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Ⓜ **Metro**

OPERATIONS COMMITTEE
MARCH 18, 2004

SUBJECT: HONG KONG SMART CARD

ACTION: RECEIVE AND FILE

RECOMMENDATION

Receive and file the report on the Wall Street Journal article dated February 19, 2004 on Hong Kong smart card system, "Octopus Card, LTD".

ISSUE

At the February 19, 2004 Operations Committee, staff was requested to provide additional information on Hong Kong's smart card system based on the news article published in the Wall Street Journal.

The Octopus system was launched in the mid-1990's as a joint venture between MTR, the subway operator and four other core transit shareholders. An additional 80+ other retailers, government agencies and transit service providers are now participating in the Octopus program.

Octopus is a contactless proximity smart card similar to Metro's UFS smart card. The Hong Kong system operates as a stored value card and can be used on board vehicles, at countertops, and turnstiles.

Attached for your information is a document presented in Paris at an international transportation conference in 2001 (Attachment A). The information below captures current updated statistics.

• There are approximately 6.8 million transit riders in Hong Kong. 95% of the population uses the Octopus card.
• In Hong Kong mass-transit operators are private companies that compete against each other to get riders. Octopus has significantly penetrated the mass-transit market. To date 7.7 million Octopus cards have been issued, with 5 million cards active. Octopus

processes approximately 6 million transactions daily, and an average of 300 transactions per card per year.

- Octopus Card, LTD is a privately owned, profit-oriented corporation. Its shareholders are privately owned, profit oriented transit companies. The rail company called MTR is the largest shareholder in Octopus Card, LTD, controlling 57% in the joint venture. Octopus Card, LTD had 2003 revenues of approximately $21 million.
- Public transit accounts for 75% of Octopus transactions. Octopus has expanded into other areas, such as small retail purchases and fast food with more than 12,000 locations across Hong Kong accepting Octopus for payment. Targeted non-transit markets including:
    o Vending (Swire Coke Cola, and Vitsoy) around 40,000 transactions per day
    o Fast Food (Maxims, McDonalds trial, coming café de coral) 25,000 transactions per day
    o Retail (7-Eleven, Maxims Cakes) 62,000 Transactions per day
    o Leisure Facilities (Swimming Pools, Tennis Booking, Horse Racing Tracks) 6,000 transactions per day
- In June 2003, Octopus-card operated parking meters went into operation to begin the effort of replacing 17,000 parking meters using the less popular e-Park smartcard. The conversion of all meters is planned to be completed by 2005.
- The Octopus card has never been sold to the public. Originally the card was issued free. Now, patrons must give Octopus Card, LTD a deposit for the card of $50 Hong Kong (about $6 U.S.). This deposit is refunded to the customer when the card is returned. The average amount on each card is between HK$63 to HK$65.
- Products, such as watch-cards (wrist watches with Octopus chips in them) have also been sold, approximately 124,261 sold as of April 2001.
- At present 90% of value loads on cards in Hong Kong are paid for with cash, 5% with debit cards, 5% by autoload. The number and percentage of autoload loads should increase dramatically when Octopus and the banks come to an agreement about lower credit card fees for load transactions.
- There is an automated audit in Hong Kong to monitor discrepancies between funds in hand and the amount of money that the Central Clearing House calculates it should have received.
- Octopus Card, LTD grants around 4,000 card refunds per day. Most of these are category changes, such as youths getting student cards, or students acquiring adult cards. Disgruntled customers and broken cards account for a very small percentage of the refunds granted.
- After 3 years of use more than 90% of cards in Hong Kong function perfectly.
- Octopus receives approximately 10,000 hotline calls per month, and picks up about 72.5% of calls. There are about 4 complaints a month about Octopus.
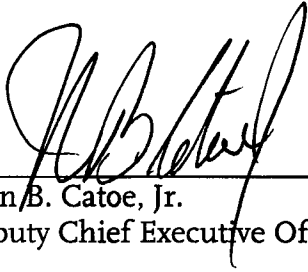
NEXT STEPS

- Continue to work on implementation of the Los Angeles UFS Regional Clearinghouse and TAP Service Center to ensure delivery of a successful program much like the Hong Kong Octopus.

