

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND

HEAD 710 – COMPUTERISATION

Office of the Government Chief Information Officer

New Subhead “Wi-Fi Connected City”

HEAD 47 – GOVERNMENT SECRETARIAT :

OFFICE OF THE GOVERNMENT CHIEF INFORMATION OFFICER

Subhead 700 General non-recurrent

New Item “Providing Public Wi-Fi services in Study Rooms and Youth Service Centres”

Members are invited to approve the creation of the following two new commitments–

- (a) \$474.7 million under Capital Works Reserve Fund Head 710 Computerisation for implementing the Wi-Fi Connected City programme; and
- (b) \$25.3 million under Head 47 – Government Secretariat : Office of the Government Chief Information Officer for subsidising the provision of public Wi-Fi services in study rooms and youth service centres of non-profit making organisations.

PROBLEM

We need to build up Hong Kong as a Wi-Fi Connected City by enhancing the provision of free public Wi-Fi services at government and other public venues as well as extending this provision to more locations.

/PROPOSAL

PROPOSAL

2. The Government Chief Information Officer, with the support of the Secretary for Innovation and Technology, proposes to create -
- (a) a commitment of \$474.7 million for implementing the Wi-Fi Connected City programme by providing free public Wi-Fi services in selected government venues through a combination of public-private collaboration and government-funded arrangements as elaborated in paragraphs 10-18 below; and
 - (b) a commitment of \$25.3 million for subsidising the provision of free public Wi-Fi services in study rooms and youth service centres of non-profit making non-government organisations (“NGOs”) for around five years.

JUSTIFICATION**Provision of Free public Wi-Fi services**

3. We see the need to adopt new and cost-effective means of providing free public Wi-Fi services having regard to proven public demand and developments of existing services, as set out in the ensuing paragraphs.

GovWiFi Programme

4. The Finance Committee of the Legislative Council (“LegCo”) approved a total of \$285.6 million in 2007 and 2011 for providing Government Wi-Fi (“GovWiFi”) services at designated government venues for ten years. As of March 2016, around 3 100 Wi-Fi hotspots have been installed at 603 government venues to provide GovWiFi services to the public at full cost to Government. There is continued increase in public demand for GovWiFi services over the years, with the average number of daily users and Internet connections having increased from 3 700 and 6 700 in June 2009 to over 37 000 and 55 000 in March 2016 respectively. The average download speed per user has been increased from 1 Mbps since its service launch in 2008 to the current 3-4 Mbps to keep pace with technological growth while ensuring cost-effectiveness. The GovWiFi venue coverage has also extended from the original target of 350 to 603 venues. The related Government’s service contract for the supply and implementation of service, support and maintenance of the necessary network equipment and associated services will expire in January 2018. We need to continue the provision of free public Wi-Fi in those government venues.

Wi-Fi.HK brand

5. Apart from GovWiFi services provided by the Government, a number of public and private organisations are also providing completely free or time-limited public Wi-Fi services to the general public or their customers across the 18 districts in Hong Kong. To make it easier for the public and visitors to access free public Wi-Fi services in Hong Kong, the Office of the Government Chief Information Officer (“OGCIO”) collaborated with the industry as well as public and private organisations to launch the common brand of “Wi-Fi.HK” in August 2014. Participating organisations of Wi-Fi.HK offer at least 30-minute free Wi-Fi services to the public and visitors without prior user registration. At the end of 2015, the number of hotspots under Wi-Fi.HK has significantly increased from some 5 000 since its service launch to over 17 000 (including 3 100 GovWiFi hotspots at government venues) with a wide coverage of locations¹. The mobile app developed for supporting the brand is well-received by the public and visitors. The number of downloads keeps on increasing and has exceeded 170 000. We need to continue our efforts in the promotion and development of the Wi-Fi.HK common brand.

Free Wi-Fi services provided in hospitals

6. In early 2015, OGCIO helped the Hospital Authority (“HA”) to collaborate with Wi-Fi service providers to provide one-hour free Wi-Fi.HK services at public areas such as the waiting halls of their Accident and Emergency Departments and specialist out-patient clinics of six public hospitals² as a pilot project with positive feedback. Riding on the success of the pilot project, we will continue the facilitation work to help HA to extend the Wi-Fi coverage to all public hospitals.

