
INFORMATION NOTE

Operation of the Octopus Card in Hong Kong

1. Background

1.1 At the meeting of the Panel on Financial Affairs held on 5 February 2007, regarding the recent incidents in which some Octopus cardholders failed to add value to their Octopus cards via the EPS add-value terminals at several Mass Transit Railway (MTR) stations but the corresponding amounts had still been debited from their bank accounts, the Panel requested the Research and Library Services Division to provide information on the operation of the Octopus card.

1.2 Launched on 1 September 1997, the Octopus card is a touch-and-go electronic payment system using a contactless smartcard technology. Each Octopus card contains a built-in microchip that stores all payment information of the cardholder. Under the *Banking Ordinance* (BO) (Cap.155), the Octopus card is a "multi-purpose card", which is defined as a stored value card "on which data may be stored in electronic, magnetic or optical form and for or in relation to which a person pays a sum of money to the issuer of the card (directly or indirectly) in exchange for (a) the storage of the value of that money, in whole or in part on the card; and (b) an undertaking by the issuer (express or implied) that the issuer or a third party will, on production of the card, supply goods and services (which may include money)".¹

2. Operator of the Octopus card

2.1 The Octopus card is operated by the Octopus Cards Limited (OCL), which was called the Creative Star Limited before 2 January 2002.² The Creative Star Limited was established in 1994 as a non-profit-making entity by five public transport operators, with the Mass Transit Railway Corporation Limited (MTR Corporation) being the biggest shareholder.³ In April 2000, the Monetary Authority (MA) of Hong Kong authorized the Creative Star Limited as a deposit-taking company, allowing it to expand the applications of the Octopus card to services that were not related to transport. In October 2005, after a corporate restructure, the shareholders of OCL formed the Octopus Holdings Limited (OHL), with OCL being OHL's wholly-owned subsidiary responsible for the payment services of the Octopus card. **Table 1** sets out the major developments of OCL in the past 15 years:

¹ Hong Kong Monetary Authority (2002), paragraph 10.3, and Section 2, *Banking Ordinance*.

² Transport Bureau (2000), pp. 1-2.

³ As at March 2000, the shareholding structure of the Creative Star Limited was as follows: MTR Corporation (67.8%); Kowloon-Canton Railway Corporation (24.7%); Kowloon Motor Bus Company (1933) Limited (3%); Citybus Limited (1.4%); and The Hong Kong & Yaumati Ferry Company Limited (3.1%).

Table 1 — Major developments of the Octopus Cards Limited

Year	Major developments
1992	The MTR Corporation reviewed its automatic fare collection technology and recognized the contactless smartcard technology as the most appropriate platform for its future fare collection system.
1994	The MTR Corporation and four other public transport operators jointly formed the Creative Star Limited, a non-profit-making entity established under the <i>Companies Ordinance</i> (Cap. 32) for overseeing the development and implementation of the Octopus card.
1997	The Creative Star Limited launched the Octopus card.
2000	The Creative Star Limited applied for and obtained a deposit-taking company authorization from MA of Hong Kong to expand the application of the Octopus card to non-transport-related services.
2001	The shareholders of the Creative Star Limited signed a new agreement to change the Company's status from non-profit-making to profit-making.
2002	The Creative Star Limited was renamed OCL to better reflect its major business and be easily remembered by its customers.
2005	The shareholders of OCL formed OHL as a holding company for OCL responsible for the payment services of the Octopus card and the other four wholly-owned subsidiaries responsible for the non-payment services spun off from the Octopus card. ⁴

2.2 OHL is jointly owned by five public transport operators, namely:

- (a) the MTR Corporation, with about 76% of its share still being owned by the Government since its partial privatization and public listing on the Hong Kong Stock Exchange in October 2000;
- (b) the Kowloon-Canton Railway Corporation (KCRC), a public corporation governed by the *Kowloon-Canton Railway Corporation Ordinance* (Cap. 372);

⁴ The four subsidiaries are: the Octopus Rewards Limited responsible for the development and operation of the Octopus Rewards programme; the Octopus Knowledge Limited responsible for providing international automatic fare collection consultancy services; the Octopus Connect Limited responsible for providing customer relationship management and research services; and the Octopus Investments Limited which is an investments holding company. The Octopus Knowledge Limited has a subsidiary, the Octopus Netherlands Limited, providing consultancy services for the introduction of a smart card system in the Netherlands.