- Provide information on other domestic and international smart card systems of interest as part of the Monthly UFS Update
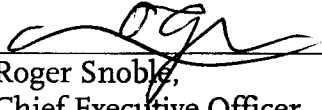
ATTACHMENTS

A. The Hong Kong Project
B. Wall Street Journal Article (February 19, 2004)

Prepared by: Richard Hunt, Deputy Executive Officer, New Vehicle Technology
Jane Matsumoto, UFS Project Manager

John B. Catoe, Jr.
Deputy Chief Executive Officer

Roger Snoble,
Chief Executive Officer

Octopus Card, LTD project description

The Hong Kong Project

Brian Chambers
Principal Consultant
Creative Star Ltd

Current Status

- 7.7 million cards in circulation
- 70-90K cards per month sold
- 60+ service providers
- 6 million+ transactions per day
- 300K add value transactions
- 17,000 devices in the field

Card Segmentation (22/04/01)

	708,631	
Elder?	773,282	
P-Cards	4,813,525	including 124,261 watches
	661,227	
	441,544	
Total	7,398,209	
P-Card Breakdown		
	100,000	
	341,544	

The Organization

- Creative Star Limited - 2001

  MTR 地鐵　KCR 九廣鐵路　KMB 九巴服務 日日進步　CITYBUS城巴　NWFB/FF

- 60+ Service Providers
  - Transport
  - Retail Services
  - Parking
  - Vending
  - Access Control
  - Leisure Services

