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Legislative Council

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**Panel on Economic Development
Meeting on 28 November 2016**

**Updated background brief on
the new Air Traffic Control System**

Purpose

This paper provides background information on the new air traffic control ("ATC") System and summarizes the concerns raised by Members in the Fifth Legislative Council on relevant matters.

Background

2. The Civil Aviation Department ("CAD") is tasked to provide, inter alia, air ATC service to flights arriving at or departing from the Hong Kong International Airport ("HKIA") and aircraft overflying the Hong Kong Flight Information Region. The ATC System, comprising advanced electronics systems, is an essential tool enabling air traffic controllers ("ATCOs") to provide safe, reliable, effective and efficient ATC service.

3. The Finance Committee approved in May 2007 a funding of \$1,565 million for CAD to procure a new ATC System which was targeted for commissioning in December 2012. CAD implemented the new ATC System project through eight major contracts, with the new Air Traffic Management System ("ATMS") as a centerpiece of the new ATC System. While seven of the eight contracts were substantially completed within their scheduled times, there was delay in implementing the ATMS contract. Longer than expected time was taken to test and evaluate the system and a considerable number of deficiencies/observations remained to be followed up during the Site Acceptance Tests. Meanwhile, the original ATC System was operating above its planned capacity, with frequency of surveillance data display problems increasing since 2011.

Concerns expressed by Members in previous discussions

Public Accounts Committee

4. In 2014, the Audit Commission conducted a review of CAD's administration of ATC System and related services, and in particular the implementation progress of the ATMS contract, with a view to identifying issues that warrant attention and the key challenges ahead. Following the release of the Audit Report in October 2014, the Public Accounts Committee ("PAC") held a series of public hearings to follow up on the related matters. PAC published its report in June 2015.

5. PAC found it appalling and totally unacceptable that the new ATC System, which was targeted for commissioning in December 2012, was not yet in operation and such delay might pose a serious threat to Hong Kong's aviation safety and might have an adverse impact on Hong Kong's position as an international and regional aviation hub. It expressed concern that a number of outstanding deficiencies/observations remained and urged CAD to ensure that all these outstanding issues must be completely and satisfactorily resolved in a timely manner prior to putting the new ATMS into operation.

6. PAC also asked the Transport and Housing Bureau ("THB") to consider engaging external and independent experts immediately to assess the safety and performance of the new ATMS as well as the progress of implementing the ATMS contract. Regarding the ageing effect of the existing ATC System, PAC urged CAD to closely monitor the original ATC System and take pro-active effective measures to ensure that the original ATC System would be timely maintained in good operational conditions until the new ATC system was commissioned.

7. The Government accepted the views and recommendations made by the Audit Commission and PAC on the administration of ATC and related services. An updated progress report of follow-up actions taken by CAD as at 25 May 2016 is in **Appendix I**.

Panel on Economic Development

8. At the Panel meeting on 24 March 2016, members were briefed on the implementation progress of the new ATC System, including the deployment of the new ATMS. The Panel was concerned about the operational readiness of ATMS and staff readiness for using the new system. In particular, whether sufficient acceptance tests had been conducted on the new ATMS and how confident the Administration was in launching the new ATMS in June 2016. In view of the problems relating to the implementation of the new ATMS as pointed out by PAC as

well as the criticisms made by some members of the public on the reliability of the system, some members stressed the need to continuously engage independent experts to monitor CAD's work and assess the performance of the new ATMS to regain public confidence.

9. The Administration reassured the Panel that to ensure safety management and operational readiness of the new ATMS, CAD had conducted a series of stringent acceptance tests on the new system on par with international aviation safety management standards and in accordance with established Government procedures, and formulated a comprehensive training plan for relevant staff. As an additional safeguard, an external and independent expert, the National Air Traffic Services of the United Kingdom ("NATS") had been engaged by THB to conduct a "snapshot" review based on the situation in December 2015 on the system technical aspects, operations and training documents of the new ATMS. Based on that review, NATS recommended the phased functional implementation ("PFI") of the new ATC system as it would allow more time for ATC staff to familiarise themselves with the system's functions and operations in phases, and help minimise the risk of providing full functional services during the typhoon season which would induce additional workload and pressure on ATC staff. Taking into account NATS's suggestion, CAD planned to launch the new ATMS progressively from June 2016 onwards. Subject to actual implementation progress, the new ATMS would be fully commissioned and operated by October/November 2016.

