

ITEM FOR FINANCE COMMITTEE

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

Hong Kong Police Force

**New Subhead “Replacement of Command and Control Communications
System for the Operations Department”**

Members are invited to approve the creation of a new commitment of \$988 million for replacing the command and control communications system for the Operations Department of the Hong Kong Police Force.

PROBLEM

The existing command and control communications system (CCII) used by beat officers will reach the end of its useful life by 2004. The front-line operational capability of the Force will be seriously affected if a replacement system is not installed in time. Moreover, the existing CCII cannot interface with other radio systems for Traffic Branch, Police Tactical Unit (PTU) and Emergency Unit (EU), thus hampering the efficiency of front-line officers in joint operations.

PROPOSAL

2. The Commissioner of Police (CP), with the support of the Secretary for Security, proposes to acquire a new command and control communications system to replace the one currently used by front-line officers of the Operations Department of the Police including beat officers, and officers of Traffic Branch, PTU and EU.

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JUSTIFICATION

3. The current CCII was introduced in 1990. It comprises an integrated radio communications system (commonly known as the beat radio system), the 999 emergency services telephone sub-system and the Enhanced Computer Assisted Command and Control System (ECACCS).

4. The equipment of CCII will reach the end of its useful life by 2004. Equipment, in particular the beat radios and repeaters, is aging with increasing breakdowns. The maintenance costs for the beat radio system are rising. In addition, as the technology currently used in CCII is proprietary to a particular vendor, the Police have no choice but to continue to stick to the same manufacturer for acquiring equipment or services for the system. The Police have also encountered increasing difficulty in obtaining spare parts for the beat radio system as the production of beat radios has been discontinued since 1997. Based on the vendor's commitment to supply spare components until 2002 and the past maintenance records of the system, the Police estimate that they would only be able to continue with the existing system up to 2004.

5. In addition, with changes in the geographical distribution of the population and the public's rising expectation for the quality of services provided by the Police, CCII can no longer fully meet the Police's present operational requirements. Its major deficiencies are as follows -

- (a) the infrastructure of the current beat radio system is overloaded by the voice traffic generated from the basestation repeaters and satellite receivers and cannot take up signals from additional repeaters. This will affect the response time when a surge of calls occurs at times of major incidents;
- (b) as the analogue technology used for the infrastructure in the beat radio system has only limited bandwidth, the system cannot support data and images transmission to facilitate Police's operations on the ground and at the regional command and control centres (RCCCs);
- (c) the existing ECACCS is a text-based system with no graphical user interface provided. It operates with a command line interface which requires users to be familiar with the command codes and syntax and hence is not user-friendly. The current system also cannot support bilingual processing and does not accept the use of Chinese names. In addition, with no interface with the Police Communal Information System (CIS), it makes direct exchange of incident and statistical data between the RCCCs and divisions extremely difficult;

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- (d) the existing ECACCS offers no data encryption capability and is thus subject to the risk of eavesdropping by outsiders;
- (e) the existing 999 emergency services telephone sub-system is connected to the PABX system of the buildings that each of the three RCCCs is located. Any upgrading or enhancement of the sub-system has to be conducted in conjunction with the whole PABX system and hence will be both expensive and difficult; and
- (f) CCII was designed in the late 1980s and does not provide full radio coverage over the territory. As the 30% reserved expansion capacity of CCII has been exhausted to provide coverage for the developing or newly developed towns such as Tin Shui Wai, Ma On Shan and Tseung Kwan O, further extension of radio coverage is not possible and some new development areas may become blindspots under the existing system.

6. At present, as beat officers, Traffic Branch, PTU and EU are using their own radio systems, cross communication with the same radio is not possible. In joint operations, officers need to bring along more than one radio, which is very undesirable from the operational point of view.

