For discussion
on 1 March 2012

Legislative Council Panel on Transport

Trial of Advanced Traffic Detection Technologies

PURPOSE

This paper briefs Members on the Administration's proposal to carry out a trial of advanced traffic detection technologies in Hong Kong.

BACKGROUND

2. On 9 May 2005, a number of fallen trees and scaffolding incidents due to inclement weather caused serious traffic congestions in extensive areas in Kowloon. In the same month, the Administration appointed a Task Force on Emergency Transport Coordination (the Task Force) to review the mechanism for handling emergency traffic and transport incidents.

3. The Task Force made a number of long term recommendations in June 2005 which were related to the deployment of advanced technologies to collect, display, share and disseminate real-time traffic and transport information for incident management. In 2007, the Transport Department (TD) conducted a "Feasibility Study on Deploying Advanced Technologies in Incident Management (FSIM)", which was completed in May 2010. FSIM recommends, inter alia:

(a) implementing a new Traffic and Incident Management System (TIMS) in TD; and

(b) conducting a trial to evaluate the effectiveness of various state-of-the-art traffic detection technologies in the Hong Kong environment.

4. As regards the proposed TIMS, TD consulted on 28 June 2010 the Legislative Council Panel on Transport and got funding approval from the Finance Committee of the Legislative Council in November 2010. The design of TIMS is in progress and the system is expected to be operational by 2015.

5. To take forward FSIM's recommendations on the trial of traffic detection technologies, TD commissioned a consultancy study in September 2010. The consultant proposed to carry out a trial of four selected detection technologies.

TRAFFIC AND INCIDENT MANAGEMENT

6. For traffic management, it is necessary to have traffic information such as speed, density and volume. In case of incidents affecting traffic, availability of real time traffic information is critical to the timely activation of appropriate measures to manage the incidents, such as liaison with relevant parties, identifying traffic diversion routes and disseminating information to the public. Over the years, various traffic detection technologies have evolved to automatically collect and analyse real-time traffic information. Through the use of these technologies, early detection of incidents is possible so that operators at traffic management centres can respond and take action more promptly.

7. In Hong Kong, induction loops installed in carriageways have been used for many years to collect real-time traffic information. However, the installation and maintenance of induction loops cause disruption to traffic. Although closed-circuit television (CCTV) cameras have also been installed, only traffic images are captured, and traffic information such as speed, density and volume is not available unless counted manually. In order to enhance traffic and incident management capabilities, including effective dissemination of real-time traffic information to the public, installation of more traffic detectors at strategic locations to provide wider coverage of our road network is necessary. The objective of the proposed trial is to evaluate new types of traffic detectors available in the market in respect of their functionalities and effectiveness in the Hong Kong environment, so that efficient and effective ways to install more traffic detectors can be developed.

TRAFFIC DETECTION TECHNOLOGIES

8. The following four traffic detection technologies have been selected for trial:

(a) Automatic Licence Plate Recognition;
(b) Bluetooth Identification;
(c) Video-based Analysis; and
(d) Microwave Radar.

9. All these four traffic detection technologies are being widely used in different overseas jurisdictions to collect real-time traffic information to facilitate traffic and incident management. Their general working principles are described in the ensuing paragraphs.

Automatic Licence Plate Recognition

10. Automatic Licence Plate Recognition (ALPR) is a technology that captures the licence plate number of a vehicle at different locations and matches them to calculate its average speed. In the trial, only licence plate numbers of vehicles owned by limited companies will be captured by the system for calculating vehicle speed. An up-to-date list of licence plate numbers of vehicles owned by limited companies (white list) will be downloaded to the camera system on site from TD's VALID System[1] every night so that only licence numbers in the white list will be captured by the system for processing. The captured licence plate numbers will be encrypted to make sure that they will not be recognisable outside the system to protect privacy. All these encrypted data will be deleted immediately after the speed has been calculated.

Bluetooth Identification

11. Bluetooth Identification (BI) is a technology based on capturing the unique identification signal of bluetooth devices such as mobile phones, hand-free headsets, etc. The identification signal is built in all bluetooth devices for communicating with each other, and can be detected by suitable equipment installed at a distance. By setting up detectors on roadsides to detect the identification signals emitted by bluetooth devices in moving vehicles,

[1] Vehicles and Drivers Licensing Integrated Data System

traffic speed can be calculated to derive the traffic flow condition. As the identification signal does not contain information of the owners, such as names or mobile telephone numbers, the detection will not identify whereabouts of individuals. To further safeguard against any possible intrusion of privacy, the identification signals will be encrypted once they are detected to make them not recognizable outside the system, and the system will discard the data immediately after the speed has been calculated.