10. Subsequent to the Panel meeting on 24 March 2016, THB engaged NATS to conduct a further round of independent assessment on the overall scheme of PFI, the readiness of various safety documents, and the final stage of staff training. At the request of the Panel, the Administration provided for members' information the NATS's latest report on the overall readiness of the operational transition for Stage 1 of PFI of ATMS, as well as the NATS's "snapshot" review report. The two reports were circulated to members on 31 May 2016 vide LC Paper No. CB(4)1060/15-16(01).

11. According to the Administration, NATS confirmed that all recommendations for the purposes of PFI Stage 1 configuration including all engineering documentation related items as well as human factor aspect on user preference and operational effectiveness enhancement items such as font size, audio alert sounds for different situations, overlapping of aircraft data label on-screen, etc. had been addressed by CAD.

12. The PFI of new ATMS was commenced on 19 June 2016¹. According to the Administration, the new ATMS would support the operations of certain control positions in the ATC Tower during specified periods in the initial stage of PFI. Its operational scope and service coverage would be progressively expanded over a period of five months. On 12 July 2016, the Panel conducted a visit to the new ATC Centre of CAD to better understand the progress of the implementation of the new ATMS.

Council questions

13. At the Council meeting on 4 November 2015, Hon WONG Yuk-man raised a question relating to the new ATC System. Hyperlink to the Council question and the Administration's response is provided in **Appendix II**.

Latest development

Incident happened on 27 October 2016

14. On 27 October 2016, a display degrade was found in some workstations of the new ATMS during the PFI stage². The workstations concerned were unable to process certain non-routine data. According to the Administration, the said matter arose from the input of non-routine commands into the new system in order to facilitate the China International Aviation & Aerospace Exhibition in Zhuhai. This led to the activation of the designed protective measures of the system among a small number of workstations not used for direct communication with flights, and the input was not processed in the usual manner. Upon investigation, CAD identified the root cause of the issue soon afterwards, and would follow up and implement enhancement on the data processing.

15. On 11 November 2016³, the Administration announced that NATS had confirmed that the new ATMS was safe, stable and reliable, and that CAD was ready for the full commissioning of the new ATMS. THB had also invited NATS to assess the impact of the workstation display degrade incident on the commissioning of the

¹ Source: Press release issued by CAD on 20 June 2016 (<http://www.info.gov.hk/gia/general/201606/20/P201606200226.htm>).

² Source: Press release issued by the Administration on 28 October 2016 (http://www.news.gov.hk/en/categories/infrastructure/html/2016/10/20161028_184505.shtml).

³ Source: Press release issued by the Administration on 11 November 2016 (<http://www.info.gov.hk/gia/general/201611/11/P2016111100722.htm>).

new ATMS. NATS confirmed the cause of the incident, which was triggered by an unusual flight plan without entry to the Hong Kong Flight Information Region. The display degrade was an automatic protection mechanism by system design to contain the non-routine data. NATS further confirmed that the CAD's decision to revert to the original system immediately upon the display degrade incident was a decision "as intended", which "allowed CAD to smoothly and safely transition out of PFI and maintain continuous operations without any safety or operational impacts". Moreover, the new ATMS was stable and no "system crash" was observed at any time. NATS was confident that the cause had been identified and the issue satisfactorily resolved.

Full commissioning of ATMS

16. On 14 November 2016⁴, the Administration announced the full commissioning of ATMS. To further safeguard aviation safety, the original ATMS will serve as a back-up for a period of time in accordance with international practice.

Incident happened on 15 November 2016

17. On 15 November 2016⁵, the position of an departing aircraft was not displayed temporarily on the radar screen of one workstation in the new ATC Centre and there was a brief occurrence of split tracks (showing two flight tracks of the same aircraft on the screen). Through radar screen updates, aircraft position was shown again automatically within 12 seconds.

18. According to the Administration, the phenomenon of aircraft positions temporarily not displayed on the radar screens was also observed occasionally in ATMS elsewhere. There are long established guidelines on how to tackle relevant scenarios for all ATCOs to follow. According to the experience of NATS, given the complexity of ATMS, even with all reasonable efforts and endeavours, there could still be possibilities to have set-backs during introduction of a new system. To safeguard aviation safety, CAD has laid down procedures for trained and professional ATCOs to handle different situations. It is normal and in accordance with international practice that the new ATMS needs some time to optimize its performance and suit the local operating environment. CAD will continue to closely monitor the operations of the new ATMS with a view to bringing further improvements to it.

⁴ Source: Press release issued by the Administration on 14 November 2016 (<http://www.info.gov.hk/gia/general/201611/14/P2016111400855.htm>).

⁵ Source: Press release issued by the Administration on 19 November 2016 (<http://www.info.gov.hk/gia/general/201611/19/P2016111900824.htm?fontSize=1>).

