

ITEM FOR FINANCE COMMITTEE

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

Fire Services Department New Subhead "Replacement of communication and mobilising system for Fire Services Department"

Members are invited to approve a new commitment of \$718.6 million for replacing the existing communication and mobilising system in the Fire Services Communication Centre of Fire Services Department.

PROBLEM

The existing communication and mobilising system installed in the Fire Services Communication Centre (FSCC) of the Fire Services Department (FSD) will reach the end of its serviceable life by 2003. Effective communication and mobilisation of fire and ambulance resources will be seriously undermined if a replacement system is not available in time.

PROPOSAL

2. The Director of Fire Services (D of FS), with the support of the Secretary for Security, proposes to acquire a new communication and mobilising system to replace the existing system in FSCC.

JUSTIFICATION

3. The existing system, known as the Second Generation Mobilising System (SGMS) has been in use since 1991. It has a design capacity for

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handling 56 700 fire and 568 600 ambulance calls. As it is approaching the end of its serviceable life, D of FS, after a comprehensive review of SGMS, engaged an independent consultant in May 1999 to conduct an in-depth study of FSD's future communication and mobilisation requirements. The study recommends replacement of the existing system for the following reasons -

- (a) SGMS will reach the end of its serviceable life in 2003. Many spare parts of the existing system have become obsolete and are not easily available in the market. The maintenance costs for the proper functioning of SGMS are rising as the system ages;
- (b) the existing capacity of SGMS will not be able to cope with the growth in call volume projected by the consultant beyond 2003. The consultant projected that FSCC will handle a total of about 563 000 calls (65 100 fire and 497 900 ambulance calls) in 2000. Based on historical trend, the consultant further projected that the number of fire and ambulance calls will increase at an annual average of 2 575 and 21 759 respectively from 2000 onwards. This will bring the total number of emergency calls to about 635 900 (72 800 for fire and 563 100 for ambulance) in 2003, and 879 300 (98 600 for fire and 780 700 for ambulance) by 2013;
- (c) the system functions and capacity of SGMS have been stretched to their limits and cannot support vast data and image transmissions. This renders further upgrading of both the hardware and software of the existing system extremely difficult;
- (d) SGMS requires manual input of location code and status. Such manual processing has limitation in providing accurate and updated data efficiently and in turn affects the search of fire and ambulance resources for efficient despatch to the scene; and
- (e) the system has limited integration capability and is incompatible with other supporting systems installed in FSD after the commissioning of SGMS, e.g. the Green Wave System (the system to control the signalling of traffic lights) and the Incident Location Identification System.

4. At present, with the support of SGMS, only about 80% of fire calls and 94% of emergency ambulance calls could meet the target despatch time (one-minute for fire calls and two-minute for emergency ambulance calls). The growth in the number of fire and emergency ambulance calls and the demand for continuous service improvement would require more complex mobilisation of fire and ambulance resources such as the despatch of special tactical unit/equipment (e.g. diving unit, first intervention vehicle, etc.), ambulance aided motor cycle and Emergency Medical Assistant Ambulance, etc. A timely replacement of SGMS is essential to meeting these continuous service demands.

Proposed New Mobilising System

5. To cope with the demand for emergency services in future, D of FS proposes to develop a new communication and mobilising system, namely the Third Generation Mobilising System (TGMS), to replace SGMS in 2003. The new system will adopt an open platform design with graphic working environment. It will have a larger design capacity (capacity to handle about 99 000 fire and 781 000 ambulance calls), enhancement in various mobilising activities and resource identification, and flexibility for further upgrading to cope with the projected growth in call volume in the next ten years and to meet the target despatch time. The estimated life span of TGMS will be not less than ten years. The new mobilising system, according to the design recommended by the consultant, will comprise -

- (a) Computerised Mobilising System (CMS) – it will be a high-power system built on an open platform with pre-emptive multi-tasking functionality to cope with the projected workload during the lifespan of TGMS;
- (b) Telephone System – the system with Computer Telephony Integration (CTI) technology will facilitate Automatic Call Distribution. Through the Calling Line Identification System (CLIS), address information of the caller using lined telephone network could be readily retrieved to help speedy identification of incident address;
- (c) Automatic Vehicle Location System (AVLS) – it will provide accurate location data of all FSD mobile resources, such as vehicles and fireboats, automatically;
- (d) Geographic Information System (GIS) – the system working with AVLS and CMS will indicate on digitised map the nearest available fire and ambulance resources to any reported address of incident for efficient

