

# **EMV CHIP APPLICATIONS: Catching the Next Wave**

*How to create business opportunities by  
leveraging the chip and PIN infrastructure  
with added value applications*



**Retail Banking Research**

**April 2010**

# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b>	<b>I</b>
<b>TABLE OF FIGURES</b>	<b>5</b>
<b>ACKNOWLEDGEMENTS</b>	<b>7</b>
About the author: Nick Collin	7
About the publisher: Retail Banking Research (RBR)	7
Confidentiality	7
Disclaimer	7
<b>EXECUTIVE SUMMARY</b>	<b>9</b>
EMV Chip: the Basics	9
Leveraging the EMV Chip Infrastructure	9
Realising the Core Benefits of EMV Chip	10
Adding Value with EMV Chip	11
Business Opportunities	15
<b>PART I: ABOUT EMV CHIP</b>	<b>17</b>
<b>1. INTRODUCTION</b>	<b>17</b>
<b>2. TECHNOLOGY DEVELOPMENT</b>	<b>19</b>
Hinzmann's Golden Rules	19
Infrastructures and Applications	21
Standards	23
The Hype Curve	24
Disruptive Technologies	25
<b>3. SMARTCARDS</b>	<b>27</b>
The Basics	27
Standards	28
Smartcard Operating Systems	29
Smartcard Applications	30
Lessons Learned	34
<b>4. CARD PAYMENTS – A BRIEF INTRODUCTION</b>	<b>35</b>
History	35
The Four Party Model	36
Revenues	37
Types of Card	38
The Card Payments Infrastructure	39
<b>5. EMV CHIP</b>	<b>41</b>
A New Card Payments Technology	41
The EMV Standard	43

How it Works	45
<b>6. REALISING THE CORE BENEFITS OF CHIP</b>	<b>49</b>
Key Benefit: More Security	49
Other Benefits of Chip	52
Migrating to Chip	55
<b>PART 2: ADDED VALUE EMV CHIP APPLICATIONS</b>	<b>57</b>
<b>7. ADDING VALUE WITH EMV CHIP</b>	<b>57</b>
Generic Features of EMV Chip	57
Benefits for Banks	59
Summary of Added Value Applications	60
<b>8. MULTI-PAYMENT CARD</b>	<b>63</b>
How It Works	63
Deployment Experience	63
Business Propositions	64
Marketing	65
Conclusions	65
<b>9. REMOTE CHIP AUTHENTICATION (RCA)</b>	<b>67</b>
How It Works	67
RCA Business Propositions	69
Virtual World Fraud	70
RCA as a Virtual World Fraud Solution	73
Deployment Experience	77
Conclusions	80
<b>10. E-PURSE</b>	<b>81</b>
Background and Context	81
Pre-Authorised Payment: How It Works	83
Business Propositions	84
Marketing	87
Technical Implementation	90
Deployment Experience	91
Conclusions	95
<b>11. CONTACTLESS PAYMENT</b>	<b>97</b>
How it Works	97
Business Proposition	99
Benefits	100
Marketing	102
Deployment Experience	102
Conclusions	104

<b>12. DATA STORAGE ON THE CARD</b>	<b>107</b>
Open Data Storage	108
Mass Transit Ticketing	109
Loyalty and Enhanced Payments	113
Personal Data Storage	118
Conclusions	121
<b>13. ENTITLEMENT APPLICATIONS</b>	<b>123</b>
Scenarios	124
How it Works	126
Technical Issues	128
Benefits	130
Deployment Opportunities: the Social Card	131
Conclusions	136
<b>14. MOBILE PAYMENTS</b>	<b>137</b>
Mobile Handset as a Payment Card Replacement	138
Mobile Handset as a PC Replacement	140
P2P Payments Via a Mobile Network	141
Conclusions	142
<b>15. BRINGING IT ALL TOGETHER</b>	<b>145</b>
The Multi-Application, Multi-Partner Community Card	145
Case Study – The Banco Santander Campus Card	146
Opportunities for Banks	148
Opportunity Checklist for Banks	150
Opportunities for Non-Banks	151
Opportunity Checklist for Non-Banks	155
Conclusions	156
<b>APPENDIX 1: CRYPTOGRAPHY – A HIGH LEVEL OVERVIEW</b>	<b>157</b>
Symmetric Cryptography	157
Asymmetric (Public Key) Cryptography	158
<b>APPENDIX 2: ABBREVIATIONS</b>	<b>160</b>
<b>APPENDIX 3: REFERENCES</b>	<b>163</b>

## TABLE OF FIGURES

Figure 1: The Hype Curve	24
Figure 2: Smartcards	27
Figure 3: Four Party Model – Transaction Flows	36
Figure 4: Four Party Model – Revenues	37
Figure 5: Rough Business Models	38
Figure 6: UK Domestic Card Fraud Losses, 2003-2005 (source: UK Payments)	42
Figure 7: Layered Interoperability Architecture	44
Figure 8: EMV Transaction Flow (source: MasterCard)	46
Figure 9: Nordea Credit/Debit Card	63
Figure 10: Cathay United “Combo” Card	64
Figure 11: Example of Remote Chip Authentication Card Reader in Use	67
Figure 12: 3D Secure Logos	70
Figure 13: Card-Not-Present Fraud Losses in the UK (source: UK Payments)	72
Figure 14: MOD Website Access Via RCA	79
Figure 15: Yapi Kredi Card With Visa CodeSure – Reverse View	79
Figure 16: Pre-Authorised Debit Market Segments (source: MasterCard)	87
Figure 17: Capitec Pre-Authorised Debit Card and Reader	91
Figure 18: Contactless Reader and Chip Card (source: MasterCard)	97
Figure 19: Contactless Payment (source: Visa)	98
Figure 20: Cash Payment Frequency by Value, UK, 2005 (source: MasterCard)	100
Figure 21: MODS Architecture. Source: MasterCard, 2003	108
Figure 22: KCG Contactless Card and Bus Validator (source: MasterCard)	111
Figure 23: Card reader with USB connector	119
Figure 24: “OneSmart Web” Pocketserver PC Interface (source: MasterCard)	120
Figure 25: Banka Koper Website Illustrating “OneSmart Web” Product	120
Figure 26: Generic Entitlement Proposition Architecture	126
Figure 27: Summary of EMV Chip Added Value Applications	145
Figure 28: Symmetric Cryptography	157
Figure 29: Asymmetric Cryptography	158
Figure 30: Digital Signing in a Public Key Infrastructure (PKI)	158