Request for discussion at the Panel

19. Hon Jeremy TAM wrote to the Panel on 1 November 2016 requesting for discussion on issues relating to the new ATMS, in particular the incident happened on 27 October 2016. The Administration will brief the Panel accordingly at the meeting on 28 November 2016.

Relevant papers

20. A list of relevant papers is set out in **Appendix II**.

Council Business Division 4
Legislative Council Secretariat
22 November 2016

(Enclosure 9 of Government Minutes in response to the Report of the Public Accounts Committee No. 65) (covering the updated progress of the administration of the air traffic control and related services) (as at 25 May 2016)

| Para. No. | Audit's/PAC's Recommendations | Progress to date |
|---|--|--|
| <p>Para 2.23(a) of the Audit Report</p> <p>and</p> <p>Page 73 of the PAC Report (points (b), (c) and (d))</p> | <p>Audit has recommended that the Director-General of Civil Aviation (DGCA) should –</p> <p>(a) in conjunction with the Air Traffic Management System (ATMS) contractor, expedite action in rectifying the outstanding deficiencies/observations in the ATMS and closely monitor the remaining contract work to minimise further project delay.</p> <p>PAC urges CAD to –</p> <p>(b) ensure that all the deficiencies/observations identified during the Factory Acceptance Tests and Sites Acceptance Tests must be completely and satisfactorily resolved prior to putting the new ATMS into operation;</p> <p>(c) request the Contractor to take all possible effective measures to expedite the implementation of the new ATMS contract; and</p> <p>(d) closely monitor the performance of the Contractor and take pro-active effective measures to ensure that the Contractor settles the outstanding issues in a timely and satisfactory manner.</p> | <p>CAD has continued to closely monitor the remaining work of the ATMS contractor through enhanced communication and supervision to expedite the implementation progress.</p> <p>All the acceptance tests of the new ATMS have been completed in accordance with the requirements specified in the contract. CAD is generally satisfied with the test results. All the priority items have been fully addressed. As for non-priority items, they are minor in nature and do not affect the safe commissioning of the new ATMS. CAD is working with the contractor to address these items in a timely manner.</p> <p>CAD has been delivering training sessions to Air Traffic Control (ATC) operational staff, to help them acquire the necessary competency and build up confidence to master the new ATMS. CAD's current plan is to launch the new ATMS incrementally from June 2016 onwards.</p> |

| Para. No. | Audit's/PAC's Recommendations | Progress to date |
|---|---|---|
| <p>Para 2.23(b) and (c) of the Audit Report and Page 73 of the PAC Report (point (e))</p> | <p>Audit has recommended that DGCA should –</p> <p>(b) step up maintenance efforts to address surveillance data display (SDD) problems (frozen/hang-up) in the existing ATC system; and</p> <p>(c) continue the efforts to deal with the issues of operating the existing ATC system until the new ATC system is available.</p> <p>PAC urges CAD to –</p> <p>(e) closely monitor the existing ATC system and take pro-active effective measures to ensure the existing ATC system is timely maintained in good operational conditions until the new ATC system is commissioned.</p> | <p>CAD has stepped up efforts to enhance maintenance measures to address SDD problems of the existing ATC system. Through a one-off enhancement measure for the existing ATMS conducted in 2014, including upgrading the relevant SDD workstations and optimising radar signal inputs, etc., the system loading continues to stay well within the margin of the safety performance indicator. CAD also continues to work closely with the system contractor and maintenance service provider to maintain the existing ATC system to ensure its reliable and efficient operation until after the new ATC system is fully commissioned.</p> |
| <p>Page 74 of the PAC Report (point (f))</p> | <p>PAC urges CAD to –</p> <p>(f) consider formulating a contingency plan as soon as possible to deal with the termination of the ATMS contract in case that the Contractor has failed to provide a safe, reliable and stable system by the first half of 2016 or any other indicative date to be set by CAD/THB.</p> | <p>CAD plans to launch the new ATMS incrementally from June 2016 onwards and has formulated a contingency plan to ensure the existing system can continuously provide a safe, reliable and stable ATC service. The contingency plan has reviewed the system maintainability, availability, supply of spare parts, and provision of software maintenance support services from the system supplier for the existing ATMS, among others.</p> |
| <p>Para 2.24 of the Audit Report</p> | <p>Audit has recommended that the Secretary for Financial Services and the Treasury should consider imposing an expenditure ceiling on the unused project estimate of the ATC system.</p> | <p>Based on CAD's latest estimate on the expenditure and cash flow requirements, the Financial Services and the Treasury Bureau (FSTB) has imposed an expenditure ceiling on the ATC system replacement project.</p> |

