The Technology Is Ready

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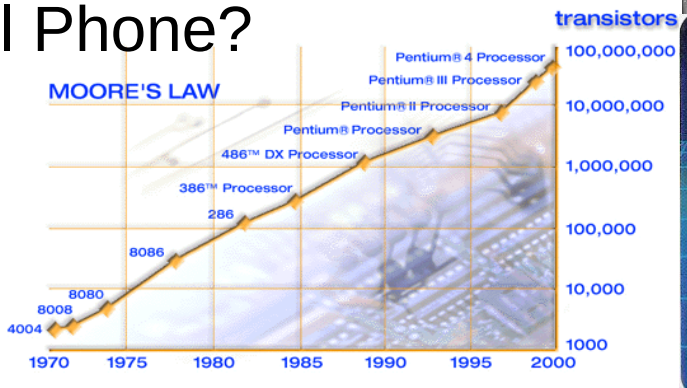
Why are you Here

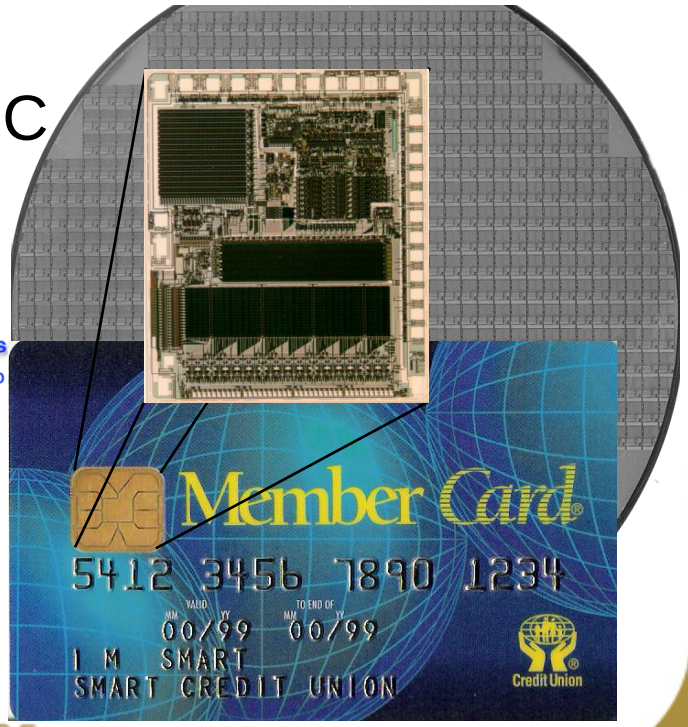
- The globe is in migration to EMV
- June 2003: Visa Canada announced its plans to migrate to chip
- January 8, CTV W-5 documented the reality of debit card fraud
- October 2005: Interac issued schedule for chip
- American Express, MasterCard and JCB are ready to support the Canadian migration to chip

The Time Has Come

What is a Chip Card?

- A plastic credit card with an embedded computer chip containing a microcomputer
  - –1976 a calculator in your card
  - –Today the power of 1981 IBM PC
  - –Tomorrow integrated with your body, PDA and Cell Phone?





History of Chip Cards a.k.a the Smart Card

- **1968** German Inventors, Jurgen Dethloff & Helmet Grotrupp German patent use of plastic as a carrier for Microchips
- 1970 Japanese Inventor, Kunitake Arimura applied for similar patent
- 1974 French Inventor, Roland Moreno patented the Smart Card
- **1978** Honeywell Bull proves miniaturization of electronics
- 1993 Work on EMV began
- 1995 MasterCard Buys Mondex