Review on Public Wi-Fi Services at Government Venues

7. OGCIO commissioned a consultancy study in mid-2015 to explore a viable business model for operating future public Wi-Fi services at government venues with a view to making the services sustainable and scalable and using public resources more effectively. The consultant recommended that the Government should adopt a public-private collaboration approach and work with the private sector to provide free public Wi-Fi services at government venues. With reference to other cities such as New York, Singapore, Amsterdam, Shanghai and Guangdong, the consultant indicated that there is a trend for city governments to

/adopt

¹ Wi-Fi.HK services cover the following locations: the Hong Kong International Airport, major tourist attractions, theme parks, public phone booths, college campuses, Cyberport, Hong Kong Science Park, government venues as well as some shopping malls, restaurants, cafés and convenience stores.

² The six pilot hospitals include: Caritas Medical Centre, Kwong Wah Hospital, Princess Margaret Hospital, Yan Chai Hospital, Queen Elizabeth Hospital and Hong Kong Eye Hospital.

adopt various partnership or collaboration models with Wi-Fi service providers so as to provide sustainable free public Wi-Fi services. The collaboration model for the provision of free public Wi-Fi services would help drive digital innovation in areas like cloud computing³, Internet of Things (IoT)⁴, big data analytics⁵ and other emerging technologies and services in Hong Kong. In the long run, this model has the potential to be further extended to private venues and evolve into a new public Wi-Fi eco-system in Hong Kong.

8. Taking into account the success of the collaboration model with HA and the consultant's recommendation, we have solicited further views from the industry in late 2015 on their interest of participating in the collaboration model for the provision of free public Wi-Fi services at government venues. The results reflect that the industry supports the public-private collaboration arrangement. The industry has also shared with us some viable business models that could sustain free Wi-Fi.HK services while ensuring the provision of commercial Wi-Fi service⁶ and other information services⁷, etc. to the public.

The proposed programme

9. It has been announced in the 2016 Policy Address that the Government will progressively expand the coverage of free Wi-Fi services in the territory. We will take a multi-pronged approach to implement the Wi-Fi Connected City initiative. Major details are as follows -

(A) Free Public Wi-Fi Service at Government Venues and Other Public Venues

Providing one-off setting up cost of basic infrastructure for opening up government venues for Public-Private Collaboration

10. The Government will open up government venues for the private sector to install their equipment and provide time-limited free public Wi-Fi services

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³ Cloud computing is a model for enabling convenient network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with simple management or appropriate service provider interaction.

⁴ Internet of things (IoT) is an infrastructure of interconnected objects, people, systems and information resources together with intelligent services to allow them to process information and react.

⁵ Big data analytics is the process of examining large amount and variety of data to uncover some hidden patterns, unknown correlations and other useful information.

⁶ Commercial Wi-Fi service refers to premium Wi-Fi service with faster speed and unlimited access offered to users who opt for such service.

⁷ Other information services include showing advertisement and service information on mobile devices of the Wi-Fi users.

at their own cost through a public-private collaboration model as far as possible. We are aware that some government venues, especially those outdoor venues in busy districts (such as promenades, parks and sitting-out areas) may have commercial value for the public-private collaboration arrangement. But there may not be sufficient basic infrastructure for the purpose of setting up hotspots, such as the unavailability of underground ducts/conduits for running electricity and data cables for connecting the venues to the network infrastructure. In addition, it may take much longer time for the private sector to set up the necessary basic infrastructure at government venues, which will likely reduce the interest of the private sector in providing Wi-Fi services under the public-private collaboration model. To attract more private organisations to install and operate the Wi-Fi services at their own cost, the Government plans to fund the one-off setup cost of the basic infrastructure at these locations. Relevant government departments will provide assistance to the private sector in carrying out other related works such as coordinating site preparation and installation works. The private sector will be allowed to provide their commercial Wi-Fi service and other information services, etc. at these venues. The Government will bear the electricity charges⁸ for the operation of the Wi-Fi services. A total of 7 000 additional hotspots is expected to be set up.

11. Service providers which are interested in participating in the public-private collaboration arrangement should fulfil a set of basic requirements such as having the licence and experience in providing public Wi-Fi services.

