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The Government of the Hong Kong Special Administrative Region

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APPENDIX 8

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(Total 3 pages)

16 January 2019

Mr Anthony Chu
Clerk to the Public Accounts Committee
Legislative Council
Legislative Council Complex
1 Legislative Council Road
Central
Hong Kong

Dear Mr Chu,

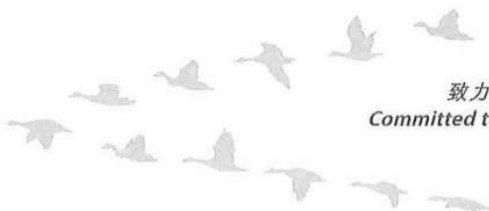
Follow-up to Public Accounts Committee Report No. 63A
Administration of the air traffic control and related services

Thank you for your letter dated 7 January 2019 requesting the Civil Aviation Department (CAD) to provide information related to the occurrence in the Air Traffic Management System (ATMS) on 13 August 2018 and the performance of the ATMS during adverse weather. I am authorised to reply as follows.

- (a) *Further measures to be taken by the Civil Aviation Department (CAD) to prevent the recurrence of similar incidents in the future and to ensure the smooth operation of ATMS*
- (b) *The latest position on the operation of the software fix to ATMS, which was implemented in October 2018*

2. Following the occurrence of the ATMS on 13 August 2018, the CAD has promptly tasked the ATMS contractor (i.e. the Raytheon Company) to conduct a thorough investigation. The contractor subsequently completed an in-depth investigation and submitted a report to the CAD including provision of a long-term solution to solve the problem.

3. According to the report, an unexpected data corruption occurred when the



system software was updating the flight route elements¹. As a result, the software could not continue its processing. It then triggered the safety assurance of shutdown of the primary Flight Data Processor (FDP) of the Main System and an automatic switchover of operation to the secondary FDP as per the multi-layer redundancy in system design, which subsequently was also shut down for the same reason. The technical staff, after consulting the air traffic control (ATC) supervisors on-site, switched from the Main System to the Fallback System, an independent but identical system with the same design, according to the established procedures. The contractor has accordingly provided a software fix to prevent recurrence of similar events².

4. After completion of the on-site testing and safety assessments, the software fix has been successfully implemented to the ATMS for operational use since late October 2018. The software fix implemented validates the flight route elements (including the updates) once again (i.e. one additional validation as compared to the past) prior to the execution of flight route element comparison. The following three new features were introduced in the ATMS through this software fix:

- (i) When a flight route contains an invalid value, the system will not proceed to the flight route element comparison for that flight;
- (ii) The software will stop processing the flight route in question when it encounters the scenario mentioned in paragraph (i). It will then confine the flight route in question and will continue to process information of other flight routes to prevent the FDPs from shutting down and other flight data from being affected; and
- (iii) At the same time, the software will display an alert message to ATC officers and technical staff together with the relevant flight information for subsequent and separate handling of the flight route in question.

5. Briefings to ATC officers and technical staff regarding the cause and follow-up actions of the occurrence have been conducted. The occurrence on 13 August 2018 has not occurred since then. The CAD will continue to closely monitor the performance of the ATMS.

(c) *Under what circumstances will CAD activate the Ultimate Fallback System of ATMS*

6. The ATMS, with sophisticated design, has built-in multiple fallback systems. Besides the Main System, it also includes a Fallback System and an Ultimate Fallback System (UFS). The Main System and Fallback System are two identically designed but independent systems, while the UFS is a separate system with software and system

¹ A flight route comprises an array of elements of a particular flight, such as standard instrument departure procedures, standard instrument arrival procedures, waypoints and airways, etc..

² The CAD issued a press release on 19 September 2018 to set out the above in detail, which is available on the CAD's website:

<https://www.info.gov.hk/gia/general/201809/19/P2018091900981.htm?fontSize=1>

architecture fully independent from those of the Main System and Fallback System. Only in event that both the Main System and Fallback System do not function properly, the system operation will be switched to the UFS according to established procedures. The UFS is therefore part of the multi-layer redundancy in system design to ensure flight safety. The UFS has never been activated since the full commissioning of ATMS on 14 November 2016.

(d) *The performance of ATMS during adverse weather brought about by the severe typhoon Mangkhut in September 2018 and in handling the rescheduled flights after the typhoon left Hong Kong. Whether any irregularities of the system were detected during the period*

7. The ATMS has been providing safe and reliable ATC services to flights operating in and out of the Hong Kong Flight Information Region since its full commissioning on 14 November 2016. In August 2017, a record high figure of 2 341 aircraft movements was recorded over a 24-hour period when the Hong Kong International Airport recovered from the impact of Super Typhoon Hato. In September 2018, the ATMS handled 2 130 aircraft movements in a 24-hour period following Super Typhoon Mangkhut. The ATMS performed satisfactorily and no irregularity was detected during the period. All these demonstrate the capability of the ATMS in overcoming the challenges brought by adverse weather and clearing the traffic backlogs caused by severe weather.

8. More recently, the ATMS also successfully handled the increased air traffic during the traditional busy travel periods of Christmas and New Year. In 2018, the total number of aircraft movements handled by the ATMS increased by 7.1% as compared with 2017, affirming the performance of the ATMS and professional performance of frontline ATC officers and technical personnel.

9. The CAD will continue to closely monitor the performance of the ATMS and optimise the system to enhance its functions in order to cope with the increasing air traffic in the future. The CAD will continue to be committed to maintaining the highest level of aviation safety.

Yours sincerely,



(Raymond Ng)

for Director-General of Civil Aviation

c.c. Secretary for Transport and Housing (Fax: 2524 9397)
Secretary for Financial Services and the Treasury (Fax: 2147 5239)
Director of Audit (Fax: 2583 9063)