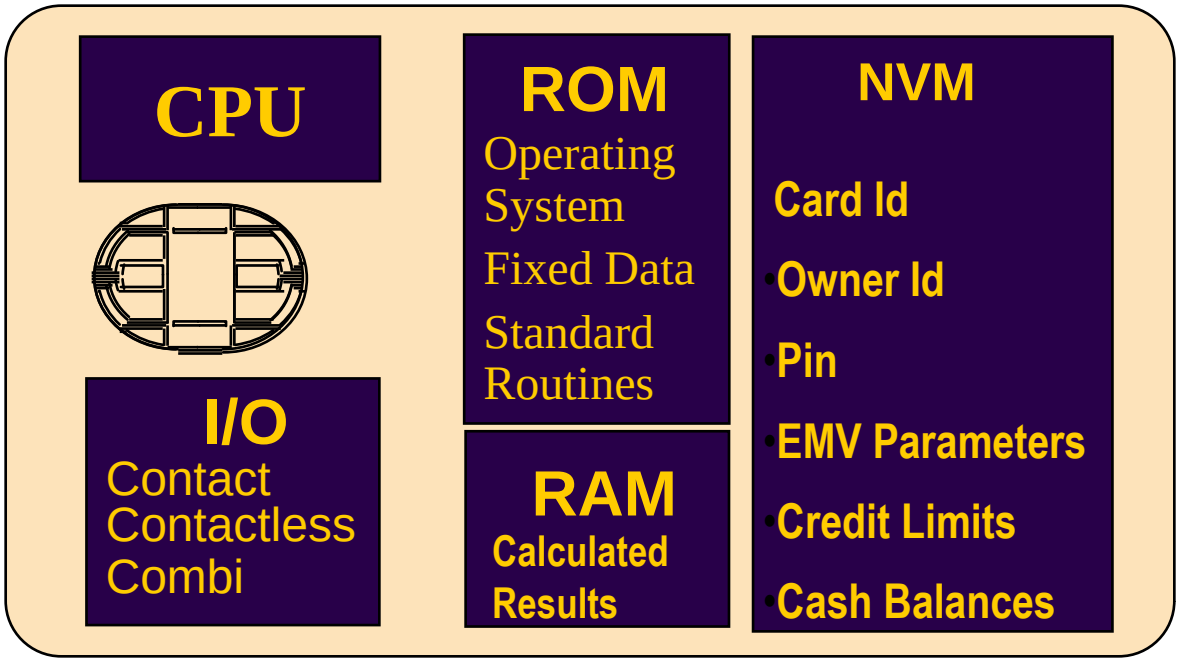
- French Banks Specifications 1977
- Honeywell Bull Produce First Cards 1978
- Payphone Cards 1983
- French Banking Pilot Begins 1**984**
- Used in TV 1990
- ETSI GSM SIM 1991
- First ePurse in Bulle, Switzerland 1992
- German Health Card 1993
- First Combi Card 1997
- Mondex in Canada **1998**

1984-1992

- France Banks elect to implement smart cards
- Carte Bancaire develop chip application - B0’
- Merchants receive government incentives
- Cardholders use PIN for both credit and debit
- Domestic fraud down to 0.02%

The World Watched

Application Requirements
Define the cost of the chip : $1 - $5 USD



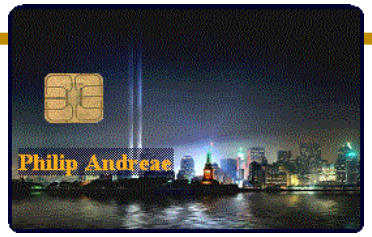
CPU- Central Processing Unit
I/O – Input Output

RAM - Read Access Memory
ROM - Read Only Memory
NVM - Non-Volatile Memory

Which Chip Card or What Form Factor?

- They Vary In Capabilities:
  - Simple memory cards
  - Secured memory cards
  - ***Processor chips with static data authentication***
  - Crypto chips with dynamic data authentication
- Terminal Interface can be:
  - ***Contact***
  - Contactless
  - USB Too
  - ***Dip and Go***
  - Tap and Go
  - Plug & Play
- Common Configurations:
  - Magnetic stripe only (Today)
  - RFID – Tags and Fobs
  - Contactless – Paypass, access and transit applications
  - ***Hybrid EMV – Magnetic Stripe with chip***
  - Dual chip – Same card, 2 chips, 1 contact - 1 contactless
  - Combi – Contact – Contactless interface connected to one Chip

