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LC Q17: Object positioning technologies

Following is a question by the Hon Emily Lau and a written reply by the Secretary for Economic Development and Labour, Mr Stephen Ip (in the absence of Secretary for Commerce, Industry and Technology), in the Legislative Council today (November 17):

Question:

Regarding the application of the object positioning technologies (OPT), will the Executive Authorities inform this Council:

- (a) of the current application of OPT in the Civil Aid Service, the Highways Department and the Transport Department;
- (b) whether the Automatic Vehicle Location System of the Third Generation Mobilising System of the Fire Services Department as well as the Third Generation Command and Control Communication System of the Hong Kong Police Force, which have made use of OPT, can be implemented as scheduled; if not, of the reasons for that and how the difficulties concerned are to be solved;
- (c) whether the Digital Trade and Transportation Network System being developed by the Hong Kong Logistics Development Council has made use of OPT; if not, of the reasons for that;
- (d) whether they have studied the positive and negative overseas experience in the development and application of OPT; if so, of the results;
- (e) whether they have studied the merits of applying OPT to the mass transit system, the logistics sector and staff deployment in the disciplined services in Hong Kong; if so, of the results; if not, the reasons for that; and
- (f) whether they will collaborate with community organisations in examining, from a holistic, multi-faceted and more open-minded perspective the impacts of the application of OPT on the economic development and high-tech industries in Hong Kong, as well as the difficulties to be encountered in applying OPT and the solutions to such difficulties; if so, of the details; if not, the reasons for that?

Reply:

Madam President,

There are two main types of object positioning technologies (OPT). The first type of technologies involves the use of the satellite-based global positioning system (GPS) while the second type is the wireless

location technology. Both types of technologies can be used for the tracking of objects and related purposes. Since the scope of OPT application is very broad and falls under the purview of a number of bureaux and departments, the following represents a coordinated reply based on information provided by different bureaux and departments:

- (a) The Civil Aid Service has ten sets of GPS devices for use in its fleet of vehicles. The devices provide an effective guarantee of safety for its staff during operations as well as greater flexibility and efficiency in its resource deployment.

The Highways Department uses GPS technologies to keep track of cleansing vehicles on expressways, conduct engineering survey control and monitor movement data of the Tsing Ma Bridge and the Ting Kau Bridge.

The Transport Department also makes use of GPS technologies, in combination with other technologies, to supply data for the Journey Time Indication System in helping drivers choose a suitable route.

- (b) The Third Generation Mobilising System adopted by the Fire Services Department (FSD) is a system with extensive and complicated functions. It comprises 22 sub-systems of which the Vehicle Location System is a key component. Any inadequate performance of this sub-system will seriously affect efficiency in resource deployment. The system therefore requires stringent tests regarding its capability and stability before it is commissioned, and these tests are time-consuming. According to the contract, the contractor is required to deliver the system by December 2003. However, the system handed over by the contractor did not measure up to the capability and operational stability standards specified in the contract and failed the acceptance test, and the rolling out of the system would as a result need to be deferred. At present, the entire system is undergoing final integrated testing and tuning. FSD is working closely with the contractor to carry out the tests and inspections so as to ensure that the system possesses the stability and performance standards specified in the contract. FSD has also urged the contractor to expedite the system tuning and improve the testing efficiency by deploying more resources in the process, ensuring that the entire system would pass all the tests and be brought into operation as soon as possible.

As regards the Third Generation Command and Control Communication System (CCIII) of the Hong Kong Police Force, although Hong Kong's topography and high-rise buildings will have some effect on the application of the system, the Police has made use of supplementary positioning technologies such as map-matching to cover areas beyond the reach of the positioning system. The CCIII will be implemented in phases starting from later this year as scheduled.

- (c) The objective of the Digital Trade and Transportation Network (DTTN) System is to provide a neutral and open electronic platform to facilitate the exchange of information and data amongst players in the supply chain. It will enhance the efficiency and reliability and

reduce the cost of information flow, thereby enhancing Hong Kong's overall logistics competitiveness. As a neutral and common electronic infrastructure to promote logistics development, the DTTN System should not replace or compete with service providers in the private sector in the provision of value-added services (such as services with object tracking functions). However, in developing the DTTN System, the Government will ensure that it will provide the communication interface conducive for the growth of value-added services.