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mobilisation. If needed, it will also indicate the shortest route to the incident. Furthermore, it will provide other useful information, such as location of hydrants, gas pipe layouts, building information and vehicular access, etc. to facilitate fire-fighting and rescue operations;

- (e) Wireless Digital Network (WDN) – this network will provide effective data and image transmission for AVLS and Mobile Data Terminals installed in emergency vehicles;
- (f) Mobile Data Terminals – these terminals will be installed in all fire and ambulance vehicles to receive and despatch incident information through WDN;
- (g) Information Management System – it will integrate with all systems for records logging, analysis, resource management, etc.; and
- (h) Other supporting systems – they include the Security System, the Fault Indication Management System, the Intercom System, the Uninterruptible Power Supply System, the Telecommunication Network, etc.

Benefits of TGMS

6. TGMS will enable the Department to bring up the performance to meet the target despatch time and handle the projected growth of emergency calls up to and including year 2013. It will also help improve fire-fighting and rescue operations in the following ways -

- (a) accurate and efficient resources deployment – TGMS will identify and locate real time resources automatically for immediate despatch to the scenes of incidents. It helps to achieve more accurate incident tasking and optimise resource management;
- (b) accurate incident address – FSCC staff can easily ascertain through CLIS incident address for timely despatch of resources and it minimises mis-reception of the reported address. However, address identification is currently not applicable to callers using mobile phones. FSD will liaise closely with the Office of the Telecommunications Authority (OFTA) on the technological development of the mobile network;

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- (c) direct and effective operational information exchange – the automation features of TGMS can improve the efficiency in information exchange by means of graphics and text transmission through WDN and hence reducing the time spent on voice communication. Moreover, 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 accurately exchanged between FSCC and the resources at scene for effective management of fire-fighting and rescue operations;
- (d) enhanced flexibility in resources identification and mobilisation – through open platform design, CMS allows easy programme development and enhancement and has the flexibility to meet future operational requirements and demand for continuous improvement in fire and emergency ambulance services; and
- (e) no additional staffing resources – with the introduction of the automatic call-out function at fire stations and ambulance depots and mobile data terminals on vehicles for address confirmation, FSCC console operators will not have to broadcast mobilising instructions and to confirm incident addresses. Hence, the time spent by a console operator in handling an emergency call can be reduced by about 30 seconds and can be released earlier to handle the next call. Overall, TGMS will enable console operators to cope with the increase in the number of calls without the need for additional staffing resources.

FINANCIAL IMPLICATIONS

Non-recurrent Cost

7. With reference to the current market situation, D of FS proposes replacement of SGMS with TGMS at a non-recurrent commitment of \$718.6 million. The equipment of TGMS will be installed in the FSCC, 99 fire stations, 39 ambulance depots, 479 fire appliances and 284 ambulances. The breakdown of the commitment sought is as follows -

/(a)

	\$ million
(a) Computerised Mobilising System	185.3
(b) Wireless Digital Network	129.0
(c) Mobile Data Terminals	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) Computerised Fire Alarm Transmission System	6.3
(m) Other supporting systems	16.4
(n) Construction and related building services works	35.6
(o) Payment to the Electrical and Mechanical Services Trading Fund (EMSTF) and the Office of the Telecommunications Authority Trading Fund (OFTATF) for project implementation	13.0
(p) Hiring of staff and services for FSD, Information Technology Services Department (ITSD) and Lands Department (Lands D) for project planning and implementation	27.6
(q) Contingency (1.6% of items (a) to (n) above)	10.5
Total	718.6

8. As regards paragraph 7(a), the estimate of \$185.3 million is for the procurement of computer aided despatch software with the necessary customisation for servers and workstations in the FSCC and the procurement and installation of 11 high resilience servers, 40 workstations, 204 remote terminals, software with the necessary customisation for all workstations; 204 remote terminals; six remote control terminals; and 763 mobile data terminals, interface software with other systems and data conversion.

9. As regards paragraph 7(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 nine hilltop repeaters, 12 tunnel repeaters and 27 rooftop repeaters, each provided with a power supply system.