- (c) the Kowloon Motor Bus Company (1933) Limited (KMB), which is a private company;
- (d) the Citybus Limited (Citybus), a member of the NWS Transport Services Limited jointly owned by two private companies, the Chow Tai Fook Enterprises Limited and the NSW Holdings; and
- (e) the New World First Bus Services Limited (First Bus), which is also a member of the NWS Transport Services Limited.

2.3 As at February 2007, the shareholding structure of OHL was as follows:⁵

- (a) MTR Corporation.....57.4%
- (b) KCRC.....22.1%
- (c) KMB.....12.4%
- (d) Citybus.....5.0%
- (e) First Bus.....3.1%

3. Expansion of Octopus applications

3.1 As at early February 2007, more than 14 million of Octopus Cards were in circulation, more than 95% of the Hong Kong people aged 12 to 65 possessed the cards, and more than 430 merchants provided Octopus services. The Octopus services handled more than 10 million transactions a day, with an average daily transaction value of HK\$77 million, amounting to a total of HK\$29 billion a year.⁶ According to OCL, the Octopus card is "the world's leading and most extensive contactless smartcard system, with the highest penetration, the highest transaction volume and the widest scope of applications".⁷

⁵ Octopus Holdings Limited – Shareholding Structure. Available from: <http://www.octopus.com.hk/company/en/operators.jsp> [Accessed February 2007].

⁶ Octopus launches their 10th Anniversary Octopus Card Design Competition, Octopus Holdings Limited, 1 February 2007, Available from: <http://www.octopus.com.hk/release/detail/en/20070202.jsp> [Accessed February 2007].

⁷ Octopus Holdings – Our Company. Available from: <http://www.octopus.com.hk/company/en/index.jsp> [Accessed February 2007].

3.2 Since 1997, Octopus applications have been expanding from public transport to retail services, parking, vending and kiosks, wet markets, schools, leisure facilities and access control for residential and commercial buildings. OCL has also been introducing Octopus services outside Hong Kong and exporting its experience and technology overseas through consultancy services and workshops. The **Appendix** details the expansion of Octopus applications since 1997.

4. Add-value service

Automatic Add-Value Service

4.1 Octopus cardholders may add value to their Octopus cards at all Octopus network outlets or through the Automatic Add-Value Service (AAVS), add-value machines using cash up to HK\$1,000 or Octopus EPS add-value terminals. Under AAVS, when the remaining value on an Octopus card reaches a zero or negative balance, or when the remaining value plus the maximum negative value are insufficient to settle the full cost of the transaction, the Octopus card will be automatically reloaded with HK\$250 through the network of Octopus readers all over Hong Kong. The reloaded amount will be deducted from the cardholder's designated credit card, savings, current or integrated bank account, with every AAVS transaction shown on the bank statement or passbook.⁸

4.2 The Octopus Automatic Add Value Agreement issued by OCL states that OCL "shall take reasonable steps to ensure" that its records of the transactions relating to the Octopus card are "true and accurate".⁹ Under the Agreement, OCL requests the AAVS account holder to notify it within 12 months of the day of any debit from the AAVS account to the account of OCL (i.e. any bank account specified by OCL to the financial institution that manages the AAVS account), if the account holder claims that OCL was not entitled to debit the relevant amount from the AAVS account. OCL states that after such a period, the account holder is not entitled to make such a claim, unless OCL "failed to exercise reasonable skill and care in respect of any such debit, or any such debit arose from any manifest error on the part of" OCL.¹⁰

⁸ Octopus Help. Available from: <http://www.octopuscards.com/consumer/help/en/index.jsp> [Accessed February 2007].

⁹ Section 14, Octopus Automatic Add Value Agreement effective from 1 September 2006. Available from: <http://www.octopuscards.com/consumer/payment/reload/tc/agreement.jsp> [Accessed February 2007].

¹⁰ Section 41, Octopus Automatic Add Value Agreement.

