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For Discussion
6 April 2000

Legislative Council Panel on Security

Replacement of Communication and Mobilizing System for Fire Services Department

Purpose

This paper informs Members that Director of Fire Services plans to acquire a new communication and mobilizing system to replace the existing Second Generation Mobilizing System (SGMS) for mobilization of fire and ambulance resources for fire fighting and rescue operation.

Background

2. The existing system, known as the Second Generation Mobilizing System (SGMS), is a telecommunication and computer integrated mobilizing system which has been in operation for nearly 10 years since its commissioning in 1991. It comprises mainly a Computer Mobilizing System (CMS) and other sub-systems with 24 operating consoles installed in the Fire Services Communication Centre (FSCC). These sub-systems include the radio system providing communication links among FSCC and front-line staff, vehicle availability location system for tracking location and status of fire and ambulance resources, telephone system and other supporting systems. The SGMS handles fire and emergency ambulance calls and mobilizes resources to the scene of incident according to the pre-determined attendance schedules and meeting the pledged despatch time (one-minute for fire calls and two-minute for emergency ambulance calls).

Justification

3. According to the system design of the SGMS, it will reach the end of its serviceable life by 2002. After a comprehensive review of the SGMS, the Fire Services Department engaged an independent consultant to conduct an in-depth study of the system from May 1999 to February 2000. The consultancy recommends to replace the existing system for the following reasons:

(a) The SGMS is approaching the end of its serviceable life in 2002;

(b) The SGMS can no longer be effectively maintained beyond 2003. Many spare parts of the existing system have become obsolete and are not available in the market. The maintenance costs for the proper functioning of SGMS are rising as the system ages; and

(c) The existing capacity of the SGMS will not be able to cope with effectively the projected growth in call volume beyond 2003. In 1999, FSCC handled 64,599 fire and 484,181 ambulance calls. Based on an upward trend of 5.4% and 6.2% per annum for fire and ambulance calls respectively, the Consultant projected that the fire and ambulance calls would increase to 96,000 for fire and 759,000 for ambulance by 2012. According to such growth rate, the SGMS will not be able to handle effectively the increased call volume commencing the year 2003 (72,800 for fire and 563,000 for ambulance).

4. Moreover, the Consultant has identified the following major deficiencies with the SGMS -

(a) System design limit – the system functions and capacity of the SGMS have been stretched to their limits and cannot support vast data and image transmissions. This renders further upgrading of both hardware and software extremely difficult;

(b) Low efficiency in identifying and locating fire and ambulance resources – owing to the increase in calls and complexity of resource searching mechanism, the

SGMS, which employs manual method in inputting location code and status, has not been sufficiently efficient in providing accurate and updated data to facilitate the searching process for efficient despatch; and

(c) Incompatibility – the system has limited integration capability and is incompatible with other supporting systems installed after the commissioning of SGMS.

5. To sum up, the growth in the number of fire and emergency ambulance calls and the continuous improvement of service requirements which demanded for more complex mobilization of fire and ambulance resources e.g. mobilization of special tactical unit/equipment, criteria despatch of Emergency Medical Assistant Ambulance etc., have made the replacement of the SGMS unavoidable.

The proposed system

6. It is proposed to develop a new communication and mobilizing system, namely the Third Generation Mobilizing System (TGMS), to replace the existing SGMS in 2003. The new system will adopt an open platform design with graphic working environment. It will have a larger capacity, enhancement in various mobilizing activities and resource identification and also flexibility for further upgrading in handling the projected growth in call volume in the following 10 years to meet the one-minute fire despatch time in response to emergency fire calls. The TGMS, which will be located on 2/F of Fire Services Headquarters Building, will comprise the following systems:

(a) Computerized Mobilizing System (CMS) – it will be a high power system with pre-emptive multi-tasking functionality to cope with the projected workload. It will adopt an open platform system design to allow effective and easy future development and enhancement in performance, functions and capacity;

(b) Telephone System – the system with Computer Telephony Integration (CTI) technology will facilitate Automatic Call Distribution (ACD). Through the Calling Line Identification

System (CLIS), the calling party's address information could be retrieved to shorten the processing time for incident address confirmation and searching and minimize mis-reception of incident address;