Fig 1- Octopus System

Backup **CCHS**
Server

Sun ULTRASparc
Server

Fiber Optic

Frame Relay Network

KCR

KMB

HYF

MTR

SPCC

LRT

CTB

Frame
Relay

Sun Workstations

LDP

CSC Processor

Gates

AVM
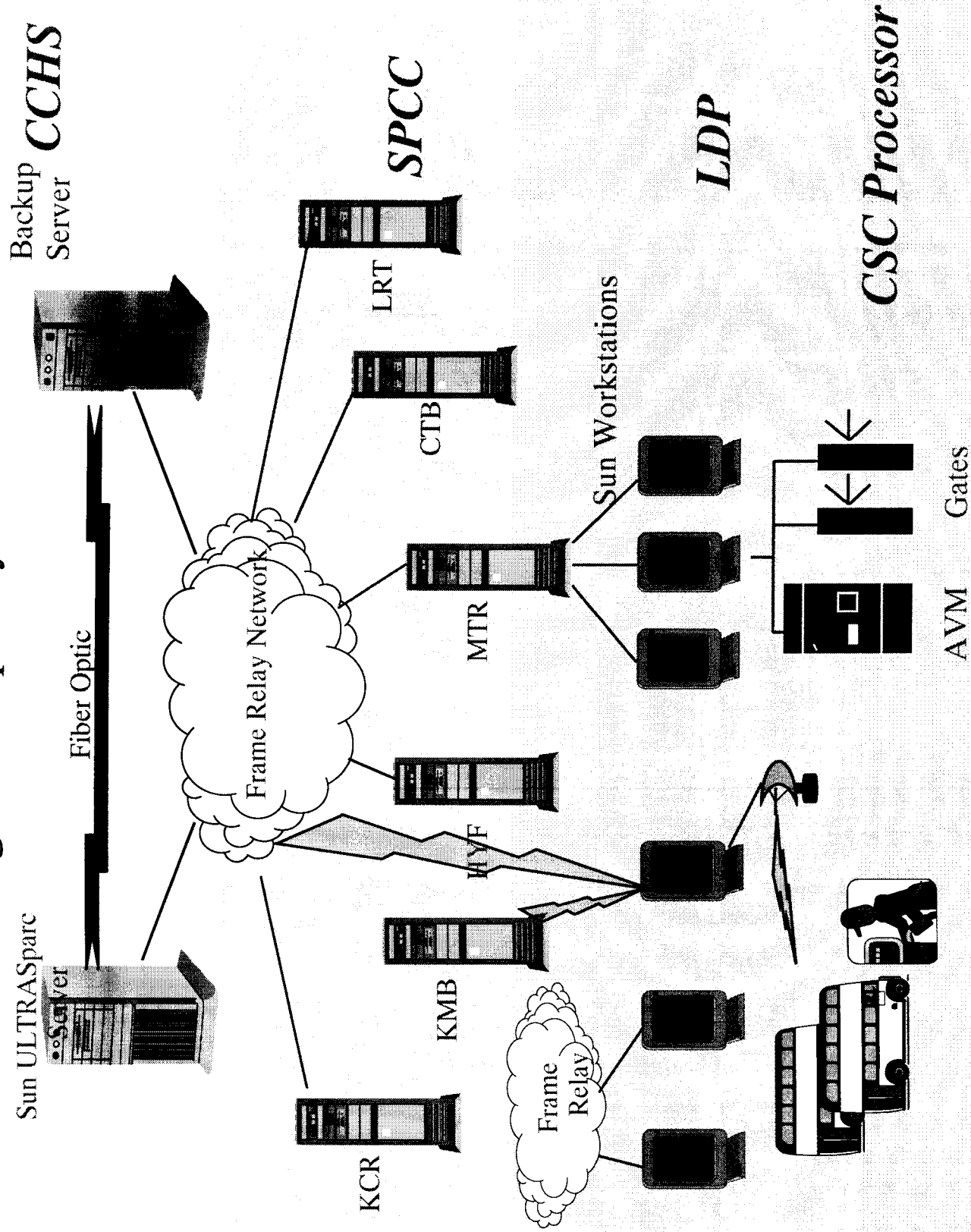
CCH Reports

- C001   Settlement Summary
- C002   Reimbursement
- C003   Reimbursement Adjustment Detail
- C004   Interchange Fee
- C005   Transaction Fee
- C006   Load Agent Fee
- C014   Audit Register Reconciliation
- C015   Acquirer Transaction Fee
- C016   Issuer Transaction Fee
- C018   CCHS Invalid Type/Sub-Type
- C019   CCHS Invalid Acquirer
- C020   CCHS Invalid Issuer
- C021   CCHS Duplicate Transaction

- C022   Invalid Device
- C023   Expired Transaction
- C027   Approved Claim
- C100   Declined Claim
- C108   New/Unregistered Device
- C109   Device with Low Transaction Count
- I014   Issuer No CSC Masterfile
- I015   Issuer Consecutive Rebate
- I016   Issuer Add Value Out of Range
- I018   Black/Blocking
- I021   Issuer Expired CSC Master
- I023   Issuer Unsold CSC
- I044   Issuer Expired Usage Out-of-Sequence

Security

- Encryption
- Authentication
- Dynamic keys
- Full audit trail
- Purse limits

## High Risk – Low Rewards
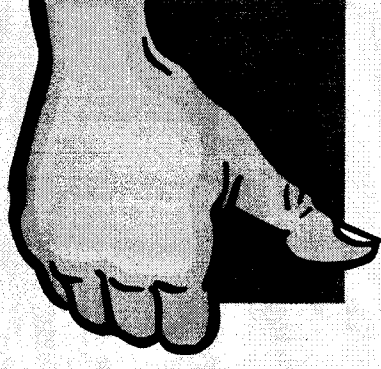
The Technology
Advantages to the Public

◆ Usable across most public transport

◆ No need to carry coins - exact fare deduction

◆ Operates in wallet or handbag

◆ Reliable & Secure

◆ Flexible recharging methods

◆ No card cost (only refundable deposit)

◆ Value recoverable for lost personalized cards

The Technology
Advantages to the Operator
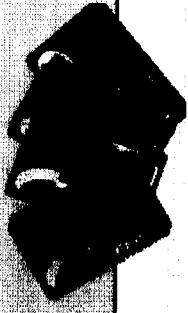
- Reduced maintenance cost

- Reduced capital replacement cost

- No card recirculation cost

- Cash handling

- Fare policy flexibility

- Improved throughput

- Fraud Reduction

- Marketing opportunities

- Extensive management data

Advantages to Integration Planning
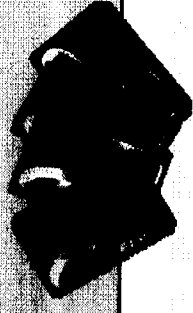
◆ Intramodal & intermodal discounts

◆ Comprehensive MIS

◆ Data source and infrastructure for ITS

◆ Encourages collaboration

◆ Public perception

Smartcard Technology

- ◆ Contactless
  - Fast
  - Easy to use
  - Different packages
  - Essential for high volume transport applications
  - PKI versions available using EC
  - Evolving standards

- ◆ Contact
  - Higher security
  - Cheaper
  - Standards
  - Banks preference
  - Infrastructure

