequisites

A General Public License (GPL) will be used to ensure the investment made by many stakeholders working together toward the common goal of approving Iridium voice and data link communications to support aviation safety services remains open and available for the longer term. Data link service providers participating in this FOI project plan must ensure the methodology used to send and receive data link messages over their Iridium based sub-network must use an open standard supported by a General Public License (GPL).

Operators participating in this project must be eligible for FANS 1/A operations per Advisory Circular (AC) 120-70A, Operational Authorization Process for use of Data Link Communication System.

The participating aircraft data link capability must be certified in accordance with AC 20-140, Guidelines for Design Approval of Aircraft Data Communications Systems, or equivalent. The ATC data link applications (CPDLC and ADS-C) must meet RTCA DO-258/EUROCAE ED-100 (transport and above), or DO-258A/ED-100A.

The Iridium radio installation and interconnect with the FANS 1/A applications has been FAA approved and meets ARINC 741.

Project Administration

This project will be administered by the Performance-based Operations Aviation Rulemaking Committee's (PARC) Communications Working Group (CWG). For further information on becoming an eligible participant in the project, contact the PARC CWG chairmen, Tom Kraft (tom.kraft@faa.gov), Arnold Oldach (aoldach@rockwellcollins.com).

Brad Cornell (Bradley.d.cornell@boeing.com) will be the coordinator for this project plan, update it, as necessary, and distribute the updates to the participants and stakeholders of this project.

The data collected and results of any analyses will be provided to the PARC CWG The PARC CWG may rely on existing FANS Central Reporting Agency (CRA) for analysis, problem resolution, and improvement to support the project. Regardless, the PARC CWG will ensure processes are in place to secure individual confidentiality of any data or analysis.

The PARC CWG will use the results from this project exclusively to substantiate the recommendations it formulates for the PARC to the FAA on the enabling criteria needed to approve the use of Iridium for ATS data communications. Any other use that may come up during the course of this project will be negotiated by the parties involved prior to that use.

Stakeholders

The participants in this trial are as follows;

Organization	Point of contact	email	tel:
PARC CWG	Arnold Oldach Tom Kraft	aoldach@rockwellcollins.com tom.kraft@faa.gov	
Continental Airlines	David Pitoniak	david.pitoniak@coair.com	
Federal Aviation Administration (FAA), Principal Ops/Avionics Inspectors (POI/PAI)	??? (Tegeder Action)		
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FAA, Flight Standards, Air Transportation Division	David Catey Robert M Davis (MEL Policy)	david.catey@faa.gov robert.m.davis@faa.gov	

Organization	Point of contact	email	tel:
FAA, Aircraft Certification, Avionics Systems Branch	Matt Wade	matthew.wade@faa.gov	
FAA, Air Traffic Organization (ATO), Oceanic Operations	Dave Maynard	david.maynard@faa.gov	
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GE	DeJonge, Michael (CAL to confirm)	(CAL to provide)	
Avionica	Tony Rios (COA Confirm)	arios@avionica.com	
SITA	?Kathy Kearns (Who confirms?)	kathleen.kearns@sita.aero	
ARINC	?Brian Pemberton (Who confirms?)		
Rockwell Collins	?TBD (COA Action)		
?UK NATS	?Iain Davies (Who confirms)	iaiin.davies@nats.co.uk	
?NAV Canada	?Norm Dimock (Who confirms)	dimockn@navcanada.ca	
?Airways Corporation New Zealand	Paul Radford	Paul.Radford@airways.co.nz	
Oakland Center	??? (Action Dave Maynard)	???	
Other center (Japan)	(If routes dictate)		
Other center (Australia)	(If routes dictate)		

Success criteria

Per RTCA DO-306/EUROCAE ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace, October 11, 2007.

