

**Twenty Third Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/23)**

Santiago, Chile, 26-27 March 2009

Agenda Item 4: Review Open Action Items

SATCOM APPROVAL FOR LONG RANGE COMMUNICATIONS (SLRC)

(Presented by Boeing)

SUMMARY

The Communications Working Group (CWG) is working together with industry to develop recommended procedures, processes, and proposed guidance material to support recommendations to the FAA for the use of Satellite Voice Communications as a long range communication system providing equivalent dispatch credit as today's HF radio systems. The CWG is progressing this important work on behalf of the FAA sponsored Performance-Based Operations Aviation Rulemaking Committee (PARC). The PARC comprises members from the FAA and the aviation community at large, provides recommendations to FAA's Senior Management for action and implementation.

The PARC CWG is committed to applying the performance-based concept, which aims to leverage existing capability, maximize benefits, by developing regulatory criteria that is not based on any particular technology. Approval of SATCOM technology for voice or data Long Range Communication systems (SLRC) to complement existing HF technology will provide a marked improvement in the Probability of Reliable Communications (PRC) in addition to increased operating flexibility.

1. INTRODUCTION

1.1 HF communications were first introduced in aircraft in the mid 1930s. And in 2009 HF is still the only approved long range communication system providing full dispatch capability for aircraft. Improvements in radio design and manufacturing as well as improvements in antenna design over the past several decades have significantly improved the operational performance of HF communications. The SLRC project plan does not promote removal of both of the HF radios. The intention is to complement the HF communication system with an appropriately configured SATCOM voice communication system. Increased communication system diversity provides a substantial improvement in overall operational communication performance.

1.2 There is a substantial fleet of SATCOM equipped aircraft that routinely operate outside VHF coverage (~5000). Most of these aircraft are expected to meet the

proposed minimum performance specifications being developed for SLRC. Specific requirements such as integration with the aircraft audio systems, voice recording, call priority handling, alerting and control systems are some of the minimum requirements for SLRC aircraft approval.

- 1.3 Another significant piece of the SLRC project will be developing proposed guidance material for consideration by ICAO headquarters on the requirements for HF radio facilities currently providing service under provision of the ICAO annexes. This guidance material will enable states to support SATCOM voice communications with minimum cost and time in addition to ensuring sufficient operational capability is provided.

2. DISCUSSIONS

- 2.1 In 1996, the FAA recognized technological advances in communications by a rule change to Title 14 Code of Federal Regulations (CFR) sections 1.1 and 121.351 that included use of a new term - long range communication system (LRCS). 14 CFR section 1.1 defines LRCS as “A system that uses satellite relay, data link, high frequency, or other approved communication system which extends beyond line-of-sight.” Examples of systems that meet this definition are HF voice, HF data link (HF DL), SATCOM voice and SATCOM data link.
- 2.2 The regulations, therefore, now address long range communication requirements in terms of LRCS. With that as a basis, an aircraft on extended over water segments unable to utilize line-of-sight systems must have at least two operational LRCSs to honour regulatory communication requirements (unless specifically excepted under 14 CFR section 121.351(c)). In addition, HF voice is the only LRCS currently acceptable for air traffic control communications in all areas. Therefore, in areas requiring two operational LRCSs, at least one must be HF-voice and in areas requiring one LRCS, that system must be HF voice.
- 2.3 SATCOM voice and data have proven to be effective and reliable long range communication systems since their introduction into service. Flight crews have used SATCOM voice (when voice communications are needed) instead of HF voice. Some regulatory authorities have granted some operators dispatch relief for a limited time whereby the aircraft may be dispatched for a limited period (5 days) with only a single HF radio system and an operational SATCOM voice system. In the interest of lowering operational costs and streamlining operational efficiency, aircraft operators are turning to SATCOM voice and data capability to meet long range communication system (LRCS) requirements. These capabilities include INMARSAT SATCOM voice using geosynchronous orbit satellites and Iridium SATCOM voice, which uses satellites in a low-earth orbit.

- 2.4 The goal of the SLRC project is to conclude on the recommendations to the FAA that would allow one HF radio system to be permanently replaced with a satellite voice system. This project is specifically investigating INMARSAT and Iridium satellite voice communication capabilities via a radio operator to determine their viability as an FAA-approved long range communication system (LRCS). If satellite voice can be FAA-approved as a LRCS, the Minimum Equipment List (MEL) could be changed to allow dispatch with one satellite voice communication system and only one HF radio system, when two LRCS are normally required.

3. Benefits

- 3.1 The cost of SATCOM communications vs. the cost of HF communications is often a subject of some debate. The goals of this project plan are to provide additional Long Range communication tools to both pilots and controllers. Operators will develop their internal standard operating procedures advising crews which communication method should be used. During the trial and more than likely on into operational service the costs of each call will be owned by the originator. However the benefits gained from weight reduction and enhanced flight planning flexibility are expected to easily justify the additional cost of ATC related SATCOM communication charges.
- 3.2 SLRC approval will enable some operators to remove one of the existing HF radios providing a ~60 lb weight savings. A 60lb weight savings will provide easily quantifiable fuel burn and commensurate emissions savings based on individual airline operating data. For example, for a typical 13 hour flight a 60lb weight reduction would result in ~30lbs of fuel burn savings. If you assume that the aircraft only operates 1 flight in a 24 hour period (very conservative) the savings for a single flight number is ~ 10,950lbs of fuel and 35000lbs of Co2 per year. The potential savings for an operator with a fleet of 30 SATCOM equipped aircraft operating similar long haul routes would come out to 328,500lbs of fuel and 1,051,200lbs of Co2 per year. And if these conservative estimates were projected over several airlines the savings in operating costs and the associated benefits to the environment is significant.
- 3.3 There are also route specific benefits that should be considered as well. An operator was forced to flight plan between North America to Beijing via the Russia Far East routes in stead of a more optimum routing because one of the HFs were inoperative. If SLRC approval had been available this flight could have operated on the preferred route, which would have been Polar 4. The flight time difference for the non-optimum route is 42 minutes longer via the Russian Far East routing, and the fuel cost of 13,000 pounds increased burnout resulting in an additional 41,600 pounds of Co2 for one flight.
- 3.4 SLRC approval would also provide operators dispatch flexibility to spare HF radios where they normally would not due to the increased radio spare pool provided by removal of one HF radio system on a fleet wide basis.



3.5 From a radio operator standpoint support for routine use of SATCOM voice will improve the facilities overall communication capability. Over time support for STACOM voice can help reduce the cost of maintaining and expanding HF radio infrastructure.

4. ACTION BY THE MEETING

4.1 The Group is invited to:

- a) note the information in this paper;
- b) note the next meeting (PARC CWG/18) is planned for June 23-24, 2009, hosted by Avionica, in Miami, Florida; and
- c) contact either Arnold Oldach (aoldach@rockwellcollins.com) or Tom Kraft (tom.kraft@faa.gov) for more information on participating in PARC CWG activities, or Brad Cornell (bradley.d.cornell@boeing.com) for more information relating to Boeing aircraft configurations eligible to participate in the trial.