12. A fair and open selection process will be devised for the allocation of venues to the interested Wi-Fi service providers. A Steering Committee will be set up (more details are set out in paragraphs 26 and 27). We will seek advice from the Independent Commission Against Corruption and the Office of the Communications Authority to ensure that the process is fair and transparent.

Government funding of free Wi-Fi services at Government venues

13. For government venues (such as public libraries, community centres, government clinics and country park visitor centres) that are of low commercial value to the private sector for public-private collaboration but with keen or special public demand for free Wi-Fi services, the Government will continue to fund the provision of free Wi-Fi services at these venues upon expiry of the current contract in January 2018. It is estimated that a total of 2 500 hotspots will be provided under this part of the programme for a five-year period.

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⁸ The annual electricity charge per Wi-Fi hotspot is about \$100 on average.

14. We will follow the procedures according to Government's procurement regulations to procure the Wi-Fi equipment and services under the government-funded arrangement.

15. The sharing of costs and responsibilities for the different venues is broadly set out as follows –

P=Private G=Government	Public-private Collaboration model	Full government-funded model
Wi-Fi equipment	P	G
Basic infrastructure & cabling	P+G	G
Wi-Fi service operating and recurrent cost (including maintenance, upgrading and Internet charges, etc.)	P	G
Customer support	P + G	G
Electricity charge	G	G
Number of hotspots covered	Around 7 000	Around 2 500

The above arrangement refers to a general model. The exact division of cost and responsibilities for individual venues will depend on outcome of negotiation with concerned service providers.

Technology standards

16. We will adopt the latest Wi-Fi standard IEEE 802.11ac for all new hotspots to be installed to improve data transfer speed and service stability. We will also use fibre network as the Wi-Fi backhaul for providing broadband service to ensure scalability of bandwidth wherever practicable.

Development and promotion of Wi-Fi.HK

17. The OGCIIO will continue to develop and promote the Wi-Fi.HK brand as a quality public Wi-Fi service through various means as set out below –

/(a)

- (a) *Adopting Wi-Fi.HK as the single brand name at government venues*
We will progressively replace GovWiFi with Wi-Fi.HK as the single brand name for public Wi-Fi services at government venues to make it more convenient to the public;
- (b) *Enhancing security of Wi-Fi.HK*
We will encourage participating organisations of Wi-Fi.HK to follow the example of GovWiFi in enhancing the security of their services through the use of digital server certificate so that the public and visitors can easily discern the legitimacy of the Wi-Fi services, thus enhancing their security and reliability; and
- (c) *Promoting Wi-Fi.HK to more private sector's venues*
We will further promote Wi-Fi.HK to attract more private hospitals, shopping malls, and public transport operators to join the common brand and offer free Wi-Fi services.

Collaboration and facilitation

18. We will facilitate the collaboration of government-related organisations with Wi-Fi service providers to provide public Wi-Fi services at their venues in a sustainable manner. For example, OGCIO, in consultation with HA, conducted an expression of interest exercise in April 2016 to invite Wi-Fi service providers to collaborate with HA in extending free Wi-Fi services to all public hospitals. In addition, we are also working with the Housing Authority on the provision of Wi-Fi services under the Wi-Fi.HK brand at public areas of public rental housing estates for the general public.

(B) Free Public Wi-Fi Services at Venues Operated by NGOs

19. For youth service centres and study rooms run by NGOs which are of low commercial value for public-private collaboration, the Government will provide subsidies for these NGOs to provide free Wi-Fi services, thereby helping the public, in particular students, to study after school with the use of Internet resources.

20. We plan to draw up an application system for subsidizing non-profit-making NGOs currently operating youth centres and study rooms with regular funding support from the Education Bureau and Social Welfare Department

in the provision of free public Wi-Fi service in youth service centres and study rooms. The subsidy amount is to be determined with reference to the number of users and hotspots to be installed at the venues. It is estimated that the subsidy would cover a total of about 350 youth service centres and study rooms run by NGOs, involving around 500 hotspots for a period of five years. The maximum annual subsidy for each venue will be set at \$12,000 on a reimbursable basis. NGOs are required to follow the procurement procedures as stipulated by the Social Welfare Department to ensure open and fair procurement.