Smart Cards Support Many Things



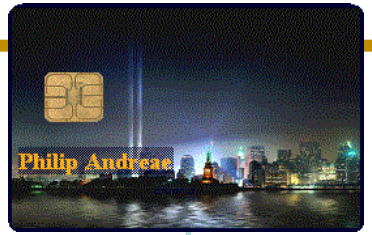
PSE – Payment Systems Environment

IATA – International Air Transport Associations

PSE	IATA	Subscriber	Loyalty	ID	Health	Profile
Credit	Ticket	Calling Card	Points	Passport	Pharmacology	Access/Rights
Debit	Itinerary	Parking Cards	Rewards	Drivers License	Emergency Data:	Home Address
Stored Value	Boarding Pass	Transit Card	Coupons	Corporate ID	Blood type, Donor	vCard
Home Banking	Frequent Flyer	Fitness Club	Discounts	National ID	Status, Allergies	Passwords
Payment Guarante	VIP – Security	Library Card	Punch Card	Photo	Physician's Details	Credentials
				Biometrics	Health Insurance	Car Key

Key uses: Security, Authentication, Identification, Purse and Data Storage

Public Transport Is Going Contactless



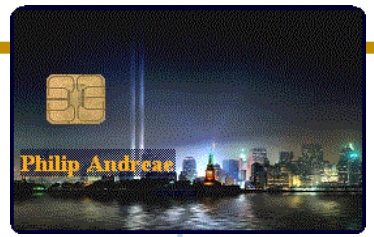
Profile

Senior Citizen Card
Monthly Pass
Parking Reservation
E-Purse

- Octopus, the Hong Kong Transport System, is also now a bank with payments included on the card
- Major cities are implementing contactless fare collection systems – London, Paris, San Francisco, Seattle, Tokyo, Strasburg Washington DC …
- Burlington and Gatineau have systems in operation
- Montreal, Vancouver, Edmonton, Calgary … are in progress
- Most systems include an e-purse other merchants could accept

ePurse is the focus…..

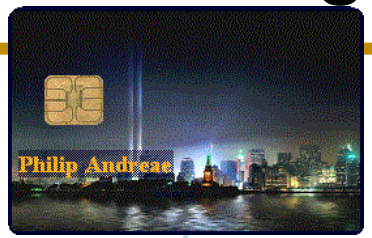
Governments Are Pursuing Smart Cards



Passport
Drivers License
SIN
Gov. Entitlements
Identity Card

- Identity theft is a global concern seeking a secure means of identification
- Digital identity, drivers license, benefits and health cards are seen as likely applications
- The U.S. Department of Defence issued millions of cards
- A digital ID is being sought yet privacy is a concern
- Borders are going contactless due to U.S. passport requirements yet interoperability and privacy are a civil libertarian's concern
- Integrity in the Payment systems is a national issue

Retailers Are Pursuing Smart Cards

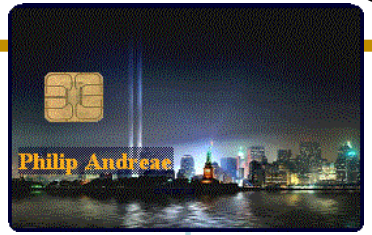


- Boots
- Esso
- Target
- Delhaize
- ASDA
- Marks & Spencer

- The issuing banks expect retailers to investment in PIN pads, EMV terminals and central system upgrades
- Most see large investments with no return on investment
- CRM and data-mining use a central database - barcode
- For loyalty programs, database solutions work
- Mid-tier merchants are being ignored
- Renting space on a Payment card is an option

Yet, partnering with one bank is not a solution

The Banks Are Pursuing Smart Cards



PSE – Payment Systems Environment

- Credit
- Debit
- Stored Value
- Home Banking
- Payment Guarantee

- AMEX, Diners, Interac, JCB MasterCard and Visa support a global migration to EMV
  - Europe implemented a liability shift this year
  - 2006 thru 2010 Asia Pacific, Central Europe, Middle East, Africa, Latin America have liability shifts planned
- Various electronic purse schemes have been tried
  - Mondex
  - Proton (Exact)
  - Visa® Cash
  - Common Electronic Purse Standard CEPS
- MasterCard is focused on contactless – PayPass™