(d) Active development of GPS technology began in the United States as early as in the 1980s. Initially, its use was focused on military purposes. In 1993, the US government started to introduce civilian applications of GPS technology and civilian systems began to develop. After a decade or so of development, the technology is rather mature. A wide variety of GPS products, which are able to identify the location of objects with accuracy to the order of 5-50 metres, are available in the market.

In the urban areas of Hong Kong, tall buildings and sophisticated structures generate strong multi-path interference that greatly degrades the accuracy and performance of the GPS. To overcome this technical barrier, a number of supplementary positioning systems have been developed. The commonly used ones are:

- * Dead reckoning: a technique that estimates location based on previous speed and direction recorded by sensors such as odometers.
- * Map-matching: a technique that estimates the location of an object (e.g. a vehicle) by using semantic map information such as elevation, transportation network configuration, etc.
- * Differential GPS: a technique that uses signals from Satellite Positioning Reference stations and an Active Control System to enhance the GPS accuracy. This is mainly used in surveying.

Drawing on overseas experience, various Government departments and the private sector in Hong Kong have applied GPS technology in different areas and developed a wide range of new services and products. For example, government departments such as the Highways Department, the Transport Department and the disciplined services have made use of GPS technology and related products in the delivery of their services. As for the private sector, land surveyors, geographic information systems software companies and information services companies have also developed new products in surveying, information provision and fleet management with GPS technology. Despite its extensive application in a number of areas, any widespread use of the GPS in the business sector will depend mainly on commercial considerations such as cost and the nature of its application.

Development of the wireless location technology began at a relatively later time and manufacturers have only embarked on the research and development of the technology in recent years. The Government has provided support to research projects in this area through the Innovation and Technology Fund so as to promote further

development of the technology.

(e) The major franchised bus companies in Hong Kong have already commissioned different service companies to study and test the application of OPT in enhancing greater efficiency in fleet management and providing more information to passengers (e.g. bus arrival time) with a view to improving service quality. Given the presence of tall buildings and the large number of vehicles in Hong Kong, the franchised bus companies are still testing the use of such technologies. The Transport Department will monitor their test results and keep in view of global development in this area. On the logistics front, logistics service providers can utilise OPT in providing value-added services, such as multi-modal integration solutions, distribution and transportation management, and inventory management, etc.

OPT is used in the FSD to boost operation efficiency. If the real-time location of fire-fighting and ambulance resources available for deployment can be accurately identified, the best possible configuration of fire engines, ambulances and officers can be deployed to the scene. In this connection, the Automatic Vehicle Location System (AVLS) has to link up with the Geographic Information System (GIS) to achieve accuracy in resource deployment. The GIS not only provides and displays names of roads and buildings, but also information on traffic direction. The Mobilising System is capable of working out the best possible option in resource deployment through an instant synthesis of the location where the accident happens, the whereabouts of fire-fighting resources and the related road network. The AVLS and the GIS enable officers in the Fire Service Communication Centre to monitor on screen the real-time movement of all fire engines and ambulances such that they could come up with deployment decisions in a more effective and flexible manner.

Since 2002, the Government Flying Service has started to transmit the GPS data of its aeroplanes and helicopters to the Air Command and Control Centre at its Headquarters. With these data, the Department can indicate the altitude and location of the aircraft on the digital map display of the Centre for the purpose of aircraft deployment. In addition, the Police applies OPT to enhance the efficiency of its command, control and deployment duties.

(f) The Government has been watching closely the development of OPT. Through the Innovation and Technology Fund, it provides support for research institutions to conduct relevant research projects in order to assist in tackling difficulties in the application of the technology. The aim is to promote further development of OPT with a view to promoting its business applications. For example, the Government, through the aforesaid Fund, has provided funding to the Hong Kong Baptist University and the Hong Kong Institute of Vocational Education to develop a mobile phone-based Mobile Location Estimation System (MLES) as a complementary technology. The MLES makes use of signals transmitted from the base stations of various local network operators, coupled with the information of these base stations, to estimate the position of the mobile phones. The project has now been substantially completed. The Hong Kong Wireless Technology Industry Association is presently promoting the

system to local network operators, with a view to having its application rolled out in the near future.

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