Smartcard Technology
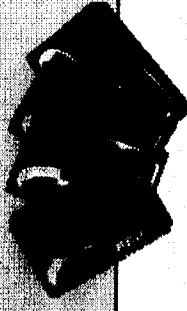
- ◆ Hybrid Contact/Contactless Interface

- ◆ Less reliable
- ◆ Security implications unless have two purses
- ◆ More expensive
- ◆ Ownership issues

Public Interface - Passenger Gate
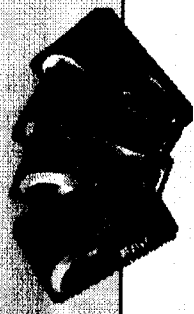
- Existing gates upgraded

- Magnetics retained for single journey tickets

Octopus on Buses

- 3 Major bus operators
- 7000 buses
- Free travel if equipment not functioning
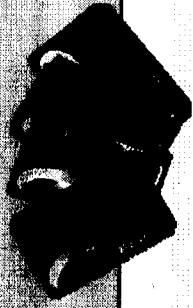
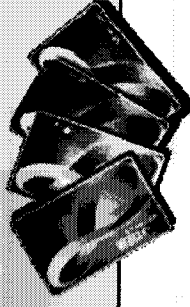# PLB Operations

On Street Parking Trial
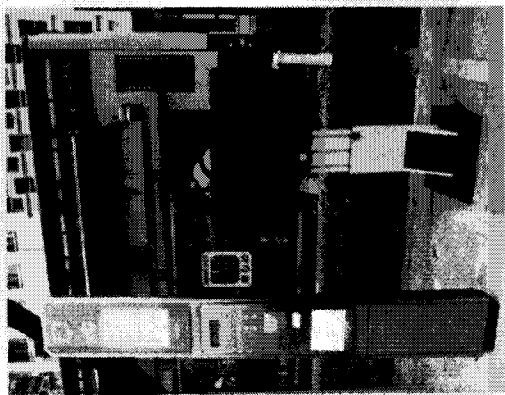
Adding Value

- Add Value Machines
- Customer Service Centres
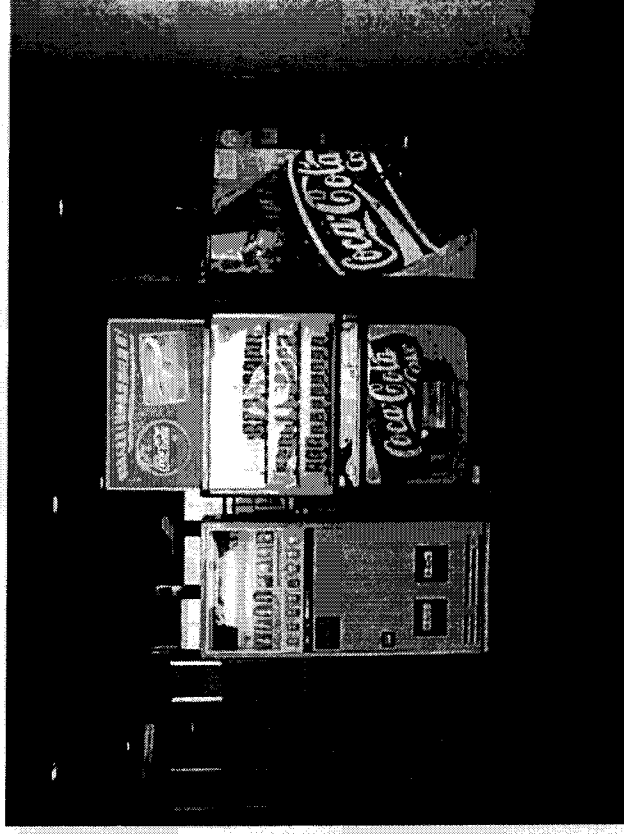- Retail outlets
- Autopay