| Para. No. | Audit's/PAC's Recommendations | Progress to date |
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| | | As the recommendation has been implemented, we recommend deleting this part from the next progress report. |
| Pages 74 and 75 of the PAC Report (points (a), (b), (c) and (d)) | <p>PAC urges THB to –</p> <p>(a) consider engaging external and independent experts immediately to assess the safety and performance of the new ATMS as well as the likelihood of completing Phase 1 of the new ATMS contract by the ATMS Contractor in the first half of 2016, and then formulate a plan on the way forward for the ATC system replacement project accordingly based on the expert findings;</p> <p>(b) closely monitor the performance of CAD to ensure that there will be no further delay in the implementation of the ATC system replacement project;</p> <p>(c) step up its supervisory role to ensure the effective implementation of major projects by CAD in the future; and</p> <p>(d) update the LegCo and/or obtain the FC's approval, where applicable, in the future for any subsequent substantial variations in its approved funding proposals, such as contract variations or delays in the implementation of major projects.</p> | <p>(a) CAD engaged a consultant in 2012 to provide expert advice and conduct safety assessment workshops for colleagues involved in formulating the safety case report on the design, implementation and transition of the new ATC system. THB appointed another consultant in November 2015 to advise the Secretary for Transport and Housing of the system and staff readiness for the new ATMS. According to the assessment of THB's consultant, the ATMS is safe, stable and reliable and in line with the good practice in other ATC centres. THB's consultant has also made recommendations to cater for user preference and operational effectiveness. CAD has developed an action plan to ensure the recommendations will be adequately addressed prior to commissioning the new system.</p> <p>(b) THB has been monitoring the progress of the ATMS project closely and receives regular update reports from CAD. THB is represented at the Steering Committee on ATMS Project chaired by the Deputy Director-General of Civil Aviation.</p> <p>(c) The Government plans to create a supernumerary Administrative Officer Staff Grade B (D3) post</p> |

| Para. No. | Audit's/PAC's Recommendations | Progress to date |
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| | | <p>in CAD, to be designated as Deputy Director-General of Civil Aviation (2) (DDGCA(2)), to strengthen the capacity of CAD's senior management in taking forward various key projects as well as enhancing the overall administrative control and management of the department. The proposed DDGCA(2) will work closely with THB on implementation of major projects by CAD.</p> <p>(d) THB will update the LegCo and/or obtain the FC's approval in the future for any subsequent substantial variations in its approved funding proposals where appropriate.</p> <p>As this recommendation will be implemented on an on-going basis, we recommend deleting this part from the next progress report.</p> |

List of relevant papers

| Issued by | Meeting Date/ Issue Date | Paper |
|-------------------------------|-----------------------------|--|
| Audit Commission | October 2014 | Chapter 4 of Report No. 63 of the Director of Audit on the results of value for money audits |
| Public Accounts Committee | 3 June 2015 | Part 4 of Supplemental Report of the Public Accounts Committee on Report No. 63 of the Director of Audit (Report No. 63A) |
| | 28 October 2015 | Government Minutes in response to the Report of the Public Accounts Committee No. 63A and No. 64 |
| | 25 May 2016 | Government Minutes in response to the Report of the Public Accounts Committee No. 65 (covering the updated progress of the administration of the air traffic control and related services) |
| Panel on Economic Development | 9 July 2013 | Letter from Hon Gary FAN on replacement of the Air Traffic Control System (Chinese version only) Administration's response |
| | 10 July 2013 | Letter from Hon TANG Ka-piu on replacement of the Air Traffic Control System (Chinese version only) Administration's response |

| Issued by | Meeting Date/ Issue Date | Paper |
|------------------|-------------------------------------|--|
| | 21 March 2014 | <u>Letter from Hon Albert CHAN on the safety of the new Air Traffic Management System (Chinese version only)</u> <u>Administration's response</u> |
| | 17 December 2015 | <u>Letter from Hon TANG Ka-piu on New Air Traffic Control System (Chinese version only)</u> <u>Administration's response</u> |
| | 26 January 2016 (Item VIII) | <u>Background brief</u> <u>Administration's paper</u> |
| | 24 March 2016 (Item VI) | <u>Background brief</u> <u>Administration's paper</u> <u>Follow-up paper (28.4.2016)</u> <u>Follow-up paper (30.5.2016)</u> |
| Council Meeting | 4 November 2015 | <u>Written reply by the Secretary for Transport and Housing to a question on "New Air Traffic Control System" raised by Hon WONG Yuk-man</u> |