Add-value service via EPS

4.3 Through Octopus EPS add-value terminals, Octopus cardholders can use ATM (Automated Teller Machines) cards or credit cards with a debit account to add value to their Octopus cards. EPS is a system of electronic payment services launched in 1985 by a "payment card scheme operator"¹¹ called the EPS Company (Hong Kong) Limited (EPS Company). Established in 1984, the EPS Company is currently a consortium of 22 banks in Hong Kong. Its service is to provide convenience for customers and merchants via use of electronic fund transfers.

4.4 According to the Hong Kong Monetary Authority (HKMA), payment card scheme operators are not subject to the *Clearing and Settlement Systems Ordinance* (Cap. 584) because of their relatively small daily average transaction volume, and therefore HKMA does not have regulatory power over them.¹² Nevertheless, HKMA has encouraged the payment card industry to adopt a self-regulatory approach under which the payment card scheme operators have drawn up the Code of Practice for Payment Card Scheme Operators (the PCSO Code). The PCSO Code is "not legally binding".¹³ Nevertheless, the development of the PCSO Code was overseen and has been endorsed by HKMA. Each payment card scheme operator is required to monitor its compliance with the PCSO Code and submit a report annually on its compliance status to HKMA, which is responsible for "monitor[ing] the overall implementation of such self-regulatory approach".¹⁴

4.5 The PCSO Code "specifies general principles for the payment card scheme operators to observe in order to promote the general safety and efficiency of payment cards in Hong Kong and to foster public confidence in them". In particular, the PCSO Code provides that each payment card scheme operator "should have comprehensive, rigorous and well-documented operational and technical procedures to address reasonable operational reliability, the integrity of its network and the timeliness of transactions in the face of malfunctions, system interruption and transmission failures or delays".¹⁵

¹¹ "Payment card scheme operators" means multi-purpose payment card schemes which provide credit and/or debit function through a payment network for making payment of goods or services. The payment card schemes exclude multi-purpose stored value cards (such as the Octopus card), which are dealt with separately in the Code of Practice for Multi-purpose Stored Value Card Operation issued by OCL in August 2005. Besides the EPS Company, there are seven payment card scheme operators (such as the Visa International Service Association and MasterCard Asia/Pacific (Hong Kong) Limited) that have payment card operations in Hong Kong.

¹² According to HKMA, the daily average transaction volume attributable to credit and debit cards issued in Hong Kong is about HK\$1 billion, which is relatively small compared with the HK\$600 billion for the interbank payment systems. Hong Kong Monetary Authority (2006).

¹³ Section 1.2, the PCSO Code.

¹⁴ Section 1.2, the PCSO Code.

¹⁵ Section 6.5, the PCSO Code.

5. Balance-checking

5.1 When a cardholder uses the Octopus card every time, the transaction amount and the remaining value are shown on an Octopus reader or on a printed receipt. The cardholder can also check the remaining value and the date, amount and service provider of the latest transactions on an Octopus Enquiry Machine at any MTR, Airport Express, KCR East Rail, KCR Light Rail or KCR West Rail stations. The transaction records of all Octopus cardholders are kept by OCL.¹⁶

6. Regulation of the operation of the Octopus card

Statutory regulation

6.1 BO empowers MA to regulate the issue of multi-purpose cards, including the Octopus card. According to HKMA, before 25 April 2000, the Octopus card was exempted from the definition of "multi-purpose card" under BO "because of its restricted range of uses".¹⁷ However, since 25 April 2000, MA has allowed the Octopus card to be used for a wider range of uses, including non-transport-related services, and OCL is therefore subject to MA's regulation. Under BO, MA has a function to "take all reasonable steps to ensure" that any business of taking deposits carried on by an authorized institution "is carried on (i) with integrity, prudence and the appropriate degree of professional competence; and (ii) in a manner which is not detrimental, or likely to be detrimental, to the interests of depositors or potential depositors".¹⁸

6.2 OCL is required to meet the relevant authorization criteria for the issue of multi-purpose cards set out in BO. According to HKMA, such criteria include:¹⁹

- (a) "fitness and propriety of management and controllers", and "adequate systems of control for appointment of managers". For instance, the appointment of the Chief Executive Officer of an authorized institution is subject to approval by MA;
- (b) "adequate accounting systems" and "adequate systems of control" for ensuring, among others, the prudent and efficient running of the business and monitoring the risks to which an authorized institution is exposed and complying with legislative and regulatory requirements.²⁰ For instance, MA may require an authorized institution to submit to MA an independent auditor's report on specific controls relating to particular areas of the institution's business operations;²¹ and

¹⁶ Section 17, Conditions of Issue of Octopus published by OCL.