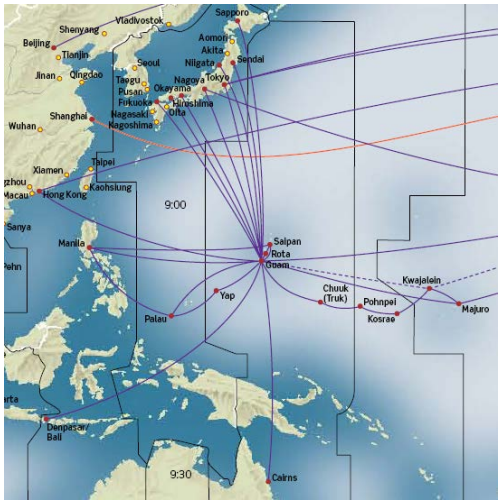
Additional operational requirements as negotiated through various forums (e.g., NAT SPG (NAT FIG, Satcom Task Force, ISPACG Data Comm Group and FIT, IPACG FIT, etc). For example, an availability requirement of
(0.999 for safety, per DO-306/ED-122)
0.9999 for operational efficiency, on a per Oceanic ATC Centre (OAC) basis:
No more than 4 outages greater than 10 minutes for any 12 month period
Failures causing outages for multiple OACs are not counted more than once
No more than 50 minutes of total downtime for any 12 month period

Extraction of RCP 240 and RCP 400 requirements for intervention capability and surveillance requirements support by the ADS-C application are provided at Attachment 1.

Description of project

Operations

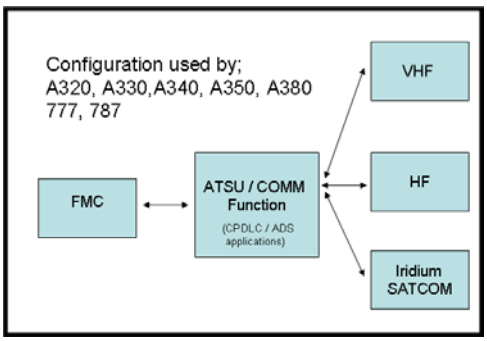
Continental has indicated a willingness to participate in the project. CAL plans to outfit 9 Boeing 737-800 aircraft with an ARINC 741 compliant voice and data capable Iridium based SATCOM system. These aircraft will be equipped with a certified FANS 1/A package. These aircraft are based in Guam and fly daily extended over water operations outside of VHF coverage (see figure) in airspace currently supporting FANS services. These aircraft will fly using FANS 1/A ATC data link services via CPDLC and ADS-C from Oakland (ZOA) center over the Iridium network. Five aircraft will be configured to use the SITA network and other four will be configured to use the ARINC network.

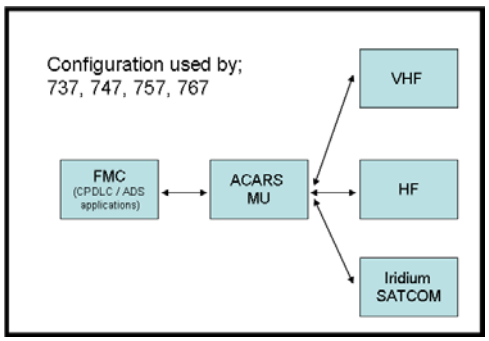


Any operational considerations, like managing connectivity, should be described?

