LC Paper No. CB(2)1689/00-01(03)

For discussion
on 7 June 2001

Legislative Council Panel on Security

Replacement Command and Control Communications System for The Operations Department of The Hong Kong Police Force (HKPF)

PROBLEM

The existing mission critical command and control communications system (CC II) used by beat officers was introduced in 1990 and will reach the end of its useful life by 2004. A replacement system is needed accordingly. In addition, the existing system now has significant maintenance problems and operational deficiencies, which only a replacement system will overcome.

PROPOSAL

2. The Commissioner of Police, 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 Hong Kong Police Force, including beat patrol officers, and patrol officers deployed to Traffic Branch, the Police Tactical Unit (PTU) and the Emergency Unit (EU).

JUSTIFICATION

The current system

3. The current command and control communications system (CC II) was introduced in 1990. It comprises the Integrated Communications System (commonly known as the 'Beat Radio System' but including mobile radios in HKPF patrol vehicles); the 999 Emergency Services Telephone Sub-system

(999 Sub-system); and the Enhanced Computer-assisted Command and Control System (ECACCS).

4. The primary function of ECACCS is to provide a comprehensive computerised command and control facility in conjunction with the Beat Radio System and the 999 Sub-system. ECACCS terminals are installed at the three Regional Command and Control Centres (RCCC) to support controllers in the handling and deployment of resources to scenes of incidents, and at all HKPF stations to facilitate tracking and taking follow-up action on local incidents. Details of all incidents reported through 999 or at HKPF stations are input into ECACCS, which will verify the location and route the information to the (divisional) console concerned automatically, for deployment of resources as necessary. ECACCS provides computer service coverage for both routine policing as well as internal security and major incident situations. Interfaced with the Enhanced Police Operational Nominal Index Computer System (EPONICS) and the Transport Department's Vehicle and Licensing Identification System (VALID), and with restricted access to the Immigration Department's Registration of Persons System (ROPS), it also provides information including wanted and missing persons, and vehicles of interest in support of HKPF operational activities on the streets (see also para. 9(a) below).

Maintenance problems with the current system

5. CC II equipment, particularly the Beat Radio System and the 999 Sub-system, will reach the end of its useful life by the end of 2004. Beat radios and repeaters are aging with increasing breakdowns. The maintenance costs for the Beat Radio System are rising. In addition, as the technology currently used in CC II is proprietary to a particular vendor, HKPF is invariably obliged to turn to this same vendor for acquiring equipment or services for the system. HKPF has also encountered increasing difficulty in obtaining spare parts for the Beat Radio System as production of the model used by HKPF has been discontinued since 1997. The vendor's contractual commitment to supply spare components will last until 2002. However, based on past maintenance records and by stocking up spare parts, HKPF considers that it will be able to maintain the system until 2004 but only with great difficulty beyond that.

Operational deficiencies of the current system

6. In addition, with the changes in geographical distribution of the population coupled with a justifiably increasing public expectation in respect of HKPF quality of service, CC II can no longer fully meet HKPF's operational requirements. Its main deficiencies are as follows -

(a) The current Beat Radio System infrastructure is overloaded and cannot take up signals from additional repeaters, which affects response time if there is a sudden surge of calls;

(b) as the analogue technology used for the Beat Radio System infrastructure has limited *frequency bandwidth*, it cannot support data and image transmission in support of HKPF operations;

(c) the Beat Radio System was designed in the late 1980s and does not provide full radio coverage of Hong Kong. The developing new towns of Tin Shui Wai, Ma On Shan and Tseung Kwan O have exhausted the reserve expansion capacity of the System and there are a number of radio black spots in developing areas;

(d) the existing 999 Sub-system is connected to the Private Automatic Branch Exchange (PABX) system of the buildings in which the three RCCCs are located. Any upgrading or enhancement of the existing Sub-system has to be conducted in conjunction with the whole existing PABX system and hence is both difficult and expensive. Furthermore, when there is a sudden surge of calls to a particular RCCC, there is no mechanism available to direct the overspill to other RCCCs; and

(e) as beat patrol officers and patrol officers deployed to the Traffic Branch, PTU and EU are using their own radio systems, cross-communication is not possible. In joint operations, officers need to carry more than one radio, which is undesirable and cumbersome.

