For information

Panel on Security of the Legislative Council

**Supplementary Information on the
Automated Passenger Clearance (APC) System and
Automated Vehicle Clearance (AVC) System**

This paper provides the following information requested by Members at the Security Panel meeting on 7 December 2004-

(a) the types and numbers of tests conducted on the automated passenger clearance (APC) system and the results of such tests; and

(b) the timetable for installation of APC channels, the estimated number of passengers holding suitable smart identity (ID) cards, the estimated number of passengers using APC channels and the capacity of APC channels.

Tests on the APC system

2. The Immigration Department (ImmD) conducted extensive tests on the APC system before its roll out in mid-December 2004. Such tests include unit tests of different components of a APC channel (e-Channel), studies on the time required for completing different steps in the self-service immigration process, ergonomic tests of the positioning of the smart card reader and the fingerprint scanner at the e-Channel, integrated tests of the whole system, resilience tests and load tests. Details are at **Annex A**. Tests results show that the system meets the required standards and help ImmD further refine the design of the e-Channel.

Timetable for Installation of APC Channels

3.   ImmD aims to install about 270 e-Channels by mid-2006.   A phased approach is adopted in the installation of e-Channels at the control points in order to minimize disruption to the passenger traffic and immigration clearance there.   The tentative installation schedule is at **Annex B**.

Estimated Number of Passengers Using APC Channels

4.   As at end January, about 2.2 million permanent Hong Kong residents holding smart ID cards can choose to use e-Channels.   So far, some 167,000 passengers have used the e-Channels.

5.   We plan to extend the facility to non-permanent residents holding smart ID card when necessary legislative amendment to the Immigration Ordinance, Cap. 115 have been introduced.   Assuming necessary legislation is in place by mid-2006, about 5.4 million holders[1] of smart ID card will be potential users of the e-Channels.   When the identity card replacement exercise is completed by end March 2007, about 6.9 million smart ID card holders will be potential users of the e-Channels.

Handling Capacity of APC Channels

6.   Three e-Channels began to operate at the Lo Wu Control Point on 16 December 2004.   The processing time of a passenger who is familiar with the process at the e-Channel and has a relatively good fingerprint ranges from 9 to 12 seconds.   Irregular cases involving less than satisfactory fingerprints will require a longer processing time of some 35 seconds.   Assuming that irregular cases will account for 3% of the total passengers and it takes an average of 12 seconds to clear one normal passenger (accounting for about 97% of the total passengers), one e-Channel is capable of handling about 283 passengers per hour.

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[1]   The figure includes permanent and non-permanent residents of Hong Kong but excludes persons under the age of 11.

7.　　　　The APC system can raise the overall throughput at control points because two traditional counters can be converted into three e-Channels and because it frees up manpower for deployment to serve visitors and other ID card holders who may prefer to use traditional counters.　The system will enable ImmD to provide better services to the increasing number of passengers crossing our boundary every day.

Security Bureau
18 February 2005

Different Tests Conducted on APC System

Test	Objective	Period of the tests	Result
Unit Test Smart card reader	• To study the impact of a card reader on the surface of a smart ID card.	May to November 2004	• The design of the reader was modified to ensure smooth insertion and ejection of card, thus minimizing the chance of damaging the card surface. • After the improvement of the design, a self-test program was developed to enable automatic insertion and ejection (insertion cycle) of a smart ID card. The reader was able to achieve 310,000 insertion cycles without any card reading problem and card damage.
Gate Motor	• To test the opening and closing of auto-gate doors.	August to November 2004	• The service level of the machine met the requirement.

Test	Objective	Period of the tests	Result
	• To conduct stress test on the continuous opening and closing of the auto-gate doors.		• A self-test program was developed to enable automatic opening and closing of the gate doors. The gate doors were able to achieve 100,000 non-stop opening and closing without any problem.
Fingerprint Scanner	• To test the ability in detecting fake fingers.	June to November 2004	• The service level of the machine met the requirements.
Portable Digital Assistance (PDA) connectivity test	• To test the connectivity of PDA with access points at different distance.	August to November 2004	• After the test, the network connection was further fine tuned and the performance was satisfactory.
Time studies	• To test the response time of various devices / components of the system including card insertion and ejection at the card reader, data retrieval from the chip, mutual authentication between the ID card and the card reader, computer response time etc.	June to November 2004	• Various response times met the requirements.