¹⁷ Granting of authorization to Creative Star Limited as a deposit-taking company. Press Release, 25 April 2000, Hong Kong Monetary Authority. Available from: <http://www.info.gov.hk/hkma/eng/press/2000/20000425e4.htm> [Accessed February 2007].

¹⁸ Section 7 (2), *Banking Ordinance*.

¹⁹ Hong Kong Monetary Authority (2002), chapter 4.

²⁰ Hong Kong Monetary Authority (2002), paragraph 4.68.

²¹ Section 59 (2), *Banking Ordinance*.

- (c) "business to be conducted with integrity, prudence and competence", such as an authorized institution's track record, including its ability to deal with unexpected contingencies, and the institution's general competence in its avoidance of operational errors. For instance, where MA is of the opinion that an authorized institution is carrying on its business in a manner detrimental to the interests of holders or potential holders of multi-purpose cards issued by the institution, MA, after consultation with the Financial Secretary, may require the institution "to take any action or to do any act or thing whatsoever in relation to its affairs, business and property" as MA may consider necessary; "to give a direction" that "the institution shall seek advice on the management of its affairs, business and property from an Advisor, for which purpose MA shall appoint a person to be the Advisor of that institution"; and "to report the circumstances to the Chief Executive in Council".²² Under BO, if a director, the chief executive or a manager of an authorized institution fails to take any action or to do any act or thing whatsoever in relation to its affairs, business and property as MA may consider necessary, he or she may commit an offence and may be liable to a fine and imprisonment.²³

Non-statutory code of practice

6.3 In overseeing the safety and efficiency of the operation of retail payment systems, HKMA has been encouraging retail payment system operators to adopt a "self-regulatory approach" through the issuance of, and compliance with, relevant codes of practices. OCL has been subject to the "non-statutory" Code of Practice for Multi-Purpose Stored Value Card Operation (the Code) issued by OCL "on a voluntary basis".²⁴ Nevertheless, the Code is "endorsed by HKMA", and the Code states that HKMA "will monitor the compliance with the Code".²⁵

6.4 The Code is intended to "promote safety and efficiency of multi-purpose stored value card operation by setting out the guiding principles for multi-purpose stored value card issuers, system operators and merchant acquirers to follow in their daily operations; and through this, to foster general public's confidence in the multi-purpose stored value card operation".²⁶ The guiding principles set out in the Code include:

- (a) "There should be rules stating the arrangements to handle disputes over the amount of stored value and cardholders' liability with respect to unauthorized transactions";²⁷

²² Section 52 (1), *Banking Ordinance*.

²³ Section 52 (4) and Schedule 13, *Banking Ordinance*. The offending person is liable on conviction upon indictment to a fine of HK\$2 million and imprisonment for five years or on summary conviction to a fine of HK\$100,000 and imprisonment for two years.

²⁴ Sections 1.1 and 1.2, the Code.

²⁵ Section 1.2, the Code.

²⁶ Section 2.1, the Code.

²⁷ Section 5.1, the Code.

- (b) "Reasonable effort should be made by the system operators to ensure a high degree of security and operational reliability of the system";²⁸
- (c) "There should be comprehensive, rigorous and well-documented operational and technical procedures to ensure operational reliability, which encompasses the robustness of devices and networks and timeliness of transactions in the face of malfunctions, system interruption and transmission failures or delays";²⁹ and
- (d) "System operators should ensure that relevant cardholders' transaction information that relates to a specified period, to the extent that such information is appropriately recorded by the system, could be provided to respective cardholders in a readily comprehensible form".³⁰

6.5 Under the Code, system operators should submit HKMA statistics relating to the operation of the Octopus card, such as the number of cards issued and in circulation, the total volume and value of transactions, the number of terminal facilities, system performance and relevant financial information. They should also inform HKMA of major decisions that may affect the safety and efficiency of the system.³¹ The Code does not have a provision on OCL's liability on its non-compliance with the Code.