7. The existing ECACCS is a text-based system with no *graphical user interface* (GUI)[1] provided which does not make it particularly user-friendly. Other than the foregoing, however, it continues to meet users'

[1] A graphical user interface is a graphics-based operating system interface that uses icons, menus and a mouse (to click on the icon or pull down the menus) to manage interaction with the system. It is the front end (desktop) man-machine interface (MMI).

requirements and its shortcomings are remediable. Unlike the Beat Radio System and the 999 Sub-system, which will reach the end of their useful lives by 2004, ECACCS has no particular shelf life and can be successively enhanced.

THE PROPOSED SYSTEM

8. HKPF has conducted a thorough study of its operational requirements and proposes to replace CC II by a new digital command and control communications system (CC III). At the FC meeting held on 10 March 2000, Members discussed the project and suggested that the Administration consider implementing it in two phases, namely Phase I – Design; and Phase II – Implementation, so as to leverage continuing technology advancement. Accordingly, Phase I commenced and was funded by HKPF from internal resources. Preliminary design and "users' requirements" were finalised by the end of 2000. In January 2001, a Request-for-Information (RFI)[2] was issued to the industry and a total of 42 responses were received from vendors worldwide, including 28 from Hong Kong companies. This has enabled the Police to firm up the system design and come to a clear view of the proposed budget. The main characteristics of the new system are set out below:

(a) The new system will have four main modules: the Beat Radio System; the 999 Sub-system; the Computer-assisted Command and Control System (CACCS3); and the Mobile Computing Sub-system;

(b) the new digital radio infrastructure will be built to *open standards*,[3] and will be *scaleable* (capable of expansion). Equipment such as beat radios will no longer be proprietary and henceforth can be procured from open markets, at lower cost. In addition, the new system will allow an incremental approach to development and system enhancement in future, obviating the

[2] A Request-for-Information on a proposed project is a non-binding document issued to the industry containing preliminary specifications of the project and seeking indicative costs and confirmation that such a project could be built.

[3] Until recently, each manufacturer had its own proprietary equipment designs. This has always been to the disadvantage of the customer who has been 'locked into' the original supplier. 'Open standards' denote designs that can be replicated by a number of manufacturers, giving the customer more choice.

need for major changes and upgrades, which will be more cost effective;

(c) it will provide comprehensive radio coverage in support of HKPF operations. The proposed system will facilitate the deployment of resources and hence strengthen HKPF's capability to prevent and detect crime. For example, serving as an integrated communications system for beat patrol officers, and patrol officers deployed to the Traffic Branch, PTU and EU, the new system will improve communications between front-line officers and facilitate the efficient and effective deployment of resources during emergencies and large-scale operations;

(d) it will have sufficient interference-free high-speed data channels to allow transmission of not only voice but also data and images. Based on the results of internal trials, *mobile data terminals* (mobile computing facilities) will be installed on board Police emergency response vehicles[4] in addition to mobile radios, giving officers manning them dual data and voice communications capability. Beat patrol officers will be provided with dual voice and data communication (rather than full mobile computing) capability as well;[5]

(e) its new digitised, encrypted transmission platform will greatly enhance protection against eavesdropping and unauthorized access;

(f) a *Geographical Information System* (GIS) (electronic mapping, plotting of incidents/places of HKPF interest etc) will be installed to facilitate the plotting of scenes of crimes and incidents on digitised maps in the RCCCs;

(g) it will also have an Automatic Vehicle Location System (AVLS) which, integrated with the GIS, will enable the RCCCs to keep track of Police patrol vehicles for rapid deployment to the scene of an incident;

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[4] Emergency response vehicles are, in general terms, frontline patrol vehicles, which are deployed by radio to emergency situations. They include EU and PTU vehicles, and Traffic patrol cars.