The Smart Card Forms a Relationship

- Portable, anytime - anywhere access mechanism

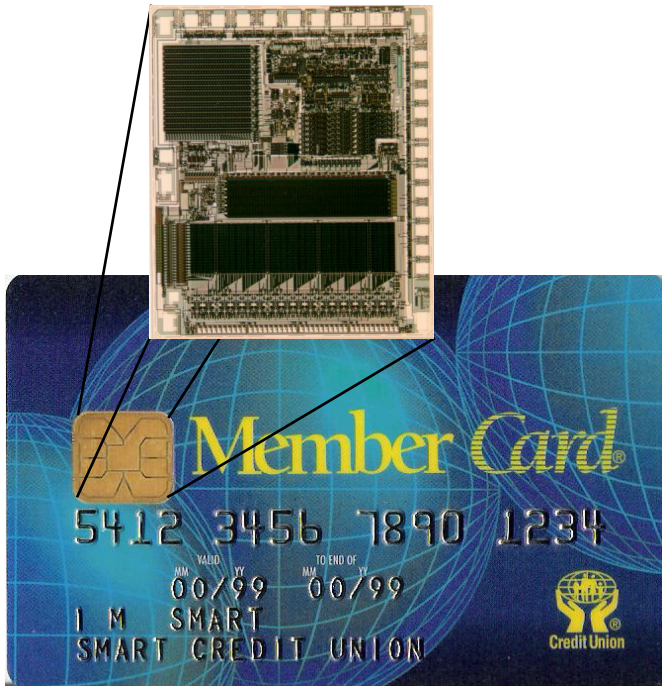
Cardholder

Interface Device IFD

- Secure Identity
- Payment Mechanism
- Access Rights
- Personal Profile
- Internet Access Mechanism

1991 - “ECPS” Identified Smart Cards as the Solution to Payment Card Fraud

- The technology was proven in France
- Debit card and security drove the requirements
- The banks believed in the integrity it would provide
- The technology is secure



A belief in future profit

ECPS = European Council for Payment Systems

Began December 1993

Stable Version Released 1998

The international schemes decided smart cards are the way forward

Europay, MasterCard, Visa International started "EMV Integrated Circuit Card Specifications for Payment Systems"

Fraud Control
Pin On Credit

Cost Reduction
Off-line Authentication

Logic in Chip
Credit Risk Management

Revenue Creation
Value Added Services

The Classic Smart Card Business Case

- Is Based On
  - A CAM to stop counterfeit loses
    Card Authentication Method
  - A CVM to reduce lost and stolen card fraud
    Cardholder Verification Method
  - Offline algorithms to reduce processing cost
  - Support of future value added services

The Specifications are Stable
International Standards Organization and EMV

ISO 7816 - Smart Card

Part 1: Physical characteristics

Part 2: Cards with contacts -- Dimensions and location of the contacts

Part 3: Cards with contacts -- Electrical interface and transmission protocols

Part 4: Organization, security and commands for interchange

. . .

ISO 14443 - Contactless

Part 1: Physical characteristics

Part 2: Radio frequency power and signal interface

Part 3: Initialization and anti-collision

Part 4: Transmission protocol

. . .

EMV Version 4.1 May 2004

Book 1 - Application independent ICC to terminal interface requirements

Book 2 - Security and key management

Book 3 - Application specification

Book 4 - Cardholder, attendant, and acquirer interface requirements

Interoperability: The Goal

EMVco Certification: The Method

EMV Defines Application Selection

The key to merging all payment products onto one card

1. – MasterCard®
2. – *Member Card®*

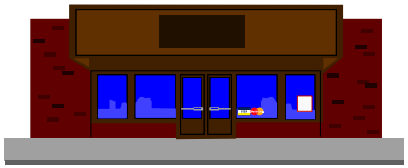
Enter 1 or 2 to select payment Method
?

Consumer Selection

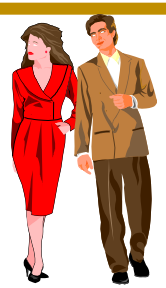
PSE – Payment Systems Environment
AID – Application Identifier