(c) Geographic Information System (GIS) – the system working with Automatic Vehicle Location System (AVLS) and CMS will indicate on digitized map the nearest available fire and ambulance resources to any reported address of incident for efficient mobilization. It will also provide other useful information, such as location of hydrants, gas pipe layouts, building information and vehicular access, etc. to assist fire fighting and rescue operation;

(d) Wireless Digital Network (WDN) – it is a network for effective data and image transmission for Automatic Vehicle Location System and Mobile Data Terminals in emergency vehicles. The network enabling high frequency spectrum efficiency will be an open standard system with flexible system connectivity;

(e) Automatic Vehicle Location System – it will provide accurate location data of all mobile resources automatically. By integrating with GIS and WDN, CMS will recommend nearest resources location information for efficient resources deployment, incident tasking and mobilization;

(f) Mobile Data Terminal – these terminals will be installed in fire and ambulance vehicles to receive and despatch incident information through WDN;

(g) Information Management System (IMS) – it will integrate with all systems for records logging, analysis, resource management, etc; and

(h) Other supporting systems – they include Security System, Fault Indication Management System, Intercom System, Uninterruptible Power Supplies System, Telecommunication Network, etc.

Benefits of the TGMS

7. The TGMS will not only enable the Department to handle the projected growth of emergency calls and meet the one-minute fire despatch time up

to and including year 2013 without incurring additional staffing resources, it will also achieve the following operational improvements in fire-fighting and rescue operations:-

(a) Accurate and efficient resources deployment – through the AVLS and GIS, real-time resources location can be made available automatically for immediate despatch to incidents. Such enhancement achieves more accurate incident tasking and optimises resource management;

(b) Accurate incident address – through the introduction of calling line identification system, incident address can be easily ascertained so that an accurate address could be obtained for despatch; and

(c) Direct and effective operational information exchange – through wireless digital network, mobile data terminals and remote control terminals, vital operational information/data, such as caller's information, chemical data, location of hydrants and public utilities, building information, vehicle access, incident details, etc. can be exchanged between FSCC and the resources at scene for effective management of fire fighting and rescue operations.

Cost estimation

Non-recurrent cost

8. According to the estimates provided by the consultant, the non-recurrent cost of the replacement system will be $691 million, broken down as follows -

	$ million
* (a) Computer Mobilizing System	185.3
* (b) Wireless Digital Network	129.0
* (c) Mobile Data Terminal	87.2
* (d) Automatic Vehicle Location System	72.5
* (e) Telephone System	40.1
* (f) Information Management System	33.0

*	(g)	Geographic Information System	26.2
*	(h)	Console System	11.5
*	(i)	Dual Infrastructure Backbone	10.4
	(j)	Calling Line Identification System	7.4
	(k)	Fault Indication Management System	6.6
	(l)	Computerized Fire Alarm Transmission System	6.3
	(m)	Digital Communication Recording System	3.8
	(n)	Master Time Generation System	2.7
	(o)	Uninterruptible Power Supply System	2.4
	(p)	Telecommunication Network	2.2
	(q)	Remote Control Terminal	2.2
	(r)	Video Projection System	1.5
	(s)	Intercom System	1.0
	(t)	Security System	0.6
*	(u)	Construction and related building services work	35.6
*	(v)	Payment to trading fund for project implementation	13.0
	(w)	Contingency	10.5
		Total :	691.0

(* Detailed breakdown of major expenditure items are shown in the Appendix.)

Non-recurrent Staff Cost

9. The estimated non-recurrent staff cost for implementing the project between 2000-01 to 2003-04 will be $ 74.7 million, broken down as follows –

		2000-01 to 2003-04	**$ million**
(a)	FSD	A project team headed by a Senior Divisional Officer with officers and other ranks in the fire and ambulance grades to provide management and development support for implementing the TGMS.	55.1

(b)	Lands Department	A project team comprising Land Surveyor, Survey/Technical Officers for logistic and development support for implementing the TGMS.	10.8
(c)	Information Technology Services Department	A project team comprising Systems Managers and Analyst/Programmers to provide logistic and development support for implementing the TGMS.	8.8
	Total :		74.7

10. The estimated costs given at paragraphs 8-9 above are indicative only. They are being critically reviewed by the Administration for inclusion in the funding submission to the Finance Committee.