[5] The new beat radio will be an integrated unit providing voice transmission (both radio and mobile telephone), short data messaging, direct wireless access to selected databases, for example EPONICS, and, subject to the maturity of the technology, an inbuilt video camera.

(h) the enhanced ECACCS, which will be migrated to modern hardware, will be user-friendly (by the addition of a Graphical User Interface on desktop terminals) and will accept Chinese language input; and

(i) the new 999 Sub-system will enable 999 calls to be routed around the same RCCC (intra-flow) or to the other two RCCCs (inter-flow) automatically if there is a sudden surge of calls in one centre. In addition, the new 999 Sub-system will be built on its own PABX system and hence future upgrading will be much easier and less expensive.

9. The proposed system will further improve Police services to the public in the following ways -

(a) CC III will allow 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 (VALID) (for stolen vehicle checks), the Communal Information System (CIS) (for filing crime reports) and Immigration Department's Registration of Persons System (ROP)[6] (for forged ID cards). Such functionality will greatly improve the utilisation and efficiency of the new communications system and enhance the quality of service provided by HKPF. For example, ID checks will be conducted directly through data transfer from mobile data terminals and beat radios[7] instead of through RCCC operators, as is currently the case. It is expected that the average time required for such a check will be reduced by 10 to 15 seconds. As a result, radio channels and RCCC operators will be freed up for voice communications of higher priority and other urgent tasks;

(b) with the provision of new mobile computing facilities Police patrol vehicles will be able to effectively function as reporting

[6] As now, the interface will be strictly limited to checking if a Hong Kong ID card is valid or forged. Other information in the ROP system will not be accessible.

[7] To make things completely clear, mobile data terminals are, essentially, ruggedised notebook computers mounted in patrol vehicles and used to support the transmission and receipt of *data.* As stated, the new beat radio will be capable of both voice and data transmission.

centres with members of the public being able to make (and officers being able to "accept") reports on the spot; and

(c) the new 999 Sub-system will provide a speedier response when all lines are engaged by making available a further 10 call takers, in addition to the existing seven, to deal with such surges.

FINANCIAL IMPLICATIONS

Non-recurrent cost

10. It is estimated that the one-time, capital cost of CC III will be $948.49 million. Hereunder is a breakdown of these costs compared with last year's proposed budget (as set out in FCR(1999-2000)71). A more detailed breakdown is at Annex A -

Annex A

	Item	Last year's submission $ million	This year's submission $ million
(a)	Command control and network management sub-system	100.00	192.00
(b)	Radio base stations sub-system	74.00	105.00
(c)	Backbone radio relay sub-system	30.00	43.76
(d)	Subscriber radios with encryption	360.00	240.00
(e)	999 sub-system	15.00	15.00
(f)	AVLS and GIS	66.50	52.75
(g)	Computer-assisted Command and Control System 3 (CACCS3)	78.00	64.84
(h)	Mobile computing sub-system	68.50	35.45
(i)	Project management (employment of contract staff)	48.35	42.22

(j)	Supporting services (including site preparation, installation, training and documentation)	44.00	77.10
(k)	Maintenance, test equipment and spares for the system development phase	58.00	40.90
(l)	Radio spectrum licence fee and tariff for leased line rental	15.00	20.00
(m)	Contingency	20.65	19.47
	Total	**978.00**[8]	**948.49**

11. As regards item (a), the estimate of $192 million is for the procurement of digital switches and facilities inside RCCCs. It comprises a total of three digital exchange switches including Internet protocol routers at three RCCCs (instead of two asked for in last year's submission – the additional switch is needed to cater for the additional base stations; see para. 14 below); 123 dispatcher terminals and console furniture in the Headquarters Command and Control Centre (HQ CCC) and three RCCCs; nine central voice loggers (recorders) at three RCCCs; wall displays for mobile data and remote status monitoring of equipment at hilltop sites and key locations in three RCCCs; uninterruptible power supplies (UPS); and a radio network management system and terminals. The additional $92 million is mainly accounted for by the need for an additional switch.