Payments: A Four Party Model

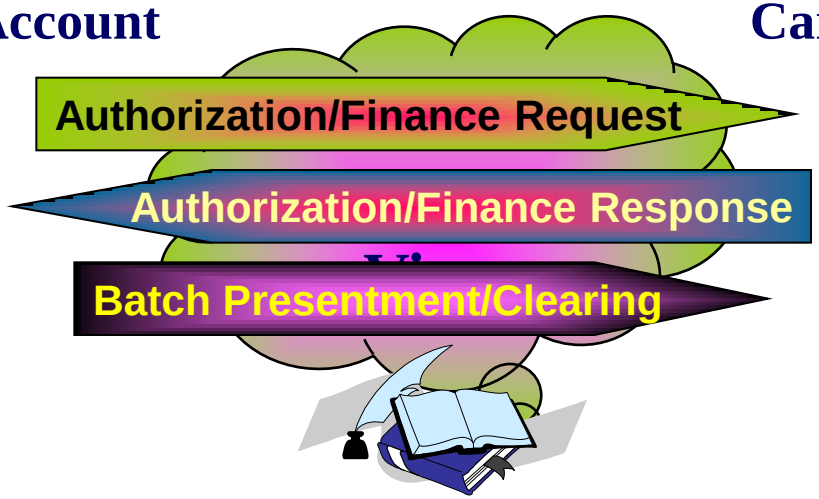
Retailer - Acquirer ⇔ Issuer - Cardholder

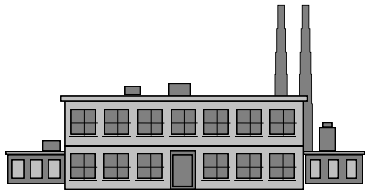


Merchant
Commercial Account

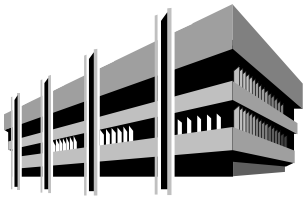


Cardholder - Member





Acquirer



Issuing FIs

Payment
Scheme

Payments a Process with Purpose
Yet No Longer Secure

Card Security Features

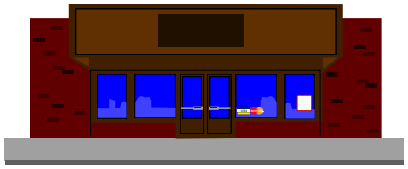
Hologram

Authentication

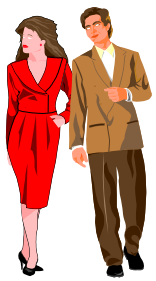
Magnetic Stripe

Online Authentication (cvv/cvc)