Implementation plan

11. It is proposed to commission the new mobilizing system according to the following implementation plan -

	Activity	**Time Table**
(a)	Tender preparation, tender evaluation and award of contract	May 2000 to December 2000
(b)	Detailed system design by contractor in accordance with defined user's requirements; site preparation and building services works	January 2001 to December 2001
(c)	Procurement of hardware and software, software customization and system installation	January 2002 to March 2003
(d)	Site acceptance tests, system commissioning tests and phase-in parallel run	April 2003 to June 2003

(e)	System reliability tests and on-line performance and functional tests	July 2003 to December 2003

Other alternatives considered

12. As advised by the Consultant, upgrading of the existing hardware operating system is not feasible. In addition, owing to rapid change of computer technology, it is extremely difficult to upgrade the system software while using the existing system hardware configuration which was developed 10 years ago.

13. Like-to-like replacement is considered not a cost effective alternative. Without suitable enhanced functions and upgraded capacity, the operating consoles will have to increase from 26 in 2003 to 34 in 2012 so as to cope with the projected workload and complexity. Furthermore, the increase in operating consoles will unavoidably require additional workspace and staff resources, which is not feasible owing to physical constraints of the existing operation centre.

Security Bureau
April 2000

Appendix

Detailed breakdown of major expenditure items

As regards paragraph 8(a), the estimate of $185.3 million is for the procurement of computer aided despatch software with the necessary customization for servers and workstations in the communications centre and the procurement and installation of 11 high resilience servers, 40 workstations, 204 remote terminals, software with the necessary customization for: all workstations; 204 remote terminals; 6 remote control terminals; and 763 mobile data terminals, interface software with other systems and data conversion.

2. As regards paragraph 8(b), the estimate of $129 million is for the procurement and installation of digital radio repeaters, antenna, digital microwave radio link equipment, battery chargers and digital cross-connect multiplexers to be installed at hilltop radio stations, tunnel repeater stations and rooftop radio basestations in government buildings together with all system software, network management software and interface software with other systems and 763 mobile transceivers with antenna. It comprises a total of 9 hilltop repeaters, 12 tunnel repeaters and 27 rooftop repeaters each provided with power supplies system.

3. As regards paragraph 8(c), the estimate of $87.2 million is for the procurement and installation of 763 ruggedized laptop computers for fire appliances and ambulances, interface for AVLS and WDN, removable storage device for each mobile data terminal, the necessary operating software and interface software with other systems.

4. As regards paragraph 8(d), the estimate of $72.5 million is for the procurement and installation of one resilience server, one system management workstation, 763 mobile positioning units, software for 763 mobile data terminals and interface software with other systems.

5. As regards paragraph 8(e), the estimate of $40.1 million is for the procurement and installation of 7 servers, 2 workstations, 2 PABX, 2 interface voice/data gateway, network switches and management software, Computer Telephony Integration software, call reporting software, interactive voice response system software, automatic call-out software and interface software with other systems.

6. As regards paragraph 8(f), the estimate of $33 million is for the procurement and installation of 6 database servers, 10 ad-hoc query software licenses, report compiling software, relational database management software and interface software with other systems.

7. As regards paragraph 8(g), the estimate of $26.2 million is for the procurement and installation of 2 resilience servers with software, 4 workstations with software, interface software with other systems, all necessary GIS software for 36 CMS workstations, 6 remote control terminals and 763 mobile data terminals.

8. As regards paragraph 8(h), the estimate of $11.5 million is for the procurement and installation of 36 consoles including all metal-ware, task lighting and accessories.

9. As regards paragraph 8(i), the estimate of $10.4 million is for the procurement and installation of a high-speed network with redundant physical paths. It includes the router switch, hub, LAN cables for the LAN/WAN in the TGFSCC, stations and depots.

10. As regards paragraph 8(u), the estimate of $35.6 million is to meet the cost of alterations and additional works for TGFSCC. It also includes the procurement and installation of related building services including air-conditioning system, electrical and distribution system and fire service system.

11. As regards paragraph 8(v), the estimate of $13 million is to meet charges for professional advice on the design, implementation and commissioning of the TGMS. It includes 12 man-month of Senior Engineer and 24 man-month of Engineer from the Electrical and Mechanical Services Department and 24 man-month of Technical Engineer from the Office of the Telecommunication Authority.