12. As regards item (b), the estimate of $105 million is for the procurement of digital radio base stations and antenna equipment to be installed at hilltop sites and on the rooftops of buildings. It comprises a total of 260 base stations grouped into 120 cell sites ($102 million) (instead of 80 sites in last year's submission – see para. 14 below); and battery power supplies for each cell site ($3 million). The urban areas of the harbour basin will have 20 cell sites (rather than 15 sites in last year's submission – see para. 14 below) with three base stations per site, while the remaining 100 cell sites will each

[8] $10 million consultancy study fee deducted from last year's total estimate of $988.00 million

need two base stations per site. The $31 million increase over last year's submission is mainly accounted for by the need to purchase additional digital base stations and antenna equipment to cater for the additional cell sites.

13. As regards item (c), the estimate of $43.76 million is for the procurement of three 7.5 GHz digital microwave main loops including hot-standby/diversity radios connecting the hilltop sites; rooftop sites; HQ CCC/RCCCs; 20 to 25 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. The additional $13.76 million is mainly accounted for by the need for more spur links brought about by the need for more cell sites.

14. Items (a), (b) and (c), which are inter-related and may be collectively referred to as the *radio infrastructure,* have now been costed at significantly more than last year's estimates. This is due to one main reason. The original costings were based on a handheld radio having a power of *three watts*. This standard has recently been superseded worldwide in favour of a power of *one watt*, i.e. a third of the original. During the RFI exercise, all the responding vendors confirmed that the TETRA standard (TETRA = **TE**rrestrial **T**runked **RA**dio) is now one watt.[9] This necessitated a major resizing of the proposed infrastructure, the main implication being the need for more cell sites.

15. As regards item (d), the estimate of $240 million is for the procurement of 9,250 encrypted handheld radios ($200 million); 750 encrypted mobile (vehicular) radios ($20 million); handheld radio accessories including batteries, chargers, and battery condition testers ($18.5 million); and mobile radio ancillaries ($1.5 million).

16. The new estimate for item (d) represents a significant saving over last year's figure. This has been brought by a critical review of the number of radios needed and reduction in unit costs, by reference to the RFI responses (handheld radios reduced from 10,500 to 9,250, unit cost reduced from $29,000 to $22,000; mobile radios reduced from 1,500 to 750, unit cost reduced from $30,000 to $27,000). The reduction in handhelds has been achieved by reducing 'spare' inventory to a more conservative level on the basis that the handhelds will be inherently more reliable and therefore will

[9] There are, in fact, very good reasons for this. Lower power means less energy costs and less opportunity for eavesdropping, amongst other things.

breakdown less. The reduction in mobile radios represents a change in policy whereby, generally, only emergency response vehicles will be equipped with radio.

17. As regards item (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 a 999 PABX and console cluster for seven call taker/supervisor positions with computer-telephony integration servers at each RCCC; ten additional call taker positions for each RCCC for overflow calls from 999 console clusters; facilities to redirect 999 calls to other console operators within the same RCCC (intra-flow); facilities to direct 999 calls from one RCCC to another designated RCCC (inter-flow); a 999 network management system; three UPS for the PABXs at three RCCCs; an interface gateway with CACCS3; and equipment installation, factory acceptance, training and documentation.

18. As regards item (f), the estimate of $52.75 million is for the procurement of equipment including 500 AVLS receivers for Police patrol vehicles, including installation ($13.75 million), four sets of AVLS and GIS hardware and software for HQ CCC and three RCCCs ($35 million); and four high-speed Local Area Networks (LAN) for handling AVLS and GIS data traffic in HQ CCC and three RCCCs ($4 million).