What You Have



Manual



PIN

Verification

Signature

What You Know

Floor Limit

Credit Limit

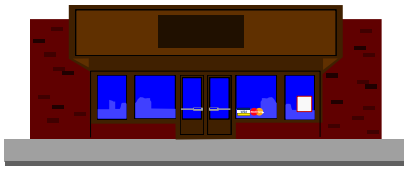
Approval

Available Balance

EMV: A Secure Physical Token

At Every Point of Interaction

Unique Serial Number and Certificates
Valid Scheme ➔ Issuer ➔ Card



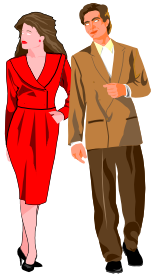
Authentication

Offline Authentication with Online Optional

What You Have

Verification

PIN Verified in Chip



What You Know

Credit Limit

Terminal Risk Management

By Issuer

Approval

At POI

Available Balance

Card Risk Management

Chip Changes the Fabric

The card is no longer a passive component

Card Production and Personalization

Security Features
Encode Mag. Stripe

Embed Chip
EMV and Card Keys

PIN Management

Pin Offset
or Host-Based

Consumer Choice:
A Need for PIN
Synchronization

Finance and Fraud Management

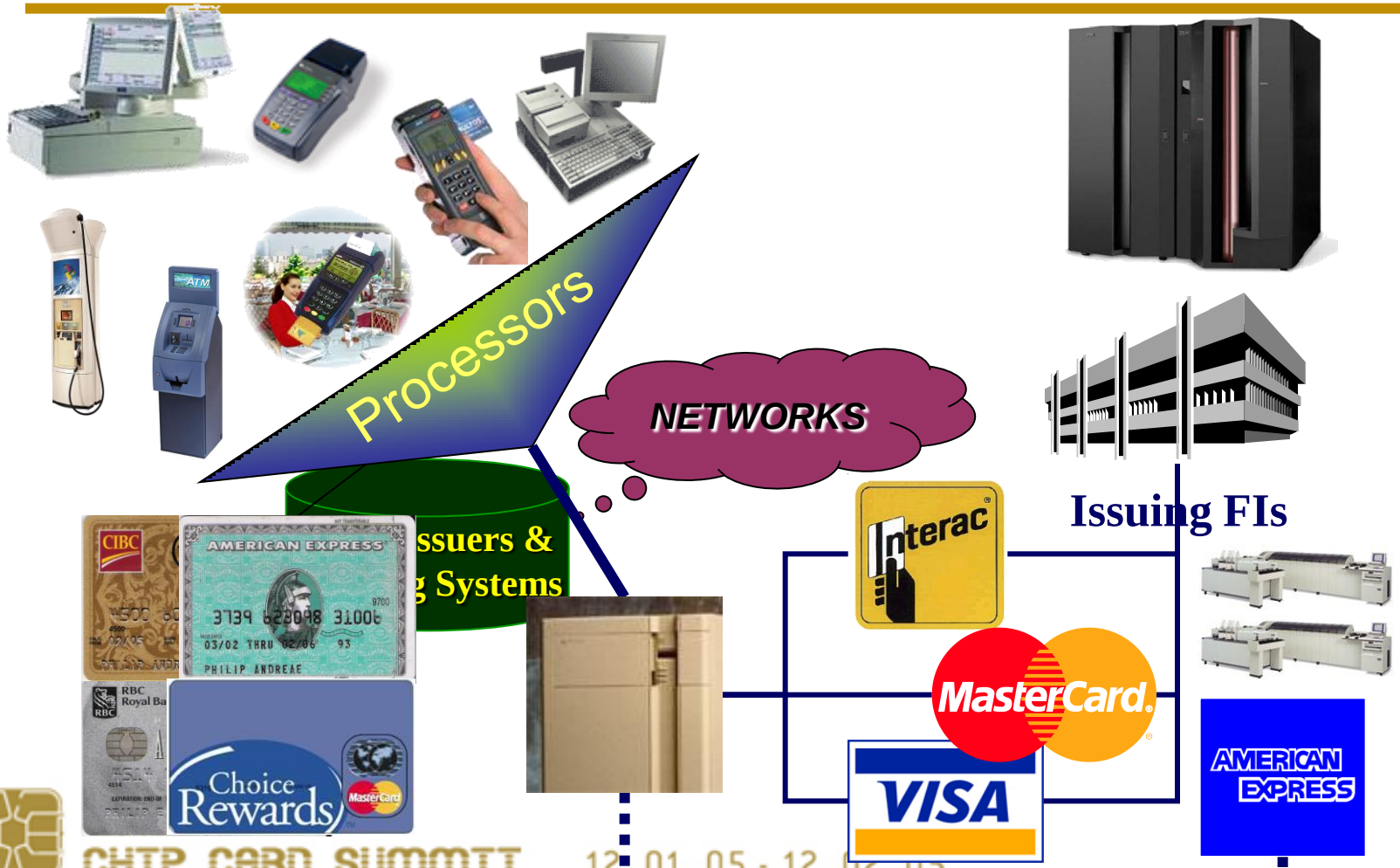
Online
Authorization

Chip Can Actively
Engage at POI

Issuer Can
Update the Card Dynamically

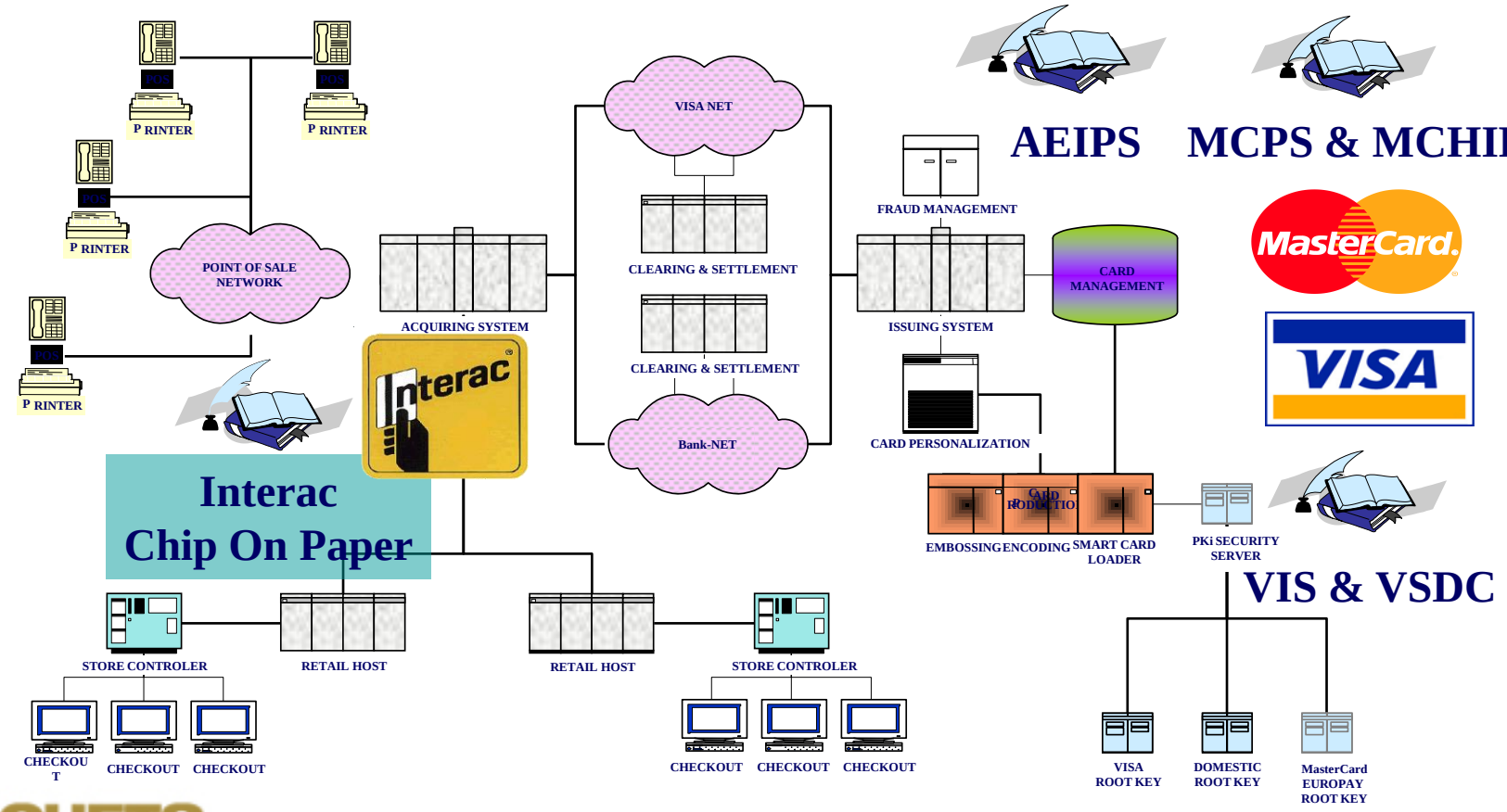
The Chip Card is the Easy Part

All your strategic systems are affected



International Specifications are Available

Issued by Each Association



Benefits of EMV to Issuers

- Global interoperability
- More secure payment card
- Reduced fraud; therefore, less exceptions
- Efficiency in servicing low value transactions