7. The Police have conducted a thorough study of their operational requirements and propose to replace CCII by a new digital command and control communications system (CCIII). The new system can better meet the Police's current and future operational requirements. Its main characteristics are set out below -

- (a) its digital radio and computer infrastructure is of open standard and expandable. Equipment such as beat radios will no longer be proprietary and hence can be procured from open market. In addition, the new system allows an incremental approach to development and system enhancement in respect of features/functions without major changes to the infrastructure in future, which should be more cost-effective in the long run;
- (b) it provides a wider radio coverage to include all areas essential for Police operations;
- (c) it provides a unified and integrated communications platform for all beat officers, and officers working in Traffic Branch, PTU and EU;
- (d) it has sufficient interference-free high speed data channels to allow transmission of voice, data and images. Mobile data terminals (a

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mobile computing facility) will also be installed at Police vehicles and vessels to equip them with the capability to provide voice and data communications simultaneously. Subject to the recommendations of a consultancy study, such mobile computing facility may also be extended to cover beat officers;

- (e) its new digitised transmission platform will greatly enhance the security protection against eavesdropping and unauthorised access;
- (f) a Geographical Information System (GIS) with the capabilities for electronic mapping and analysis of location-related incidents information will be installed to facilitate the Police to identify the location of scenes of crime and incident readily on the electronic map;
- (g) it also has an Automatic Vehicle Location (AVL) System which, when integrated with the existing Global Positioning System (GPS) and the new GIS, can keep track of the positions of Police vehicles and vessels on electronic maps;
- (h) the new ECACCS is window-based and does not require users to input data with fixed command codes and syntax. It is therefore more user-friendly; and
- (i) the new 999 emergency services telephone sub-system will enable 999 calls to be passed within the same RCCC (i.e. intra-flow) or to the other two RCCCs (i.e. inter-flow) automatically if there is a sudden surge of calls in one centre, thus optimising the available RCCC resources and improving response time to emergency calls. In addition, the new 999 emergency telephone sub-system will be built on its own PABX system and hence future upgrading will be much easier and less expensive.

8. CCIII can further improve the Police services provided to the public in the following ways -

- (a) with the provision of the mobile computing facility, officers in patrol vehicles and vessels, subject to the operational need and with proper authorisation, will have direct access to various information systems such as the Enhanced Police Operational Nominal Index Computer System (EPONICS) (for “Wanted or Missing Persons” checks), Transport Department’s Vehicle and Driver Licensing Information Data System (for stolen vehicle checks) and CIS (for filing crime reports). Such facility can greatly improve the utilisation and efficiency of the communications system and

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enhance the quality of services provided by the Police. For example, identity card checks can be conducted directly through the mobile data terminals in vehicles without requiring the RCCC operators to perform the checking. The average time required for such a check is expected to be reduced by 10 to 15 seconds (from 30 seconds under CCII to 15 to 20 seconds under CCIII). As a result, more radio channels and RCCC operators can be freed for voice communications of higher priority and other urgent tasks. With the facility, Police vehicles and vessels can also function as mobile reporting centres and the public can make crime reports on the spot;

- (b) the new 999 emergency services telephone sub-system can provide speedier response, by reducing the response time by 50%, to any sudden surge of 999 calls; and
- (c) the proposed system can facilitate the deployment of resources and hence strengthen Police's capability in preventing and detecting crimes. For example, serving as an integrated communications system for beat officers, and officers of Traffic Branch, PTU and EU, the new system can improve the communication among these front-line officers and facilitate the deployment of resources in large scale operations. In addition, with the AVL System and GIS, RCCCs, we can keep track of the position of all Police vehicles and vessels on electronic maps and this will facilitate more flexible and efficient deployment of resources and faster tactical response to incidents.

FINANCIAL IMPLICATIONS

Non-recurrent cost

9. Drawing reference to the radio systems currently used by the Police and price quotations in recent tender exercises, CP estimates that the non-recurrent cost of the proposed CCIII will be \$988 million, broken down as follows -

	\$ million
(a) Command, control and network management sub-system	100.0
(b) Radio repeater sub-system	74.0
(c) Backbone radio relay sub-system	30.0
(d) Subscriber radios with encryption	360.0

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	\$ million
(e) 999 emergency services telephone sub-system	15.0
(f) AVL and GIS	66.5
(g) ECACCS	78.0
(h) Mobile computing sub-system	68.5
(i) Project management (employment of contract staff)	48.4
(j) Consultancy study	10.0
(k) Supporting services (including site preparation, installation, training and documentation)	44.0
(l) Maintenance, test equipment and spares for the first year	58.0
(m) Radio spectrum licence fee and tariff for leased line rental	15.0
(n) Contingency	20.6
Total	988.0

10. As regards paragraph 9(a), the estimate of \$100 million is for the procurement of two digital exchange switches at two RCCCs (one is shared by the three RCCCs while the other is the reserve), 120 despatcher terminals and console furniture in Headquarters command and control centre (CCC) and three RCCCs, nine voice loggers (recorders) at three RCCCs, three message/data switching servers Internet Protocol routers, wall displays for mobile data in three RCCCs, ECACCS/radio interface gateway, remote status monitoring of radio equipment at hilltop stations and key locations, uninterruptible power supplies, radio network management system and terminals.