Expanding Applications

- ◆ Vending
- ◆ Telephones
- ◆ Fast Food
- ◆ Retail
- ◆ Parking
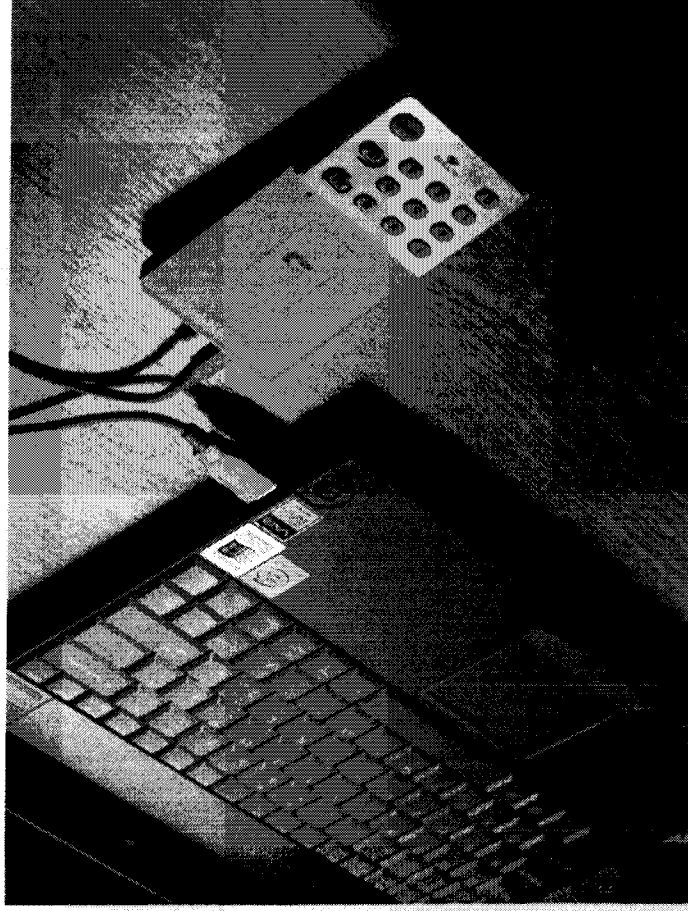 - • Off Street
  - • On Street
- ◆ Access Control

Vending

- ◆ Vending - Swire Coca Cola/Vitasoy
- ◆ Newspaper
- ◆ Photos

Internet

- USB – Low cost reader
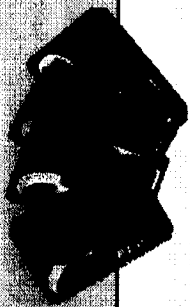- Secure – add value
- Secure – anonymous micropayments

Access Control

- Access premises
  - MTR Office implemented
 - First residential building – Tierra Verde launched in July 2000
- Access networks

Reasons For Creative Star Pursuing Non Core Business

◆ Encourage further use of Octopus for transport payments by even greater penetration and propensity to use.

◆ Business Growth

- Attractive transaction fees with low marginal costs

- Greater card base, more valuable for co-branded credit/Octopus cards

- Increase in float probable

Extension of Octopus as a Marketing Tool
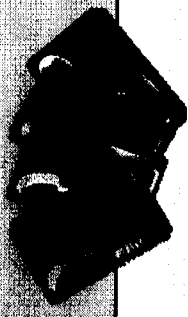
◆ <u>Marketing Initiatives</u>

- LRT & MTR loyalty schemes
- Through fares without penalty
  - KCR bus to KCR train
  - MTR underground to MTR Airport Express
- Segmented Markets
  - 60% discount for Airport Workers on Airport Express

Marketing
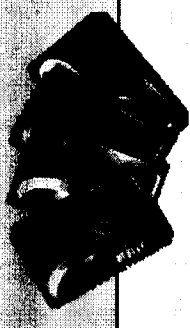
- ◆ Loyalty Schemes

- ◆ Discounting fares

- ◆ Intermodal Discounts

- ◆ Lucky Numbers

Reasons For Octopus Success

◆ "Killer" application – critical mass

◆ Collaborative Operators

◆ Technology minded public familiar with SV

◆ Expertise – Project Management/Contractors/Suppliers

◆ Expansion –developing product

THE WALL STREET JOURNAL.

THURSDAY, FEBRUARY 19, 2004 B3

TECHNOLOGY JOURNAL.

