

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND HEAD 708 - CAPITAL SUBVENTIONS AND MAJOR SYSTEMS AND EQUIPMENT

Civil Aviation Department

New Subhead "Enhancement to Air Traffic Control Systems"

Members are invited to approve the creation of a new commitment of \$50.7 million for enhancing six critical Air Traffic Control systems.

PROBLEM

The existing Air Traffic Control (ATC) systems will not be able to cope with the projected increasing density and complexity of air traffic movements in Hong Kong and in the Pearl River Delta in the coming years.

PROPOSAL

2. The Director-General of Civil Aviation (DGCA), with the support of the Secretary for Economic Services, proposes to enhance the following six critical ATC systems –

- (a) Radar Data Processing and Display System;
- (b) Flight Data Processing System;
- (c) Radar Simulator;
- (d) Speech Processing Equipment;
- (e) Automatic Message Switching System; and
- (f) Aeronautical Information Database System.

/JUSTIFICATION

JUSTIFICATION

The Six Systems and the Proposed Enhancement

3. The existing ATC systems were designed in 1992 and procured in the mid-1990's for the new Hong Kong International Airport (HKIA). The systems perform adequately at present when the capacity of the HKIA stays at about 45 to 47 movements per hour. However, looking ahead the Airport Authority (AA) anticipates that over the next ten years air traffic will grow by some 6% per annum in terms of aircraft movements at the HKIA. Regionally, the International Civil Aviation Organization (ICAO) and the Airport Council International forecast that air traffic in the Asia Pacific Region will grow at about 6% to 8% per annum.

4. To enable us to continue to handle effectively such projected increase in the density and complexity of air traffic movements in Hong Kong and in the Pearl River Delta area¹, the DGCA considers it desirable to enhance the capacities, functionalities and human-machine interface of six critical ATC systems. The enhanced ATC systems will also contribute to the maintenance of Hong Kong's status as an international and regional aviation centre.

5. The functions of the six ATC systems and details of the proposed enhancement are as follows –

(a) Radar Data Processing and Display System (RDPDS)

Functions

The RDPDS is a critical part of the ATC systems. It processes data received from seven radars and displays information on aircraft positions and related data, such as aircraft callsign, track altitude and aircraft speed, etc. The information is needed for traffic control in the approach/departure and en-route phases of flights.

Proposed enhancement

(i) Improve the human-machine interface, allowing the system to change automatically to default mode after system restoration, more flexible modification of flight routes, and more detailed presentation of aircraft equipage on flight plans and radar displays.

/(ii)

¹ Apart from the HKIA, there are four other airports (Macau, Zhuhai, Shenzhen and Guangzhou) in the Pearl River Delta, all of which are very close to each other.

- (ii) Increase the capacity for entry of data on flight plans.
- (iii) Upgrade system security to prevent unauthorised creation or modification of data.

(b) Flight Data Processing System (FDPS)

Functions

The FDPS processes flight plan data including the estimated time of departure/arrival, flight levels, estimated times at reporting points, cruising speed etc., and prints flight progress strips needed by controllers to keep track of flights.

Proposed enhancement

Similar to those in respect of the RDPDS.

(c) Radar Simulator (SIM)

Functions

The SIM is a replica of the operational system employed for controllers' training and procedure evaluation.

Proposed enhancement

Increase the range of operating scenarios under different weather conditions for training purposes. At the same time, the human-machine interface functions will be improved to achieve better operational efficiency.

(d) Speech Processing Equipment (SPE)

Functions

The SPE is a digital voice switching system which enables controllers to communicate with pilots, controllers in other operational positions and neighbouring ATC units etc. via intercom, telephone, hotlines and/or VHF/HF radios.

/Proposed

Proposed enhancement

- (i) Improve the generation and control of audio alerts, control of additional VHF communication channels and coverage of controller communication groups to meet expanding operational requirements.
- (ii) Expand system capacity to cope with 20 Inter Area Speech Circuit (IASC) channels instead of the current 12 IASC channels.