11. As regards paragraph 9(b), the estimate of \$74 million is for the procurement of digital radio repeaters and antenna equipment to be installed at the hilltop radio stations and government buildings. It comprises a total of 175 basestations grouped into 80 cell sites (\$72 million) and two power supplies for each cell site (\$2 million). The urban areas of the harbour basin will have 15 cell sites with three basestations per site while the remaining 65 cell sites will each need two basestations.

12. As regards paragraph 9(c), the estimate of \$30 million is for the procurement of three main loops of 15 GHz digital microwave hot-standby/diversity radios connecting the hilltop stations, cell sites and Headquarters CCC/RCCCs, 10 to 15 spur links inter-connecting the main loops and the district operation rooms. The sub-system will also have the capacity to serve as a dedicated wireless radio back-up for the leased circuits between RCCCs.

13. As regards paragraph 9(d), the estimate of \$360 million is for the procurement of 10 500 encrypted portable radios for use by about 24 000 officers (\$304 million), 1 500 encrypted vehicular radios (\$46 million), three radio storage racks per police station for 68 stations (\$2 million), 68 battery conditioner (\$1 million), 680 multi-unit battery chargers (\$5 million), and 18 encryption keyfill loaders and keyfill work stations for 18 district operation rooms (\$2 million).

14. As regards paragraph 9(e), the estimate of \$15 million is for the procurement of a new emergency services telephone sub-system to handle 999 calls. The sub-system includes 999 PABX and suite for seven operator/supervisor positions with computer-telephony integrative terminal at each RCCC, ten additional operator positions for overflowed calls from 999 suite, facility to intra-flow influx of 999 calls to other console operators within the same RCCC, facility to inter-flow 999 calls from one RCCC to another designated RCCC, 999 network management system, three uninterruptible power supply for the PABXs at three RCCCs, interface gateway with the GIS and equipment installation, factory acceptance, training and documentation.

15. As regards paragraph 9(f), the estimate of \$66.5 million is for the procurement of equipment including 500 global positioning satellite receivers with vehicle installation (\$2.5 million), hardware and software for AVL and GIS (\$30 million), four high speed local area networks (LAN) for handling AVL and GIS data traffic in Headquarters CCC and three RCCCs (\$4 million), and 100 GIS terminals and software (\$30 million).

16. As regards paragraph 9(g), the estimate of \$78 million is for the procurement of two resilience servers (\$20 million), two computer aided despatch (CAD) software (\$12 million), 300 CAD workstations for the RCCCs (\$30 million), and the associated system integration/engineering services for interfacing other systems such as EPONICS (\$16 million).

17. As regards paragraph 9(h), the estimate of \$68.5 million is for the procurement of 500 laptop computers for patrol vehicles and vessels with installation (\$35 million), 500 wireless data modem (\$6 million), 500 client software (\$7.5 million) and hardware and software for wireless LAN gateway, firewall server and application server (\$20 million).

18. As regards paragraph 9(i), the estimate of \$48.4 million is for the employment of contract staff including 54 man-months of Senior Telecommunications Engineer, 162 man-months of Telecommunications Engineer, 60 man-months of Senior Project Manager, 108 man-months of Project Manager, 168 man-months of Systems Analyst and 168 man-months of Programmer for the detailed planning and implementation of the new communications system.

19. As regards paragraph 9(j), the estimate of \$10 million is for the conduct of a consultancy study, including the procurement of equipment for trial, to examine the feasibility and cost-effectiveness of applying the mobile computing concept on beat officers, advise on the most appropriate device to meet the operational requirements and the conduct of pilot trials (paragraph 7(d) above refers). The study will be completed in early 2001.