10. As regards paragraph 7(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.

11. As regards paragraph 7(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.

12. As regards paragraph 7(e), the estimate of \$40.1 million is for the procurement and installation of seven servers, two workstations, two Private Automatic Branch Exchanges, two interface voice/data gateway, network switches and management software, CTI software, call reporting software, interactive voice response system software, automatic call-out software and interface software with other systems.

13. As regards paragraph 7(f), the estimate of \$33 million is for the procurement and installation of six database servers, ten ad-hoc query software licenses, report compiling software, relational database management software and interface software with other systems.

14. As regards paragraph 7(g), the estimate of \$26.2 million is for the procurement and installation of two resilience servers with software, four workstations with software, interface software with other systems, all necessary software for 36 CMS workstations, six remote control terminals and 763 mobile data terminals.

15. As regards paragraph 7(h), the estimate of \$11.5 million is for the procurement and installation of 36 consoles including all metal-ware, task lighting and accessories.

16. As regards paragraph 7(i), the estimate of \$10.4 million is for the procurement and installation of a high-speed network with a redundant physical path as fallback. It includes the router switch, hub, Local Area Network (LAN) cables for the LAN/Wide Area Network in the FSCC, stations and depots.

17. As regards paragraph 7(j), the estimate of \$7.4 million is for the procurement and installation of one resilience server, firewall and application software, interface with telephone operators' address database servers, interface with the Telephone System, the necessary operating software and interface software with other systems.

18. As regards paragraph 7(k), the estimate of \$6.6 million is for the procurement and installation of two servers, one concentrator, five workstations, management interface for the other systems, operating software and interface software with other systems.

19. As regards paragraph 7(l), the estimate of \$6.3 million is for the procurement and installation of three resilience servers, network communication equipment, two fallback terminals and printers, server operating software and interface software with other systems.

20. As regards paragraph 7(m), the estimate of \$16.4 million is for the installation of other supporting systems as follows -

- (a) \$3.8 million on the Digital Communication Recording System for the procurement and installation of two voice conversation loggers, one voice record information logger, six playback units, three administration units and 36 instant playback modules;
- (b) \$2.7 million on the Master Time Generation System for the procurement and installation of two Global Positioning System master clocks, one change-over unit, one distribution unit, two synchronizers and two digital clocks;
- (c) \$2.4 million on the Uninterruptible Power Supply System for the procurement and installation of one 120kVA and one 60kVA modules. Each module shall be incorporated with batteries, maintenance bypass system and automatic change-over system;

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- (d) \$2.2 million on the Telecommunication Network for the procurement of network service including installation of voice circuits, data circuits, private wires and leased lines;
- (e) \$2.2 million on the Remote Control Terminals for the procurement and installation of six industrial grade workstations, three servers for modem pool together with metal-ware and operating software, and all the necessary operating and application software;
- (f) \$1.5 million on the Video Projection System for the procurement and installation of three rear projection screens, three projectors, three workstations and one display controllers together with all the necessary operating software and interface software with other systems;
- (g) \$1 million on the Intercom System for the procurement and installation of one server, 64 intercom units, external access gateway, LAN-based call management software and interface software with other systems; and
- (h) \$0.6 million on the Security System for the procurement and installation of 12 sets of closed circuit television (CCTV) cameras, ten sets of access control readers and the associated controlling and recording system.

21. As regards paragraph 7(n), the estimate of \$35.6 million is for the procurement and installation of related building services including the air-conditioning system, electrical and distribution system and fire service system. It also includes the cost of fitting-out works for FSCC e.g. installation of raised floor and cable trunking etc.

22. As regards paragraph 7(o), the estimate of \$13 million is to meet charges for professional advice on the design, implementation and commissioning of TGMS. D of FS considers it cost-effective to use EMSTF and OFTATF services for the TGMS project in view of their extensive involvement in the maintenance of SGMS, active participation as members of the Steering Committee in the study and planning of TGMS and thorough understanding of FSD's operational requirements. The estimate includes 12 man-months of a Senior Electronics Engineer and 24 man-months of an Electronics Engineer from the Electrical and Mechanical Services Department, and 24 man-months of a Telecommunications Engineer from OFTA.