19. The RFI responses have significantly increased the unit cost of AVLS receivers, from $5,000 to $27,500. It was thought last year that relatively simple AVLS equipment would suffice but it is clear, now, that having regard to Hong Kong's topography – notably building height and density – that only sophisticated equipment will provide the required accuracy. In addition, there will need to be very rigorous testing of the facility before implementation. Overall, however, the new estimate for item (f) is significantly lower than last year's submission. This is due, largely, to the decision to utilize CACCS3 desktop terminals for the display of GIS data as well and therefore the 100 GIS terminals included in last year's submission are no longer required.

20. As regards item (g), the estimate of $64.84 million is for the upgrading of ECACCS ($37 million) by migrating it to modern backend hardware (servers); the addition of a Graphical User Interface and Chinese language capability; interfaces with other systems such as EPONICS; and 290 new console workstations ($27.84 million).

21. The estimate of $78 million in last year's submission for the complete *replacement* of ECACCS was based on its original cost suitably adjusted, and our belief that a new system built to *open* standards would not be significantly more expensive, indeed possibly cheaper. The RFI exercise, however, indicated otherwise.[10]

22. As regards item (h), the estimate of $35.45 million is for the provision of 270 ruggedised laptop computers (otherwise known as mobile data terminals [MDT]) for emergency response vehicles and installation ($16.47 million); 270 sets of 'client' software (for the MDTs) ($4.05 million); 270 GIS software licences for the MDTs ($5.13 million); and hardware and software for the wireless LAN gateway, and firewall and application servers ($9.8 million).

23. The considerable reduction over last year's estimates has been brought about by a critical review of the actual numbers of MDTs required. The initial thinking was that all Police patrol vehicles should be supplied with MDTs. On critical reflection, however, the business case for supplying MDTs to all Police patrol vehicles is not sufficiently strong. Conversely, emergency response vehicles, which have the dual role of functioning as mobile command centres at the scenes of serious incidents will be equipped with MDTs.

24. As regards item (i), the estimate of $42.22 million is for the employment of contract staff including 54 man-months of Contract Senior Telecommunications Engineer, 282 man-months of Contract Telecommunications Engineer, 52 man-months of Contract Senior Project Manager, 104 man-months of Contract Project Manager, 156 man-months of Contract Systems Analyst and 132 man-months of Contract Analyst Programmer for the implementation of the new communications system.[11] The downward adjustment over last year's submission (down from $48.4 million) has been brought about by the fact that Phase I has been completed and by the change in requirements of the project.

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[10] In addition it is now evident that, in any event, open *computer-aided dispatch* systems (which is what ECACCS is) cannot match proprietary ones in terms of performance, without prohibitive expenditure. ECACCS software has no particular shelf life and it is considered that an upgrade along the lines described is the appropriate way ahead. It is also worth mentioning that by adopting this approach the recurrent costs will be limited to $25.7 million whereas the RFI exercise indicated that an open standards system replacement would attract recurrent costs as high as $41.2 million.

[11] Flexible deployment of both in-house staff and contract staff will be adopted to facilitate smooth implementation of the project.

25. As regards item (j), the estimate of $77.1 million is for supporting services such as equipment installation in respect of items (a) to (c), i.e. command control and network management sub-system, radio base station sub-system and backbone radio relay sub-system ($33.6 million); site preparation and development for 120 cell sites and RCCCs ($16.6 million); training and documentation ($8.4 million); tender evaluation and factory acceptance test ($0.5 million); and AVLS and GIS implementation ($18 million).

26. The new estimate is an increase over last year's submission and has been brought about by two main factors: firstly, the major resizing of the infrastructure required, to take account of the new one watt radio; and secondly, for AVLS to perform to an acceptable standard in Hong Kong, a relatively sophisticated system will be required, hence the significant cost of implementation.[12] AVLS supported by GIS equipment is considered essential to the operational effectiveness of the Force.

27. As regards item (k), the estimate of $40.9 million is for provision of modular and field replaceable units, consumable spare components, special-to-type test equipment and general test equipment. The figure has been calculated on the basis of about seven percent of the cost of items (a) to (e) and is based on our experience with CC II.