Hong Kong's Electronic-Money Card Is a Hit
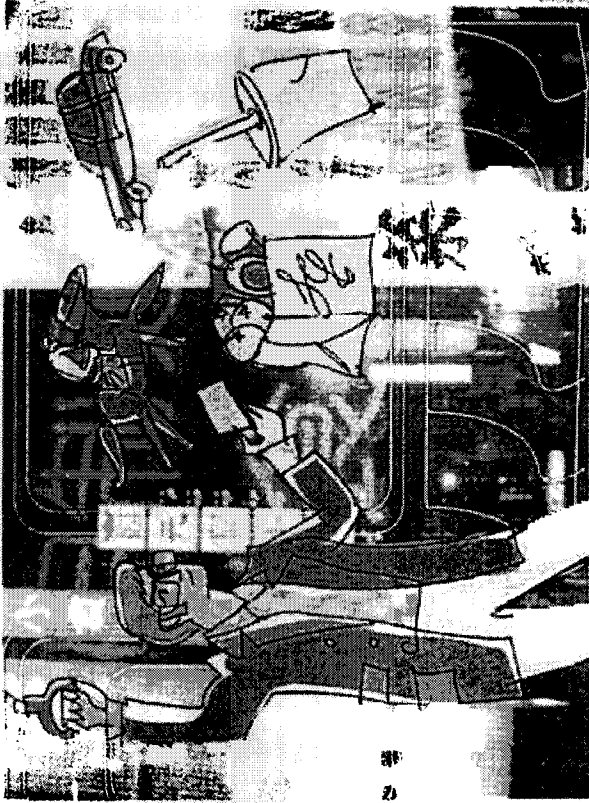
By Evan Ramstad

Hong Kong

WHEN THIS CITY of nearly seven million began offering a way to pay for subway, ferry and bus fares electronically six years ago, it hoped its residents would quickly catch on.

Instead, the payment method, known as the Octopus card, has done more than just replace pocket change on the bus. It has become a widely accepted electronic currency, used to buy a newspaper at 7-Eleven, a meal at a fast-food restaurant, even coffee at Starbucks. In all, more than 12,000 locations across Hong Kong accept the card, including parking meters, municipal swimming pools and the popular horse-racing tracks.

It also has made the chief developer, subway operator MTR Corp., an unlikely consultant on electronic money to cities around the world. And while banks and credit-card companies have for years hyped a coming cashless society, Hong Kong's mass-transit operators appear to have an early edge, though no one thinks cash will disappear soon.

About 1% to 2% of all cash transactions in the city are made with the card, says Octopus Card Ltd., a joint venture of the transit agencies that operates the card. "Our business assumption is we're going to compete with cash," says Eric Tai, the venture's chief executive.

Octopus is a stored-value card and behaves like a debit card. Money is sub-tracted when the card is held over a reading device, which is a low-range radio transmitter that can be incorporated into doors, turnstiles and countertops. Because reading devices can detect a card through leather and plastic, many people never remove their card but rather wave their purse or wallet over the reader. There is even a $35 Octopus wristwatch, with the card technology built in. Funds can be added to the cards at machines in subway sta-

tions, convenience stores and via an automatic draw from a bank account.

Sometimes called smart cards, these stored-value cards are common in Asian cities, though with varied capabilities. In Seoul, South Korea, subway riders can use stored-value cards or some credit cards. In 2002, Taipei in Taiwan launched Easy Card for use across transit systems. Singapore's CashCard, developed in 1996, has had the most success in moving beyond mass transit, and is accepted at

10,000 locations. But none have become as widely accepted as Octopus, or been able to match it as a standard suitable for being rolled out elsewhere.

In Hong Kong, Octopus emerged when MTR in the mid-1990s determined it was spending too much on magnetic-strip tickets, similar to those used in New York City and Washington, D.C. As the company studied the cost of implementing an all-electronic fare system, some managers suggested lowering the burden by sharing it with the city's major bus and ferry companies. (In Hong Kong, mass-transit operators are private companies that compete for routes.)

"Some people said all we were going to do is give away market share" to other operators, says Phil Gaffney, MTR's chief operating officer. "But the view that prevailed was that we as a public-transport operator would benefit if there were an increase in public-transport trips overall."

MTR took a 57% stake in the Octopus Cards joint venture while other mass-transit firms split the rest. Octopus takes a small percentage of each transaction, just like a credit-card company does. The closely held company had revenue last year of around $21 million.

Meanwhile, MTR began to receive requests from other cities that wanted to emulate Hong Kong's success in getting citizens to adopt Octopus. Last fall, top executives met with the Port Authority of New York and New Jersey on that agency's ideas for a system that would serve the transit systems around New York.

Illustrations by Elwood Smith