Potential benefits

Enhanced free public Wi-Fi services

21. The above measures will meet the public demand for free and secure Wi-Fi services in more places, and encourage participating organisations to promptly adopt newer Wi-Fi and other related technologies and services. Government bureaux and departments can also ride on these Wi-Fi hotspots to deliver their venue-related public e-services. It will help develop Hong Kong as a Wi-Fi Connected City in a sustainable and scalable manner, as well as enhance Hong Kong's image as a world-class city for visitors.

More business opportunities

22. The introduction of private sector participation through public-private collaboration is a more cost-effective way of bringing commercial best practices into the provision of public Wi-Fi services at government venues as compared with the conventional mode of government funding the free Wi-Fi services at such government venues through procurement of such services at full cost.

23. The public-private collaboration model enables the private sector, in particular the information and communications technology (ICT) industry, to expand their network coverage and take the opportunity to provide value-added services to their customers in more public locations, thereby creating more business opportunities.

24. The wider coverage of free public Wi-Fi services can stimulate the industry to develop more mobile e-services for the public. Providing free Wi-Fi services extensively in public areas will also be an integral part of smart city development.

/More

More e-learning opportunities

25. Subsidising NGOs in enhancing the Wi-Fi facilities of their study rooms and youth service centres would lead to better service quality and coverage. Under the Fourth Strategy on IT in Education, primary and secondary schools are progressively installing Wi-Fi services in classrooms to facilitate e-learning for students, alongside with traditional learning. Providing and enhancing Wi-Fi services at study rooms and youth service centres will bring about more learning opportunities to students by helping them to access e-learning resources outside classroom.

Programme governance and control mechanism

26. OGCIO will coordinate with all stakeholders including bureaux and departments participating in the programme to ensure a smooth implementation of Wi-Fi services at various venues. OGCIO will set up a Steering Committee and working groups with members from participating bureaux and departments, service providers and major NGOs to define the service scope and detailed requirements, devise the mechanism to select service providers, oversee the implementation and monitor the on-going service provision under the public-private collaboration model and the subsidy arrangements.

27. For Wi-Fi services provided under the public-private collaboration model, the Government will liaise and sign service agreements with participating service providers specifying the terms, conditions and service specifications as well as restrictions on the value-added services to be provided. The Government will have the right to terminate the agreement and assign the venue to other service providers if the Wi-Fi service provider of that venue violates the terms and conditions of the agreement or repeatedly fails to meet the service specifications.

28. For government-funded Wi-Fi services, a maintenance board will also be formed with representatives of major participating bureaux and departments to manage the development and maintenance of Wi-Fi services as well as monitor the service quality and contractor performance. Bureaux and departments will also monitor the usage of the service and adjust the service requirements like bandwidth and location of the hotspots as and when necessary to ensure that the service is cost-effective.

29. We will also engage a third party organisation to monitor (e.g., through periodic sample checks) the Wi-Fi services provided by the service providers under different arrangements to ensure that the Wi-Fi.HK service quality meets the requirements and public expectations, and propose any necessary follow up actions for making service improvements.

30. For the subsidy of free Wi-Fi services provided by NGOs, eligible NGOs applying and receiving the subsidy are required to sign a funding and service agreement stipulating the terms and conditions and comply with the service quality standard and service specifications of the Wi-Fi services as defined by OGCIO. NGOs receiving subsidies for Wi-Fi services will be required to provide regular usage report for review. The Government will have the right to terminate the subsidy if usage continuously falls below a certain level. We will set up a working group to draw up the implementation details of the subsidising arrangement, review and approve the funding applications, and monitor the usage and service quality on a monthly basis. The working group will report to the Steering Committee on the overall performance of the subsidising scheme.

31. As Controlling Officer, GCIO will be held to account for expenditure under the two commitments. We will report periodically on the progress and performance of the above Wi-Fi Connected City initiatives to the relevant panel of the Legislative Council.