Video-based Analysis

12. Video-based Analysis (VBA) is a technology that makes use of video images captured by CCTV cameras to gather traffic data. As vehicles move, there will be changes in video images. A backend processor is added to the CCTV system to analyse the video signals. Based on the changing characteristics of video images, traffic data such as speed, density and volume will be estimated. Once the traffic data have been calculated, the video images will be erased.

Microwave Radar

13. Microwave Radar (MR) is a technology making use of microwave to measure vehicle speed. Microwave radar installed at roadside will transmit microwave signals and when a vehicle passes, and the signals will be reflected back from the vehicle body. By detecting the reflection signals, the radar equipment is able to measure the vehicle speed. There is no identification of individual vehicles involved.

Trial Locations

14. Of the above four technologies, only ALPR, BI and MR will require installation of equipment on the roads for the field trial. For VBA, existing on-street CCTV cameras will be used and it is only necessary to install the required equipment within TD's premises to conduct the trial.

15. In the field trial, ALPR, BI and MR will be tested at four locations with different road characteristics including an urban trunk road (Nathan Road), an urban trunk road with tram (Hennessy Road), strategic roads (Kwun Tong Bypass) and strategic roads with noise barrier (Cheung Pei Shan Road):

- Nathan Road – ALPR, BI, MR;
- Hennessy Road – ALPR, MR;
- Kwun Tong Bypass – ALPR, MR; and
- Cheung Pei Shan Road – BI, MR.

As explained in paragraph 14, the testing of VBA requires only the installation of equipment within TD's premises.

16. The factors to be evaluated in the trial will include the functionalities, performance (including reliability such as the percentage of vehicle speed data that can be detected accurately) and cost effectiveness of each detection technology.

FINANCIAL IMPLICATION AND PROGRAMME

17. The trial is estimated to cost about $4.86 million and will last about fifteen months, including procurement and installation of equipment, construction of gantry for mounting of equipment, collection of data and evaluation.

PRIVACY IMPACT ASSESSMENT

18. We are mindful that there could be concern that the four selected detection technologies might involve privacy issues, and have planned to conduct Privacy Impact Assessment (PIA), which is a privacy assurance tool for data protection, on the four detection technologies. PIA is an evaluative process for assessing privacy risk associated with proposals that involve the processing and use of personal data. It is used to establish benchmarks against which a project may be audited. For this trial, PIA will be carried out in two stages to ensure that the trial complies with the Data Protection Principles set out in the Personal Data (Privacy) Ordinance, Cap 486.

19. We have already completed the first stage PIA, which is an assessment based on the working principles of the four detection technologies in question. The results have been submitted to the Office of Privacy Commissioner for Personal Data (OPCPD) for vetting, and OPCPD did not make any adverse comments.

20. To ensure compliance with the Data Protection Principles set out in the Personal Data (Privacy) Ordinance and based on the findings of the first stage PIA, the following measures have been devised:

(a) No personal data will be collected for data computation. All data collected by the system shall be non-personal data. For example:

- for ALPR, only licence plate number of limited companies will be collected.

- for BI, the unique identification signal of bluetooth devices does not contain any information of the owners.

- for VBA, no personally identifiable data will be collected; only traffic data at an aggregate level (speed, density and volume) will be extracted and stored.

- for MR, no data on the identity of the driver or vehicle will be captured.

(b) All collected raw data will be encrypted before further processing making them not recognisable outside the system, and the data will be deleted immediately after processing. This will further ensure privacy and data protection.

(c) Before the start of the data collection process, the Administration will disseminate the relevant information via TD's website. In addition, advisory signs will be erected on the road sections where the trial will be carried out.

21. The second stage PIA will be done after the relevant detection equipment has been selected. Detailed measures to further address the privacy issues will then be recommended based on the actual system design. The second stage PIA will be submitted to OPCPD for comment before the actual data collection commences.

PRIVACY COMPLIANCE AUDIT

22. Apart from the above mentioned two-stage PIA, a Privacy Compliance Audit (PCA) will be conducted upon commencement of the data collection process by an independent privacy consultant to systematically verify whether the data collection process complies with the requirements based on the findings of PIA, privacy policies, data protection principles, and code of practice with respect to privacy and information handling for all four detection technologies.

CONSULTATION

23. We consulted the Transport Advisory Committee on the proposal in December 2011 and members were in general supportive.

ADVICE SOUGHT

24. Members are invited to note the contents of this paper.

Transport and Housing Bureau
Transport Department
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