28. As regards item (l), the estimate of $20 million is for the radio spectrum licence fee and tariff for leased line rental from the public network operators during the system development phase. It comprises radio spectrum fees for repeater and backbone radio relay frequencies and subscriber radio licence fees ($4 million), leased lines installation ($0.5 million), and annual tariff for leased lines connecting the RCCCs, cell sites and the 999 Sub-system ($15.5 million). The increase over last year's estimate has been brought about by the increase in cell sites and, hence, increases in these charges.

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[12] Responses to the RFI indicated that due to Hong Kong's topography (building height and density), Global Positioning System (GPS) technology alone will not provide the required coverage and accuracy, and therefore more sophisticated location technology is needed, including 'dead reckoning' devices and Map-matching. Implementation will be difficult, technically, calling for very careful integration of the component parts of the system and rigorous testing, hence the cost. 'Dead-reckoning' and Map-matching are technologies that improve position accuracy when GPS is temporarily beyond reach of the patrol vehicle. The former feeds information concerning the speed and direction of the vehicle into the GPS receiver to enable it to continue calculating the vehicle's current position (in the absence of GPS data). The latter takes the 'dead reckoning' data and "matches" it to the road information in the GIS, to determine which road the vehicle is driving along. In the absence of this corrective process, vehicles would appear on the GIS display in ludicrous and confusing locations, e.g. the tops of buildings. The two technologies require complex calculations and sophisticated mathematical modelling to implement.

29. And finally, as regards item (m), the estimate of $19.47 million represents a contingency of about 2.6 per cent on the cost items (a) to (h) at para. 10 above.

30. The estimated cash flow will be as follows –

Year	$ million
2001-02	3.36
2002-03	228.18
2003-04	265.62
2004-05	219.34
2005-06	145.22
2006-07	86.77
Total	948.49

31. At time of first submission, Members also queried the apparent high cost of a handheld radio and mobile data terminal compared to a domestic mobile telephone and a notebook computer, respectively. An analysis of this issue is at Annex B.

Annex B

Recurrent cost

32. The recurrent costs of the project have been estimated at $59.49 million, which compares with last year's estimate of $56.75 million and the recurrent cost of CC II, which is $52 million. The estimated additional annual recurrent expenditure arising from the proposed system will be $7.49 million. Hereunder is a breakdown –

Item	Last year's submission $ million	This year's submission $ million
(i) System maintenance and spare parts	14.50	14.30

(ii) Leased-line rental		
- COMMS	9.50	15.50
- CACCS3	1.13	1.85
	10.63	17.35
(iii) Radio spectrum licence	4.00	4.00
(iv) Computer hardware and software maintenance	27.62	23.84
Sub-total	56.75	59.49
Less		
Recurrent cost of the existing system		(52.00)
Additional recurrent funding sought:		**7.49**

33. As regards item (i), the estimate of $14.3 million is for annual maintenance support for the proposed communications systems, i.e. the Beat Radio System and the 999 Sub-system.

34. As regards item (ii), the estimate of $17.35 million is for rental of high-speed data lines that will connect the RCCCs with the hilltop and rooftop sites. The increase of $6.72 million over last year's submission is accounted for by the necessary increase in such sites.

35. As regards item (iii), the estimate of $4 million is for radio spectrum licence fees.

36. As regards item (iv), the estimate of $23.84 million is for the hardware and software maintenance of the computer systems, i.e. CACCS3, AVLS and GIS, and the mobile computing sub-system.

37. Existing manpower will be deployed to operate CC III. Therefore, no additional recurrent consequences will be incurred in this regard.