Market competition

6.6 Rules and practices have been in place to prevent the emergence of a monopolized market in the use of multi-purpose stored value cards. According to HKMA, in applying the legal framework set out in BO to the authorization of the issue of multi-purpose stored value cards, MA is required to seek "not to stifle developments which would promote competition and innovation", provided that the stability of the payment system and thus of the financial system as a whole are maintained.³² Also, in its Review of Retail Payment Services in Hong Kong completed in 2001, HKMA pointed out that it supported the promotion of competition in the use of stored value card schemes.^{33, 34}

²⁸ Section 6.1, the Code.

²⁹ Section 9.1, the Code.

³⁰ Section 12.3, the Code.

³¹ Section 18.1, the Code.

³² Hong Kong Monetary Authority (2002), paragraphs 10.11 and 10.12.

³³ Hong Kong Monetary Authority (2001).

³⁴ A study published in 2003 by two scholars in Hong Kong found that the success of the Octopus card was not due to its more technological security but rather due to four factors: (a) a captive market with high transaction volume; (b) the superior efficiency of contactless smart cards; (c) the direct and quick conversion from an old system to a new one; and (d) the ability of MTR Corporation to co-ordinate with other transport operators to deploy the same system. Chau and Poon (2003).

6.7 Under the Code of Practice for Multi-Purpose Stored Value Card Operation, OCL is not allowed to install "measures having the effect of unfairly limiting, or exploiting the absence of, competition in the market". OCL cannot make any "exclusive trading clause, which prohibits the merchants from using other forms of stored value payment system".³⁵ The Code states that "[w]here appropriate given the design of the system and when technically feasible, the system operators should aim to share their technical platform with other parties interested in card issuing and merchant acquiring businesses, subject to the required security standards of the system operators and on commercial terms to be agreed between the system operators and the relevant interested parties."³⁶ The Code also states that "[s]ystem operators should not adopt discriminating pricing, and "[f]ees paid by a merchant should not be dependent on whether the merchant also accepts other retail payment instruments or not".³⁷

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³⁵ Section 17.1, the Code.

³⁶ Section 16.1, the Code.

³⁷ Section 17.3, the Code.

Appendix

Expansion of Octopus applications since 1997

Year	Expansion of applications
1997	<ul style="list-style-type: none"> • The Creative Star Limited launched the Octopus card across six public transport systems, with three million cards being sold in the first three months after the launch.
1999	<ul style="list-style-type: none"> • The Octopus reloading service was extended to retail shops. • The Octopus Automatic Add-Value Service (AAVS) through banks was launched. • The Octopus service was introduced onto maxicabs.
2000	<ul style="list-style-type: none"> • The Creative Star Limited obtained Deposit-Taking Company authorization from the Monetary Authority of Hong Kong. • Non-transport businesses started to accept Octopus services.
2001	<ul style="list-style-type: none"> • Octopus services were extended to trams, Peak Tram, convenience stores, photocopying centres, public swimming pools, sporting venues, etc.
2002	<ul style="list-style-type: none"> • Octopus services were extended to supermarkets, personal care stores, cross-border buses, etc.
2003	<ul style="list-style-type: none"> • Octopus services were extended to exhibition and convention registration, household outlets, Government parking meters, etc. • The Octopus Cards Limited (OCL) won its first Mainland China project to support Changsha in the Hunan Province in implementing a multi-purpose electronic payment system using the contactless smartcard technology for creation of a "smart city". • OCL for the first time exported its expertise abroad by introducing a contactless electronic payment smartcard system in the operation of public transport ticketing system in the Netherlands. The smartcard system was the first in the world to be implemented on a national scale.
2004	<ul style="list-style-type: none"> • Octopus services were extended to wet markets.
2006	<ul style="list-style-type: none"> • The Octopus card was accepted by all outlets of Fairwood Fast Food in Hong Kong. • Users of Octopus AAVS could increase the reload value of their Octopus cards from HK\$250 to HK\$500. • The Octopus card was first accepted by 20 Yellow Taxis operated by the Yellow Taxi Group Limited. • The Octopus card was introduced to Shenzhen and Macau in some fast food shops.³⁸

³⁸ Using the Octopus card in Shenzhen and Macau is the same as in Hong Kong, but the cardholders cannot reload their cards with cash; they can only top them up through Octopus AAVS.

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