(e) Automatic Message Switching System (AMSS)Functions

The AMSS is a message switching system supporting the exchange of aeronautical messages (over the Aeronautical Fixed Telecommunication Network (AFTN)) among Civil Aviation Department, neighbouring ATC units and other users such as airlines. The AFTN messages contain air traffic service information, weather data and other operational information which is essential to flight operation.

Proposed enhancement

- (i) Enhance system capability to include automatic processing of Air Reports² from aircraft deviating from their pre-planned flight routes (say for avoidance of adverse weather).
- (ii) Improve the human-machine interface to allow more prompt and efficient processing, transmission, reception and retrieval of AFTN messages.

(f) Aeronautical Information Database System (AIDB)Functions

The AIDB is an operational aeronautical database and information display system which supports the reception, distribution and handling of aeronautical information, such as aircraft arrival/departure information, Notices to Airmen (NOTAMs),

/meteorological

² Air Reports are reports from aircraft in flight on its position, operational and/or meteorological information.

meteorological information/forecast, etc. The AIDB also provides for electronic transfer of aeronautical data between the Civil Aviation Department and other organizations including airlines and overseas ATC units.

Proposed enhancement

- (i) Expand system capacity to process 500 000 NOTAMs instead of the current 200 000.
- (ii) Add warning alarms on expiry and missing NOTAMs to guard against the possibility of information loss; compile different NOTAM statistics and classifications of NOTAMs; add “search” facility for quick search of NOTAM messages so as to improve the efficiency and reliability of NOTAM processing.
- (iii) Enable automatic compilation of Pre-flight Information Bulletin to expedite the presentation of NOTAMs and flight data.
- (iv) Provide technical consoles and associated facilities in the Aeronautical Information Centre to streamline its operations and provide a more ergonomic working environment.

Overall Benefits

6. The proposed enhancement is essential to the maintenance and further improvement of the quality and standard of Hong Kong’s ATC services, in line with the anticipated air traffic growth. More specifically, the proposed enhancement has the following benefits –

- (a) They allow more time for controllers to execute their primary functions of air traffic planning and surveillance in a time-critical operating environment. The enhancement will increase the processing capacity of the ATC systems by up to 20% (in terms of aeronautical data that can be handled) and automate a number of manual processing functions to cater for the expected growth in the volume of air traffic and aeronautical data. Moreover, they will help expedite the dissemination to controllers of more updated flight and meteorological information, including changes to flight plans and weather conditions. All these benefits will help upkeep flight safety and improve the operational efficiency and effectiveness of ATC operations.

/(b)

- (b) The ICAO plans to introduce new ATC procedures for the airspace over the South China Sea in November 2001, such as a new direct route from Hong Kong to Bangkok and new parallel routes between Hong Kong and Singapore. These new procedures will increase the airspace capacity and present an opportunity to boost air traffic over the South China Sea. Given the substantial contribution of the air transport sector to the economy², it is important that the capacity of our ATC system be enhanced to support the growth in air traffic in Hong Kong and within the region.
- (c) The enhancement of the Radar Simulator will improve training of the radar controllers. It will help improve their operating techniques under inclement weather conditions and upgrade their performance in handling busy traffic and emergency situation. If the Radar Simulator is not enhanced, it will not be able to provide a desirable level of realism for training in the handling of traffic situations which controllers seldom come across in real life but on which controllers must be adequately drilled.

7. The six ATC systems are integrated to permit direct exchange of real-time flight operational data, such as flight plans, Air Reports, NOTAMs, meteorological data, etc., which is essential to maintain efficient ATC operation. They have to be enhanced in parallel in order to match with each other's capabilities. Apart from the six ATC systems described above, there are also other ATC systems which will require minor upgrading. DGCA intends to deploy existing resources to meet the requirement.

FINANCIAL IMPLICATIONS

Non-recurrent Cost

8. Based on latest market information, DGCA estimates that the proposal will incur a non-recurrent cost of \$50.7 million (to be amortised over 15 years), broken down as follows –

/ATC

² For example, in 1999 some 57% of the 10.7 million visitor-arrivals to Hong Kong came by air. The airport also handled 1.97 million tonnes of cargo valued at \$664.3 billion in 1999. In value terms, this accounted for about 26.3%, 33% and 20.5% of Hong Kong's total imports, exports and re-exports respectively.