Test	Objective	Period of the tests	Result
	• To assess the average time spent on the fingerprint verification process.		• The finding provided useful input for improving the design of the e-Channel.
	• To test the optimal time required for opening and closing the gate doors which could ensure the safety of the users.		• The finding provided useful input for fine tuning the speed of the door movement.
	• To assess the time spent on the overall clearance process.		• This helped to design the best workflow and the message to be displayed on the screen at the e-Channel.
Ergonomic positioning of devices	• To assess the optimal position of the card reader and fingerprint scanner to facilitate the users to insert their cards and submit fingerprints.	June to August 2004	• The study helped to identify the optimal positioning of the devices. The fingerprint scanner and smart card reader should be around 830 mm from the ground level whereas the fingerprint scanner should be positioned at an angle of about 30°.

Test	Objective	Period of the tests	Result
User Acceptance Test (UAT)	• To ensure that all user requirements including computer transactions, functionalities, the reliability and resilience arrangement, the operation flow, and the handling of irregular cases could be met. • The UAT was performed by phases as follows- (a) Individual functions - Standalone mode processing - Network mode processing - Irregular case handling under standalone mode and network mode - Detection system including tailgating, intrusion and evasion by different detection devices - Integrated operation of the hygiene solution	August to December 2004	• All requirements were met. • About 100,000 test cases were conducted. Program errors were identified and subsequently fixed.

Test	Objective	Period of the tests	Result
	- Integrated operation of the overhead display board and the front-facing light-emitting diode (LED) display (b) Functions related to backroom administration and monitoring - Channel status such as "active" and "standby" mode of the auto-gate and healthiness updating of gate devices such as gate doors and smart card readers in the Geographic Layout Screen - Irregular case monitoring - System parameter configuration - CCTV image display (c) Reporting function - Online reports - Batch reports		

Test	Objective	Period of the tests	Result
	(d) System security - Sign-on scenario (e) Cryptographic key Management System - Cryptographic key generation and distribution		
Integrated Test of the Whole System (I-UAT)	• To ensure that all user requirements related to the interface with other immigration computer systems and other departments could be met. • Following aspects are conducted in the I-UAT: (a) Application interface with ImmD's other systems such as the referral of APC cases to the existing EXPRESS for secondary examination (b) Central Terminal Profile Management (c) Central User Profile Management (d) System interface with ImmD's other systems such as file synchronization,	August to December 2004	• Test was conducted in parallel with the user acceptance test. • Interface with other systems was successful. • 5,000 test cases were conducted. Program errors were identified and subsequently fixed.

Test	Objective	Period of the tests	Result
	movement record generation and network connectivity		
Resilience Test	• To ensure that the proposed resilience solution for APC system could meet all the user requirements. • The following areas were tested under the Resilience Test: (a) Different switchover scenarios due to the loading problem of the local server (b) Different switchover scenarios due to the failure of the local server (c) Different scenarios on the interface mechanism due to the failure of other ImmD's systems.	November to December 2004	• The resilience solutions met the requirement. • Around 100 test cases were conducted. The System could run smoothly without service interruption even there was network breakdown.

Test	Objective	Period of the tests	Result
Load Test	• To ensure that the APC system can cope with the projected workload at least up to year 2010-11, a total of 9 tests involving 100 hours were conducted.	November 2004	• The load test was successfully completed.

Timetable for Installation of APC channels (e-channels)

Control Point	Total No. of APC Channel	2004 Dec	2005 1st quarter	2005 2nd quarter	2005 3rd quarter	2005 4th quarter	2006 1st quarter	2006 2nd quarter
Airport	54	-	9	18	9	9	9	-
China Ferry Terminal	9	-	-	9	-	-	-	-
Hung Hom	10	-	10	-	-	-	-	-
Lo Wu	125	3	20	12	32	28	30	-
Macau Ferry Terminal	42	-	12	-	9	6	-	15
Man Kam To	6	-	-	-	6	-	-	-
Sha Tau Kok	6	-	-	6	-	-	-	-
Lok Ma Chau	18	-	-	9	9	-	-	-
Total	270	3	51	54	65	43	39	15