

1. Record Nr.	UNINA9910817076003321
Autore	Coskun Vedat
Titolo	Near field communication : from theory to practice // Vedat Coskun, Kerem Ok, and Busra Ozdenizci
Pubbl/distr/stampa	Hoboken, NJ, : Wiley, 2012
ISBN	9786613409782 9781119966906 1119966906 9781283409780 128340978X 9781119965794 1119965799 9781119965787 1119965780
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (391 p.)
Altri autori (Persone)	OkKerem OzdenizciBusra
Disciplina	621.384
Soggetti	Near-field communication Wireless communication systems
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface xv -- Acknowledgments xxiii -- List of Acronyms xxv -- 1 Executive Summary 1 -- 1.1 Towards NFC Era 2 -- 1.1.1 Ubiquitous Computing 2 -- 1.1.2 Mobile Phones 3 -- 1.1.3 Technological Motivation of NFC 4 -- 1.1.4 Wireless Communication, RFID, and NFC 4 -- 1.2 Evolution of NFC 4 -- 1.2.1 Earlier Form of RFID: Barcode Technology 4 -- 1.2.2 RFID Technology 5 -- 1.2.3 Earlier Form of Smart Cards: Magnetic Stripe Cards 6 -- 1.2.4 Smart Card Technology 6 -- 1.2.5 NFC as a New Technology 7 -- 1.3 NFC Essentials 7 -- 1.3.1 Smart NFC Devices 8 -- 1.3.2 Standardization of NFC Enabled Mobile Phones 8 -- 1.3.3 General Architecture of NFC Enabled Mobile Phones 10 -- 1.3.4 Near Field Communication Interface and Protocol (NFCIP) 11 -- 1.4 NFC Operating Modes and Essentials 11 -- 1.4.1 NFC

Operating Modes 11 -- 1.4.2 Reader/Writer Mode Essentials 12 --
 1.4.3 Peer-to-Peer Mode Essentials 13 -- 1.4.4 Card Emulation Mode
 Essentials 13 -- 1.4.5 Case Studies 13 -- 1.5 SE and Its Management
 14 -- 1.5.1 Over-the-Air Technology 15 -- 1.5.2 GlobalPlatform Card
 Specification 15 -- 1.5.3 Trusted Service Manager 16 -- 1.5.4 UICC
 Management Models 16 -- 1.5.5 Multiple SE Environments 16 -- 1.6
 NFC Application Development 17 -- 1.6.1 JSR 257 18 -- 1.6.2 JSR 177
 18 -- 1.7 NFC Security and Privacy 19 -- 1.7.1 Why is Security
 Important? 19 -- 1.7.2 Primary Goals of Security Measures 20 -- 1.7.3
 Vulnerability, Threat, Attack, and Risk 21 -- 1.7.4 Security Tools and
 Mechanisms 21 -- 1.7.5 NFC Security 22 -- 1.7.6 Privacy, Legal, and
 Ethical Aspects 24 -- 1.8 NFC Business Ecosystem 25 -- 1.8.1
 Stakeholders in NFC Ecosystem 27 -- 1.8.2 Understanding NFC
 Business Models 28 -- 1.8.3 Business Model Approaches 30 -- 1.9
 Usability in NFC 30 -- 1.10 Benefits of NFC Applications 31 -- 1.10.1
 Future Scenarios on NFC 32 -- 1.11 NFC Throughout the World 33 --
 1.11.1 NFC Cities 33 -- 1.11.2 NFC Trials and Projects 34 -- 1.12
 Status of Academic Research on NFC Literature 36 -- 1.13 Chapter
 Summary 39 -- References 39.
 2 Towards NFC Era 41 -- 2.1 Ubiquitous Computing and NFC 41 --
 2.1.1 Ubiquitous Computing 41 -- 2.1.2 New Communication Interface
 Alternative for Mobile Phones: NFC Technology 42 -- 2.2 Mobile
 Phones 43 -- 2.2.1 Features of a Mobile Phone 44 -- 2.2.2 Mobile
 Phone Network 45 -- 2.2.3 Mobile Phone Architecture 46 -- 2.3
 Wireless Communication as a Communication Media for NFC
 Technology 47 -- 2.3.1 Wireless, Mobile, and Nomadic Communication
 48 -- 2.3.2 Wireless and Mobile Communication Technologies 48 --
 2.4 RFID Technology 50 -- 2.4.1 Earlier Form of RFID: Barcode
 Technology 51 -- 2.4.2 Barcodes vs. RFID Tags 53 -- 2.4.3 Essentials
 of RFID Technology 53 -- 2.4.4 RFID Tags as Transponders 54 -- 2.4.5
 RFID Readers 55 -- 2.4.6 Frequency Ranges 55 -- 2.4.7 Operating
 Principles of RFID Technology 55 -- 2.4.8 Near Field vs. Far Field
 Transmission 57 -- 2.4.9 Common RFID Applications Throughout the
 World 58 -- 2.5 Smart Card Technology 58 -- 2.5.1 Earlier Form of
 Smart Card: Magnetic Stripe Cards 59 -- 2.5.2 Evolution of Smart Cards
 60 -- 2.5.3 Types of Smart Cards: Capability Based Classification 60 --
 2.5.4 Smart Card Operating System (SCOS) 61 -- 2.5.5 Types of Smart
 Cards: Mechanism Based Classification 63 -- 2.5.6 Smart Card
 Applications 67 -- 2.6 Comparison between RFID Tags and Contactless
 Smart Cards 67 -- 2.7 More on NFC 68 -- 2.7.1 Inherent Security and
 Pairing Capability of NFC 70 -- 2.8 Chapter Summary 70 -- Chapter
 Questions 71 -- References 71 -- 3 NFC Essentials 73 -- 3.1
 Introduction to NFC 73 -- 3.2 Standardization and Development Efforts
 of NFC Enabled Mobile Phones 76 -- 3.2.1 NFC Forum 76 -- 3.2.2
 GlobalPlatform 79 -- 3.2.3 GSM Association (GSMA) 80 -- 3.2.4
 International Organization for Standardization (ISO)/International
 Electrotechnical Commission (IEC) 80 -- 3.2.5 ECMA International 81 --
 3.2.6 ETSI and ETSI Smart Card Platform (ETSI SCP) 81 -- 3.2.7 Java
 Community Process (JCP) 81 -- 3.2.8 Open Mobile Alliance (OMA) 81 --
 3.2.9 3rd Generation Partnership Project (3GPP) 82.
 3.2.10 EMVCo 82 -- 3.3 General Architecture of NFC Enabled Mobile
 Phones 82 -- 3.3.1 Secure Element 83 -- 3.3.2 NFC Interface 86 --
 3.3.3 Interface between SE and NFC Controller 86 -- 3.3.4 Host
 Controller and HCI 89 -- 3.4 Physical Layer of NFC 92 -- 3.4.1 ISO/IEC
 14443 / Proximity Contactless Smart Card Standard 92 -- 3.4.2 Near
 Field Communication Interface and Protocol (NFCIP) 94 -- 3.4.3 Data
 Transmission on RF Layer 96 -- 3.5 Reader/Writer Operating Mode
 Essentials 99 -- 3.5.1 Protocol Stack Architecture of Reader/Writer