FINANCIAL IMPLICATIONS

Non-recurrent expenditure

32. It is estimated that a total non-recurrent expenditure of \$500 million will be required for implementing the proposals from 2016-17 to 2022-23. The indicative cost breakdown and estimated cash flow requirements by financial years are as follows -

/2016-17

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Capital Expenditure (CWRP Head 710 Computerisation)								
(a) Pilot project under public-private collaboration model	40,000	-	-	-	-	-	-	40,000
(b) Full scale roll-out of public-private collaboration model	-	74,500	74,500	21,240	1,920	1,920	1,920	176,000
(c) Government funded Wi-Fi services at government venues	-	83,000	11,400	11,400	11,400	11,400	11,400	140,000
(d) Programme coordination, management and support	5,900	15,800	15,800	14,100	4,800	4,800	4,800	66,000
(e) Promotion of Wi-Fi.HK	2,050	2,050	2,050	1,150	1,100	800	800	10,000
(f) Contingency	4,700	17,500	10,300	4,700	1,900	1,800	1,800	42,700
								Sub-total: 474,700
Non-recurrent Subsidies to NGOs (Head 47 Subhead 700 General Non-recurrent)								
(g) Subsidies for Public Wi-Fi services in study rooms and youth service centres	1,350	4,330	4,330	4,330	4,330	4,330	0	23,000
(h) Contingency	135	433	433	433	433	433	-	2,300
								Sub-total: 25,300
Total:	54,135	197,613	118,813	57,353	25,883	25,483	20,720	500,000

33. On paragraph 32(a) above, the estimate of \$40,000,000 is for implementing a pilot project under the public-private collaboration model to provide about 1 000 new hotspots in government venues, mainly for building the necessary basic infrastructures such as underground ducts and trunking systems at outdoor government venues as well as the related support services.

34. On paragraph 32(b) above, the estimate of \$176,000,000 is the expenditure for the full scale roll-out of about 6 000 additional hotspots in government venues under the public-private collaboration model.

35. On paragraph 32(c) above, the estimate of \$140,000,000 is for the provision of five years of Wi-Fi services at those government venues outside the public-private collaboration model. These include the acquisition of external services (equipment, support and Internet access services) for the provision of Wi-Fi services according to the requirements of the venues. A total of about 2 500 hotspots will be provided.

36. On paragraph 32(d) above, the estimate of \$66,000,000 is for the co-ordination, management and support work for the new programme. It includes monitoring of the performance of the service providers and the Wi-Fi services, as well as the services of contract information technology (IT) staff for programme coordination and management.

37. On paragraph 32(e) above, the estimate of \$10,000,000 is for the promotion of Wi-Fi.HK as a free and quality Wi-Fi service in Hong Kong including publicity and promotion events, maintaining web site and mobile app, publishing of news and advertisements on conventional and social media channels, etc.

38. On paragraph 32(g) above, the estimate of \$23,000,000 is for subsidising NGOs in providing free public Wi-Fi services in study rooms and youth service centres for five years with about 500 hotspots, including one-off installation charges and monthly service charges for the provision of Wi-Fi services together with the necessary Internet access services.

39. On paragraph 32(f) and (h) above, the estimate of a total of \$45,000,000 represents an approximately 10% contingency on the cost items set out in paragraphs 32(a) to (e) and 32(g) above.

Encl.

40. It is estimated that an additional cost of \$232,000,000 up to 2022-23 can be avoided by installing 7 000 hotspots through the public-private collaboration model instead of the conventional government-funded model. Details are in the Enclosure.

Other non-recurrent expenditure

41. The implementation of the new programme will entail an additional non-recurrent staff cost of \$20,589,000 for OGCI0 during a five-year period. The cost represents a total of 180 man-months of IT staff efforts for performing tendering, service engagement, contract and agreement management works as well as arranging promotional activities. The non-recurrent provision has been earmarked from within the annual estimates of OGCI0.

Recurrent expenditure

42. Under the public-private collaboration model, the Wi-Fi service providers will provide all on-going services to the Wi-Fi services, and the associated Internet access service. The Wi-Fi service providers will also be required to provide maintenance support to the basic infrastructure as set up by the Government. No additional recurrent expenditure will need to be incurred by the Government in supporting the Wi-Fi service, except the electricity charges which will be absorbed by the departments as venue owners.

43. For Wi-Fi services provided through the government-funded arrangement, the service will be delivered through service contracts which cover the provision of equipment, implementation, on-going Wi-Fi services and operation support services for a time-limited period of five years.