IMPLEMENTATION PLAN

38. HKPF plans to implement the proposed system according to the following schedule-

	Schedule	Target completion date
(a)	Seek funding for Phase II of the project	June 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 2004 to August 2005[13]

OTHER PROPOSALS CONSIDERED

39. In addition to upgrading ECACCS, HKPF has also examined the feasibility of upgrading the other component parts of the system, rather than replacing them. Unlike ECACCS, however, these other components have a definite shelf life and, as stated, manufacture of the current beat radio has ceased. Also, the continued maintenance of an obsolescent analogue infrastructure is not cost effective. It is considered important that HKPF now embrace the latest digital technology, as other modern police forces are starting to do.

BACKGROUND INFORMATION

40. This proposal to replace the command and control communications system of the Operations Department of HKPF was last discussed by the Finance Committee on 20 March 2000. Members of the Finance Committee suggested that the Administration consider implementing the project in two phases so as to leverage continuing technology advancement.

[13] In last year's submission, the completion date quoted was December 2004. It is now planned that, subject to approval by Finance Committee, a new Kowloon West Regional Headquarters will be completed by August 2005. Accordingly, the new Kowloon RCCC will be built in the new Regional Headquarters and CC III rolled out with the commissioning of the building. CC II equipment from Hong Kong Island and the New Territories will be deployed to Kowloon to support CC II until CC III goes live.

Accordingly, Phase I commenced and was funded by HKPF from internal resources. Preliminary design and "users' requirements" were finalised by the end of 2000. In January 2001, a Request-for-Information (RFI) exercise was conducted to enable the Administration to firm up the system design and come to a clear view of the proposed budget. This revised funding proposal for implementation of CC III is submitted for approval to enable its timely implementation before the existing Beat Radio System and the 999 Sub-system reach the end of their useful lives.

Security Bureau
June 2001

Annex A

CC III Non-recurrent Cost

Item	Last year's submission HK $M	This year's submission HK $M	Remarks
(a) Command control and network management sub-system			
- 3 digital switches		140.00	
- RCCC (voice logger, console equipment etc.)		37.00	
- Network management system (NMS)		15.00	
Sub-total:	100.00	192.00	
(b) Radio base stations sub-system			
- 260 base stations		102.00	
- Battery power supply systems for each base station		3.00	
Sub-total:	74.00	105.00	Number of sites increased from 80 to 120.
(c) Backbone radio relay sub-system			
- Radio transport system			
Sub-total:	30.00	43.76	Using 7.5GHz (6 x 7MHz) compared to 15GHz (4 x 28MHz) last year
(d) Subscriber radios with encryption			
- 9,250 handheld radios		200.00	
- 750 mobile radios		20.00	
- Handheld radio accessories		18.50	
- Mobile radio accessories		1.50	
Sub-total:	360.00	240.00	No. of handhelds reduced from 10,500 to 9,250, no. of mobiles reduced from 1,500 to 750
(e) 999 sub-system	15.00	15.00	
(f) AVLS and GIS			
- 500 AVLS receivers including installation		13.75	
- 4 sets of AVLS and GIS hardware and software for HQ CCC and 3 RCCCs		35.00	
- 4 high-speed LANS for HQ CCC and 3 RCCCs		4.00	
Sub-total:	66.50	52.75	
(g) CACCS3			
- Interfaces with other systems		37.00	
- 290 new workstations		27.84	
Sub-total	78.00	64.84	
(h) Mobile computing sub-system			
- 270 mobile data terminals including installation		16.47	
- 270 sets of 'client' software		4.05	
- 270 GIS software licences		5.13	
- Hardware and software for the wireless LAN gateway, and firewall and application servers		9.80	
Sub-total	68.50	35.45	
(i) Project management (employment of contract staff)			
- Communications Branch	22.39	18.22	54 man-months of CSTE, 282 man-months of CTE
-Information Technology Branch	25.96	24.00	52 man-months of CSPM, 104 man-months of CPM, 156 man-months of CSA and 132 man-months of CAP
Sub-total:	48.35	42.22	