23. As regards paragraph 7(p), the estimate of \$27.6 million is for hiring staff and services for the management, logistic and development support for the implementation of TGMS. It includes a team of staff equivalent to 44 man-months of a Senior Divisional Officer, 36 man-months of a Divisional Officer, 44 man-months of an Assistant Divisional Officer, 116 man-months of a Senior Station Officer/Station Officer, 36 man-months of a Superintendent (Ambulance), eight man-months of a Senior Ambulance Officer and 36 man-months of an Ambulance Officer for FSD and 22 man-months of a Contract Senior Project Manager, 22 man-months of a Contract Project Manager and 44 man-months of a Contract System Analyst for ITSD. The estimate also includes 44 man-months of a Land Surveyor, 44 man-months of a Technical Officer and 44 man-months of a Survey Officer for Lands D for the preparation of digitised map data for GIS to meet FSD's operational requirements.

24. The estimated cash flow is as follows -

Year	\$ million
2000-01	76.2
2001-02	214.6
2002-03	214.6
2003-04	145.4
2004-05	67.8
Total	718.6

Recurrent Cost

25. The estimated additional annually recurrent cost arising from the operation of TGMS will be \$39.4 million, broken down as follows -

	\$ million
(a) Recurrent cost of TGMS	
(i) Network rental	9.4
(ii) Maintenance cost	64.2
Sub-total	73.6
<u>Less</u>	
(b) Recurrent cost of SGMS	(34.2)
Total	39.4

26. As regards paragraph 25(a)(i), the expenditure of \$9.4 million is for rental charges for network and telephone lines of TGMS.

27. As regards paragraph 25(a)(ii), the expenditure of \$64.2 million is for system maintenance of TGMS which will be contracted out to external service provider.

28. As regards paragraph 25(b), it is the existing annually recurrent maintenance cost and network rental charges including telephone lines used by SGMS.

29. D of FS will deploy existing staffing resources to operate TGMS and no additional staff will be required.

Implementation Plan

30. D of FS proposes to implement the project according to the following plan -

Activity	Time table
(a) Tender preparation, tender evaluation and award of contract	June 2000 to January 2001
(b) System detailed design by contractor in accordance with defined user's requirements; site preparation and building services works	February 2001 to January 2002
(c) Installation of hardware, software customisation and installation	February 2002 to April 2003
(d) Site acceptance tests, system commissioning tests and phase-in parallel run	May 2003 to July 2003
(e) System reliability tests and on-line performance and functional tests	August 2003 to January 2004

31. D of FS will prescribe appropriate provisions in the tender and the contract to specify the requirement that all the equipment and systems of TGMS are the most advanced proven products prevailing in the market.

OTHER PROPOSALS CONSIDERED

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

BACKGROUND INFORMATION

33. The existing SGMS at FSCC, commissioned in 1991, is a telecommunication and computer integrated mobilising system. It comprises mainly a CMS and other sub-systems with 24 operating consoles which handle emergency fire and ambulance calls and mobilise fire and ambulance resources effectively and efficiently to the scene of incident according to the pre-determined attendance schedules and within the target despatch time. The sub-systems which provide essential support to SGMS are as follows -

- (a) Radio System – provision of radio communication links among FSCC and the front line staff;
- (b) Vehicle Availability Location System – tracking of fire appliances/ambulances status and location through data transmission;
- (c) Telephone System – providing telephone facilities among the public, government departments, public utility companies, fire stations, ambulance depots and FSCC; and
- (d) Other supporting systems such as Remote Control Call-out System, Computerized Fire Alarm Transmission System, Incident Location Indication System, Intercom System, Uninterruptible Power Supply System, Fault Indication Management System, Master Time Generation System, Video Projection System, Public Address System, CCTV System, Multi-Track Recorder System and Instant Recall Recorder.

34. While we have not expanded the original design capacity of SGMS, the hardware and software of the system have been upgraded on a number of occasions in order to cope with the complexity in the mobilisation of fire and ambulance resources as mentioned in paragraph 4 above. The present capacity of SGMS should be marginally able to cope with the projected workload for emergency fire and ambulance services up to 2003. According to the SGMS service contract, the warranty for the performance and servicing of SGMS including provision of spare parts will expire in 2002. However, FSD will endeavour to maintain the system operation until the full commissioning of TGMS proposed in 2003.

35. We consulted the Legislative Council Panel on Security of the proposal on 6 April 2000. The Panel noted the need for a new communication and mobilising system for FSD and supported the proposal generally.

Security Bureau
May 2000