ATC system		\$ million
(a)	RDPDS and FDPS	15.4
(b)	SIM	2.9
(c)	SPE	17.8
(d)	AMSS	1.9
(e)	AIDB	8.1
	Sub-total	46.1
(f)	Contingency (10%)	4.6
	Total	50.7

9. The costs in paragraphs 8(a) to 8(e) cover the enhancement of the respective systems, mainly the provision of additional software. It also covers a few items of hardware and installation and commissioning services, the costs of which represent less than 15% of the total non-recurrent expenditure.

10. The cashflow in the coming years is estimated to be as follows –

ATC system	2001-02	2002-03
	\$ million	
RDPDS and FDPS	3.4	13.6
SIM	0.6	2.5
SPE	3.9	15.7
AMSS	0.4	1.7
AIDB	1.8	7.1
Total	10.1	40.6

/Recurrent

Recurrent Cost

11. As the enhancement mainly involves software modifications with little addition of hardware, any additional cost, e.g. for maintenance and power consumption, will not be significant and will be absorbed by the Civil Aviation Department. No additional staff is required for the proposal.

Implementation Plan

12. The completion dates for the proposed enhancement in respect of the six ATC systems are as follows –

ATC system	Completion date
RDPDS, FDPS and SIM	July 2002
SPE	December 2002
AMSS	May 2002
AIDB	September 2002

Encl. A tentative work programme is at the Enclosure.

Impact on Fees and Charges

13. The amortised project cost of the enhancement will be recovered via the ATC and En-route Navigation Services Charges⁴. Upon the implementation of the proposed enhancement by 2002-03, we estimate that the two charges will increase by about 0.3% and 0.8% respectively.

14. The increase in ATC Services Charge in 2002-03 will be shared by over 100 000 flights. As such, the additional cost per flight is estimated to be around \$19⁵. We believe that the benefits of the proposed enhancement accrued to flight safety and ATC efficiency will outweigh the additional cost. Therefore, the competitiveness of the HKIA will be upheld by the proposal.

/15.

⁴ ATC services are provided by Civil Aviation Department with the costs recovered from AA through ATC Services Charge (for aircraft landing at HKIA) and from aircraft operators through En-route Navigation Services Charge (for aircraft overflying Hong Kong but not landing at HKIA).

⁵ Assuming the AA will recover all the additional ATC Services Charge from airlines.

15. The increase in En-route Navigation Services Charge applies only to overflying aircraft which do not use the HKIA. Therefore, it will have no impact on the competitiveness of the HKIA.

Consultation

16. The implementation of the proposed enhancement is supported by the Aviation Advisory Board. We consulted the Legislative Council Panel on Economic Services on 16 January 2001 and Members supported the proposal.

BACKGROUND INFORMATION

17. Following the full commissioning of the second runway at the HKIA in August 1999, the declared runway capacity was progressively increased from 37 to 45 movements per hour. To cater for growth in demand, the runway capacity will need to be increased to 47 movements per hour during busy traffic periods in daytime starting from March 2001. There is likely to be a need for further increase in the subsequent years.

18. Civil Aviation Department is committed to providing high-standard ATC services, so as to help ensure a safe, orderly and efficient air traffic flow. It considers that the existing ATC systems should be enhanced to take advantage of the rapid advancement in ATC technology and to ensure that the existing high standard of ATC services will be maintained despite a rapid growth in air traffic.

19. The proposal will enhance ATC operations at the system level. There will be ongoing improvements to individual components of the entire system as and when necessary, such as replacement of the existing Route Surveillance Radar at Mount Parker, which is the subject of a separate proposal for Members' consideration vide FCR(2000-01)69.

**Enhancement of ATC Systems
Tentative Overall Implementation Programme**

Activity	Month	2001												2002												2003		
		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
RDPDS/FDPS/SIM																												
- Equipment Tendering, Selection and Award of Contract																												
- Equipment Production and Delivery																												
- On-site Installation and Commissioning																												
SPE																												
- Equipment Tendering, Selection and Award of Contract																												
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- On-site Installation and Commissioning																												

▼ : Equipment ready for services