(j) Supporting services (including site preparation, installation, and training and documentation)			
- Implementation services for items (a) to (c)		33.60	
- Base station development		16.60	
- Training and documentation		8.40	
- Tender evaluation and factory acceptance tests		0.50	
- AVLS and GIS implementation		18.00	
Sub-total:	44.00	77.10	
(k) Maintenance, test equipment and spares for the system development phase			
- Maintenance Management System		11.32	
- Test equipment for (a) - (d)		8.28	
- Maintenance spares for (a) - (d)		21.20	
- Spares and test equipment for (e)		0.10	
Sub-total:	58.00	40.90	
(l) Radio spectrum licence fee and tariff for leased line rental			
- Spectrum licence for (b) – (c)		4.00	
- Leased line installation for (a) – (c)		0.45	
- Leased line tariff (system development phase) for (a) – (c)		10.80	
- Leased line installation for (e)		0.05	
- Leased line tariff (system development phase) for (e)		4.70	
Sub-total:	15.00	20.00	Increase in leased line rental charges due to additional base stations
(m) Contingency			
- Communications Branch		15.49	
- Information Technology Branch		3.98	
Sub-total:	20.65	19.47	
Total:	**978**	**948.49**	

Annex B

A Comparative Analysis of a CC III Handheld Radio/Mobile Data Terminal And a Domestic Mobile Telephone/Laptop Computer

Serial No.	Major feature	CC III beat radio	Domestic mobile telephone	Mobile data terminal	Networked laptop computer
1.	Ruggedised	Yes	No	Yes	No
2.	Shower/heat/humidity proof	Yes	Not to anything like the same extent	Yes	No
3.	Shock proof	Yes	Not to anything like the same extent	Yes	No
4.	High resilience – communications maintained during exceptionally heavy traffic	Yes	No	Yes	No
5.	End-to-end encryption	Yes	No	Yes	Not normally
6.	Extremely fast call set-up time; 0.5 seconds	Yes	No	Yes	No
7.	Emergency 'officer needs assistance' function	Yes	No	N/A	N/A
8.	Backend database and conversion checking	Yes	No	Yes	Yes
9.	Dynamic regrouping of talk-group members	Yes	No	N/A	N/A
10.	Group call to all members of a talk-group	Yes	No	Yes (e-mail)	Yes (e-mail)
11.	Broadcast call to all members of multiple talk-groups	Yes	No	Yes (e-mail)	(Yes (e-mail)
12.	Broadcast call to all members of all talk groups	Yes	No	Yes (e-mail)	Yes (e-mail)
13.	Cell-phone capability	Yes	Yes	N/A	'Internet voice' but poor quality
14.	Remote monitoring of the handheld unit even in 'idle' mode	Yes	No	Yes	No
15.	Remote (over the air) disablement of the handheld unit if lost or stolen	Yes	No	Yes	No
16.	Hot-mike capability	Yes	No	N/A	N/A
17.	A mission-critical piece of equipment	Yes	No	Yes	No
18.	Customised	Yes	Some settings customisable	Yes	Some settings customisable
19.	Radio capability	Yes	No	N/A	N/A

NOTES

1. Whilst a beat radio and a mobile telephone permit a reasonable comparison, such is more difficult with an MDT and a laptop computer. With the laptop computer, we have assumed the situation whereby its owner has connected to his/her organisation's LAN/intranet, via the Internet.

2. The relatively large numbers of manufacturers and the huge production volumes of domestic mobile phones serve to continually increase competition and drive down prices. With public safety handheld units, the special-to-type features and functionality required make research and development costs high. It follows that relatively few manufacturers can accommodate such. Furthermore the market for such equipment is of a limited volume - probably not much more than 10 million handheld units, for example worldwide. Nevertheless, manufacturers are entitled to expect a reasonable return on their R & D investment.

3. However, the advent of open standards, i.e. the ability to source equipment from more than one manufacturer, has improved competition and, generally, is a win-win situation for both customers and manufacturers. Customers get lower prices. Manufacturers are able to bid for 'add-ons' to existing systems, which they would not be able to do if the systems were proprietary.