- Ability to support credit and debit on a card
- Reduced costs through offline transactions
- New revenue opportunities

Benefits of EMV to the Acquirers

- Irrefutability of payment transaction
- Reduced cost of handling chargebacks
- Low value transactions
  - Drives transaction growth
- New revenue opportunities
    - Rewards
    - Consumer profile
    - Loyalty
    - Other value-added services

Benefits of EMV to Merchants

- Guarantees payment to merchants
- Enhance efficiencies:
  - Speed and ease of use at the point-of-sale
  - Reduction in need to keep paper receipts
  - Improve dispute procedures and resolution
  - Reduce fraud

Benefits of EMV to Merchants

- Enhance the e-commerce environment
- Platform for more robust loyalty programs
- Opportunity to employ electronic payments at unattended locations and high-risk outlets

Canada Will Invest $1 Billion+

White Label ATM
$ 2,000 Per ATM
x 25,000 devices
$ 50M

Bank Machines
$ 2,000 x 28,000
$56 M

100% Terminal Replacement

Integrated Merchants
$ 2 Million Per Major x 50
+ 250 Per PIN Pad
x 300,000 Devices
$ 175M

Petroleum
$6,000 Per Dispenser

Processors
$ 2 Million x 15
$ 30M

Processors

Acquiring FI Processor

EMV demands significant change to the 8583 message

Payment Networks

Local Networks

Issuer

Issuers
$ 15 Million x 5 Banks
$ 7 Million X 10 Banks
+ $2 per Card x 75M
$ 295 M

