International Civil Aviation Organization

ELEVENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP OF APANPIRG (CNS/MET SG/11)

Bangkok, Thailand, 16 – 20 July 2007

Agenda Item 12: Review CNS/ATM systems planning and implementation

4) MET related issues

UPLINK AND DOWNLINK OF WEATHER INFORMATION – RECENT DEVELOPMENT IN HONG KONG, CHINA

(Presented by Hong Kong, China)

SUMMARY

This paper presents the latest development of uplink and downlink of meteorological information in Hong Kong, China.

1. INTRODUCTION

1.1 Last year, Hong Kong, China continued to collaborate with the aviation community to conduct projects to develop uplink and downlink of meteorological information to and from aircraft. This paper presents the latest development.

2. UPLINK AND DOWNLINK OF WEATHER INFORMATION

2.1 A trial was conducted by the Hong Kong Observatory (HKO) in collaboration with Northwest Airlines (NWA) from April to October 2006 to test the capability to uplink alphanumeric windshear/microburst information generated by the Hong Kong Terminal Doppler Weather Radar (TDWR) to NWA aircraft operating at the Hong Kong International Airport (HKIA). This trial was reported in CNS/MET SG/10 last year. A number of alert messages in the standard ARINC 623 "Terminal Weather Information for Pilots (TWIP)" format were successfully uplinked to NWA aircraft via ACARS in 1 to 2 minutes' time. With favourable feedback from NWA and its pilots, a second trial was launched in March 2007.

2.2 In the second trial (March to June 2007), windshear alerts generated by the LIDAR Windshear Alerting System (LIWAS) were also uplinked in the TWIP messages (see another paper (IP/XX) on the recent development of LIWAS). To minimize the number of messages uplinked and pilot's workload in receiving frequent updates, alerts from TDWR and LIWAS are first consolidated based on a priority scheme. This is to ensure that the TWIP message represents the most severe

hazard impacting the airport at the time. Categorization of the resulting windshear alert into three levels (viz. SIG WINDSHEAR for windshear with magnitude ≥15 kt but less then 30 kt, SEV WINDSHEAR for windshear with magnitude ≥30 kt and MICROBURST, in increasing order of priority) and coasting of the final message (i.e. the TWIP message will be kept for a period of 10 minutes unless the latest one has a higher priority than the message issued, and in which case, the latest TWIP message will be issued immediately) were introduced. These aspects of the priority scheme would be evaluated at the end of the second trial. Recently, NWA has requested that the trial should be extended further.

2.3 In August 2006, it was also demonstrated that the graphical weather products (e.g. real-time radar and satellite imageries) of the Aviation Meteorological Information Dissemination System (AMIDS) of HKO could be uplinked to the aircraft using the "Connexion by Boeing" in-flight Internet service. However, the service was not commercially sustainable and had been discontinued.

2.4 With regard to the downlink of weather information, the Hong Kong AMDAR program continued to provide aircraft weather observations in near real time. Starting from August 2006, an automatic algorithm to detect windshear from AMDAR data in ascent phase was put into operational use at HKIA. As soon as windshear is detected, which could be achieved typically within several minutes of the AMDAR data time, a windshear warning based on the AMDAR report will be generated for broadcast on ATIS.

2.5 While AMDAR reports have brought benefits in enhancing low-level windshear warning, during our recent interaction with airlines, the users also expressed the need for automated aircraft reports in support of more frequent updating of high-resolution wind and temperature data for improving terminal area forecasts.

3. FUTURE WORK

3.1 The TWIP uplink trials carried out in Hong Kong, China have successfully demonstrated the capability and potential benefits of weather information uplink, especially in windshear applications. While the trial will likely be extended at the request of NWA, the current bandwidth limitations of ACARS prevent real-time uplinking of graphical information which would fully realize the benefits to airlines and pilots. The meeting may recall that CNS/MET SG/9 formulated a draft conclusion which was subsequently endorsed by APANPIRG as Conclusion 16/52:

> *Conclusion 16/52 – Air-Ground Data Link Supporting Graphical Meteorological Information Uplink*
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> *That, ICAO be invited to identify a data link to support future uplinking of graphical meteorological information and to develop relevant SARPs and guidance to facilitate implementation.*

The completion of this task would allow wide implementation of the real-time uplink of weather information benefiting the aviation community.

3.2 In respect of automated aircraft reports in support of more frequent updating of high-resolution wind and temperature data in the terminal area, the eventual implementation of automatic air-reporting by the Mode S datalink (APANPIRG Conclusion 14/44) and/or ADS-B 1090 MHz extended squitter (APANPIRG Conclusion 17/49) will bring significant enhancements.

4. ACTION BY THE MEETING

4.1 The meeting is invited to note the information provided in this paper.

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