20. As regards paragraph 9(k), the estimate of \$44 million is for supporting services such as equipment installation for cost items 9(a) to (c), viz. command control and network management sub-system, radio repeater sub-system and backbone radio relay sub-system (\$24.3 million), site preparation for 80 cell sites (including ten hilltop sites) and RCCC preparation (\$10.8 million), training and documentation (\$8.4 million), tender evaluation and factory acceptance test (\$0.5 million).

21. As regards paragraph 9(l), the estimate of \$58 million is for provision of modular and field replaceable units, consumable spare components, special-to-type test equipment and general test equipment estimated at 10% of the total cost of items 9(a) to (e).

22. As regards paragraph 9(m), the estimate of \$15 million is for the radio spectrum licence fee and tariff for leased line rental (first year) from the public network operator. It comprises radio spectrum fees for repeater and backbone radio relay frequencies (\$0.6 million), subscriber radio licence fees (\$3.4 million), leased lines installation (\$0.4 million), and annual tariff for leased lines (\$10.6 million).

23. As regards paragraph 9(n), the estimate of \$20.6 million represents 2.6% contingency on the cost items set out in paragraph 9(a) to (h).

24. The estimated cash flow will be as follows -

Year	\$ million
2000-01	16.4
2001-02	14.0
2002-03	256.3
2003-04	315.4
2004-05	303.3
2005-06	82.6
Total	988.0

Recurrent cost

25. The estimated additional annually recurrent expenditure arising from the proposed system will be \$4,747,000, broken down as follows -

		\$'000
(a)	Recurrent cost of the proposed system	
	(i) System maintenance and spare parts	14,500
	(ii) Leased-line rental	10,632
	(iii) Radio spectrum licence	4,000
	(iv) Computer equipment maintenance	27,615
	Sub-total	56,747
	<u>Less</u>	
(b)	Recurrent cost of the existing systems	(52,000)
	Total	4,747

26. As regards paragraph 25(a)(i), the estimate of \$14.5 million is for annual maintenance support for the proposed beat radio system with an estimated life span of 14 years.

27. As regards paragraph 25(a)(ii), the estimate of \$10.6 million is for rental of high speed data lines which connect the RCCCs and the major hilltop radio stations.

28. As regards paragraph 25(a)(iii), the estimate of \$4 million is to cover the radio spectrum licence fees.

29. As regards paragraph 25(a)(iv), the estimate of \$27.6 million is for outsourcing the hardware and software maintenance services of the new computer equipment of AVL, GIS and mobile computing sub-system.

30. As regards paragraph 25(b), it is the annual recurrent maintenance cost of the existing systems including CCII and radio systems currently used by Traffic Branch, PTU and EU.

Implementation Plan

31. CP plans to implement the proposed system according to the following schedule -

Activity	Target date
(a) System design	April 2000 to July 2001
(b) Tendering and award of contract	August 2001 to April 2002
(c) Delivery of equipment, installation, acceptance tests and training	May 2002 to December 2003
(d) System commissioning and phased roll-out	January to December 2004

OTHER PROPOSALS CONSIDERED

32. There are no practical or cost-effective alternatives other than a complete replacement.

BACKGROUND INFORMATION

33. The existing CCII comprises a beat radio system, the 999 emergency services telephone sub-system and ECACCS. The total project cost

of CCII was about \$410 million. The primary function of ECACCS is to provide a comprehensive computerised command and control facility in conjunction with the beat radio network and the 999 emergency services. Terminals are installed at the three RCCCs to support controllers in handling and deployment of resources to scenes of incidents, and at all police stations in tracking and taking follow-up actions on divisional incidents. Details of all incidents reported through 999 or at police stations are entered in ECACCS which will verify the locations and pass the information to the divisional console concerned automatically for deployment of resources if necessary. ECACCS provides computer service coverage for both routine policing as well as internal security and major incident situations. Interfaced with the EPONICS, it also provides information including the “Wanted or Missing Persons” and vehicles of interest in support of Police’s “stop and search” operations on the streets.

34. We consulted the Legislative Council Panel on Security on the proposal on 28 January 2000. The Panel agreed to the need for a new command and control communications system from the security and operational points of view but requested for further details about the cost estimation. We have subsequently provided to the Panel supplementary information as set out in paragraphs 9 to 30 above.

Security Bureau
March 2000