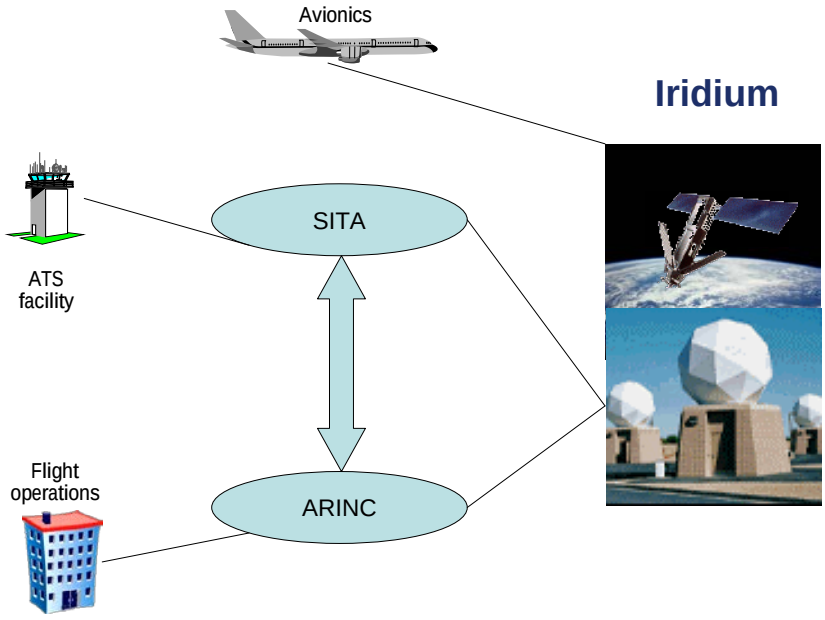
Aircraft equipage

No changes to aircraft equipment used to provide FANS 1/A services certified in accordance with AC 20-140, Guidelines for Design Approval of Aircraft Data Communications Systems, or equivalent will be required. No changes to ATC data link applications (CPDLC and ADS-C) meeting RTCA DO-258/EUROCAE ED-100 (transport and above), or DO-258A/ED-100A will be required. The Iridium base SATCOM system used to provide FANS 1/A services will meet the ARINC 741 equipment standard.





End-to-end overview



Prerequisites

Qualification means

A traditional phased testing plan used with other sub-network media will be used to qualify the Iridium sub-network. Bothe ARINC and SITA offer ACARS over Iridium service which is a prerequisite to offering FOI Structured ground tests and monitored in-service tests defined in more detail below will ensure the Iridium based sub-network performs as intended to support ATS services.

Qualification Phase Definitions

- AOI service offering by DSPs
- Structured end to end ground tests successful
- Network performance data from DSPs indicating adequate performance to support various separation standards
- Year long in-service operational evaluation on a monitored group of candidate aircraft.

End to end bench tests

Prior to allowing any in-service operations of the Iridium sub-network must pass some structured formal bench testing. In addition to avionics test benches coordination will be required with appropriate ATC ground systems to enable end to end operational evaluations. Boeing will install a representative Iridium based satcom system into a 747 and 777 test bench at in Boeing Field Washington. This installation will have the ability to connect to either SITA's or ARINC's live ACARS network. Boeing will coordinate with various Pacific and Atlantic oceanic ATC facilities to schedule formal live end to end evaluation tests. In addition to single network tests several tests that require Iridium data link traffic to exercise the internetworking channel between the two DSPs will be executed.

Deliverables from end to end tests will be provided to the PARC CWG. The PARC CWG will coordinate with the established regional coordinating groups currently managing FANS services (i.e IPACG, ISPACG, FIT-BoB, NAT-FIG). The deliverables are;

a) The ANSPs will provide statistically sufficient data sample of CPDLC transactions (only those requiring W/U response) and ADS-C position reports.

1) For each CPDLC data point, the data will include aircraft registration, time CPDLC uplink sent, time MAS received, time indicated in timestamp of downlink W/U response message, time response message received by the center's system.

2) For each ADS-C data point, the data will include tail number, time message sent by the aircraft and the time message received by the center. (messages supposed to be delivered bur weren't need to be included in the data).

b) The data link service provider provides latency for ALL (including those initiated but never delivered) messages in the data sample times between center and Iridium gateway, and between Iridium gateway and aircraft.

c) The aircraft operators, controllers, communication service providers, or any participant should report any anomalies or potential problems using problem reporting procedures already in place for FANS 1/A data link operations, also submit the problem report to the PARC CWG.

Initial in-service operational trial

Once successful ground tests have been conducted and the sample message data packages have been received from the DSP and shows favorable performance a pool of initial test aircraft will be retrofitted with Iridium Satcom systems that emulate the ARINC 741 specification. These target aircraft will be

approved to use FANS and monitored in accordance with the criteria for end-to-end monitoring like any other FANS aircraft .

Target dates

The target dates listed below are provided below are mainly provided as an example to foster discussion by the group. It is the intent of the PARC CWG to begin as soon as possible.