Acquiring Processors
$ 5 Million Each
x 6 Processors
$ 30M

Merchants
$ 300 Per POS
x 500,000 devices
$ 150M

Everyone's Legacy Systems Must Be Upgraded

CUETS CHIP CARD SUMMIT 12. 01. 05 - 12. 02. 05

Estimates are by PA&A for Canadian Payment Migration

Key EMV Migration Issues

- PIN Verification in chip and consumer select
- The EMV message structure expands
- Online CAM added to authorization process
- Point-of-interaction must be EMV and PCI PED compliant
- Introduction of cryptography everywhere

Business Process Implications

- Impact on product design
- Consumer PIN select
- Inclusion of chip in card design
- Card production and issuance
- Call centre screens and work flow
- Reduction in exception items
- Consumer education
- Merchant acceptance procedures
- Merchant and consumer contracts
- Branch processes and procedures

PIN Management

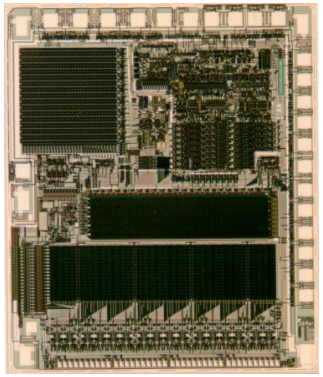
- Both credit and debit cards will employ PIN as the preferred means of cardholder verification
- The requirement: Let the consumer select their PIN
  - Yet, the PIN on chip and the magnetic stripe PIN are technically different
  - The two PINs must be synchronized and changed together at a secure point-of-interaction i.e. branch terminal or ATM
- Those without national infrastructure must consider their strategy carefully

Merchant Migration
is the Biggest Issue

- Acquirer-Owned Equipment
  - Typically written off
  - Most equipment has several good years of life left in it
- Integrated Merchants
  - Can identify saving as a result of EMV introduction
  - Will plan as part of normal point-of-sale upgrade
  - Have leverage to negotiate with acquirers
- **Small Integrated Merchant**
  - Very little leverage
  - Typically own their own payment terminals
  - Must upgrade point-of-sale software

Chip Card Manufacturing Process

Developing the mask can take upwards of 20 months



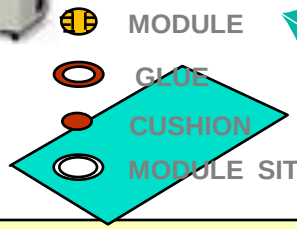
Embossing & Personalization

Module

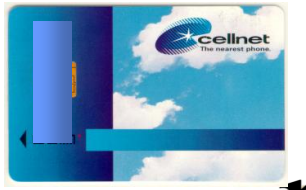
Die bond

Wire bond

Encapsulation



Module Embedding



EMV: Card and Key Management

- EMV introduces cryptography
  - To assure card authenticity
  - To guarantee an irrefutable transaction
- Various methodologies are employed
  - Public Key – between the card and POI
  - Symmetric Key – between card and issuer
- Various algorithms are employed
  - RSA – authenticate scheme, issuer and card
  - 3DES – authenticate card and transaction to issuer and issuer to card

Back Office Debit and Credit Systems

Many systems require upgrade or replacement

- Credit card systems must perform online authentication
- Banking systems must perform online authentication
- Key management becomes a core competency
- Integration with card management processes
- New PIN management techniques required
- Fraud and risk management systems
- Card life cycle must be managed
- Card issuance and replacement

Card Management

- Management of smart cards is complex
  - EMV requires management of the card during its entire life
  - Security must be managed holistically
  - Employing scripts – chip parameters can be updated during the life of the card
  - Future value of smart cards is the ability to support multiple functions within the same card
  - Managing the load or unload of applications enhances consumer proposition and fraud management capabilities

Smart Card More Than a Technology

- The technology has been proven
  - 600+ million EMV cards deployed
- Card schemes are committed
- EMV affects more than the technology
  - also business processes and product design
- Most organizations do not have appropriate depth of knowledge, and skills are in short supply
- Key is the relationship card, and creating sticky relationships for profit

The future is for those that can offer me "My Card"

Thank You