44. A total of 30 man-months of IT staff effort will be required to provide on-going programme co-ordination, management, and contract and agreement administration for the programme, entailing a recurrent staff cost of \$3,432,000 per annum starting from 2018-19. The relevant provision will be earmarked from the annual estimates of OGCI0 in the relevant financial years.

IMPLEMENTATION PLAN

45. In the second half of 2016, we propose to conduct a pilot project under the public-private collaboration model for the provision of free Wi-Fi service

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to the public in over 100 venues across the 18 districts in Hong Kong with high patronage, such as parks, sitting-out areas, promenades, tourist spots, public transport interchanges, etc. Based on the pilot results, we will formulate the long-term collaboration model and the details of the next implementation stage, including the types of government venues to be opened up, number of venues, geographical distribution as well as service requirements⁹. It will also provide opportunities for the private sector to explore the best business arrangements to make the service sustainable. Upon completion of the pilot project, the Government will review the results in six months. It is expected that the mass roll-out of the public-private collaboration arrangement will begin from mid-2017. We expect that there will be 7 000 new Wi-Fi.HK hotspots at government venues through public-private collaboration within three years.

46. With the Government's lead in driving the Wi-Fi Connected City initiative and further promotion of the Wi-Fi.HK brand to the private sector, we expect that another 10 000 hotspots provided by other public and private organisations will join the Wi-Fi.HK brand. Together with the 7 000 new hotspots above, there will be about 17 000 more Wi-Fi.HK hotspots in areas of high patronage across the 18 districts in Hong Kong for use by the public and visitors.

47. The proposed implementation plan is as follows -

<u>Activities</u>	<u>Time</u>
(a) Pilot project under the public-private collaboration model	July 2016 to March 2017
(b) Provision of public Wi-Fi services in youth service centres and study rooms run by NGOs	August 2016 to March 2017
(c) Government-funded Wi-Fi services at government venues	Early 2017 to January 2018
(d) Progressive roll-out of Wi-Fi services through public-private collaboration in large scale	April 2017 to end 2019

/PUBLIC

⁹ Service requirements include free usage time in multiple locations, minimum connection speed in different types of venues and locations, and technology standard, etc.

PUBLIC CONSULTATION

48. We have consulted the industry, and they support the implementation of a pilot project before progressively applying the model to more government venues.

49. We consulted the Legislative Council Panel on Information Technology and Broadcasting on the proposal on 11 April 2016. Members were supportive of the proposal and did not raise objection to submitting it to the Finance Committee (FC) for funding approval.

BACKGROUND

50. In the 2016 Policy Address, the Government pledged to progressively expand the coverage of Wi-Fi.HK by doubling its number of hotspots from the existing 17 000 to 34 000 within three years, covering venues including public rental housing estates, public hospitals, markets, parks, sitting-out areas, promenades, tourist spots, public transport interchanges and land boundary control points, etc. The speed of Wi-Fi connection at government venues will be doubled to 3-4 Mbps and its security will also be further enhanced. In addition, we will offer free Wi-Fi services at all youth service centres and study rooms run by the Government and non-profit-making organisations. Furthermore, we will collaborate with public and private organisations in expanding Wi-Fi.HK coverage to venues of high public patronage such as busy streets, bus stops and shopping malls.

51. In the 2016-17 Budget, the Government has earmarked \$500 million to further increase the number of Wi-Fi.HK hotspots to over 30 000, bringing greater convenience to our citizens and tourists.

Innovation and Technology Bureau
Office of the Government Chief Information Officer
May 2016

Cost Avoidance in Adopting Public-Private Collaboration Model in the Wi-Fi Connected City

	Cash flow (\$'000)							
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	Total
Cost								
Rollout of 7 000 hotspots under public-private collaboration model	40,000	74,500	74,500	21,240	1,920	1,920	1,920	216,000
Savings								
Cost avoidance as compared with a government-funded model(*)	11,200	44,800	78,400	78,400	78,400	78,400	78,400	448,000
Net savings	(28,800)	(29,700)	3,900	57,160	76,480	76,480	76,480	232,000

(*) The estimation is based on the service charges required per hotspot each year under the government-funded arrangement, i.e. \$11,200 (\$140 million / 5 (years) / 2,500 (hotspots))