Mode 100 -- 3.5.2 NFC Forum Mandated Tag Types 101 -- 3.5.3 NDEF
102 -- 3.6 Peer-to-Peer Operating Mode Essentials 108 -- 3.6.1
Protocol Stack Architecture of Peer-to-Peer Mode 108 -- 3.6.2 LLCP
109 -- 3.7 Card Emulation Operating Mode Essentials 111 -- 3.7.1
Protocol Stack Architecture of Card Emulation Mode 111 -- 3.8 Chapter
Summary 112 -- Chapter Questions 113 -- References 113 -- 4 NFC
Operating Modes 115 -- 4.1 Mobile Interaction Techniques 115 --
4.1.1 NFC Technology Interaction Technique 117 -- 4.2 Classification
of NFC Devices 118 -- 4.2.1 Active vs. Passive Devices 118 -- 4.2.2
Initiator vs. Target Devices 119 -- 4.3 Reader/Writer Mode 119 --
4.3.1 Smart Poster 120 -- 4.3.2 Generic Usage Model 121 -- 4.3.3
Leading Applications 123 -- 4.3.4 Use Cases on Reader/Writer Mode
125 -- 4.3.5 Underlying Application Benefits 127 -- 4.4 Peer-to-Peer
Mode 128 -- 4.4.1 Generic Usage Model 129 -- 4.4.2 Leading
Applications 129 -- 4.4.3 Use Cases on Peer-to-Peer Mode 130 --
4.4.4 Underlying Application Benefits 131 -- 4.5 Card Emulation Mode
131 -- 4.5.1 Generic Usage Model 132 -- 4.5.2 Leading Applications
133 -- 4.5.3 Use Cases on Card Emulation Mode 134 -- 4.5.4
Underlying Application Benefits 135 -- 4.6 Overview on Benefits of
Operating Modes 135 -- 4.7 Case Studies 136 -- 4.7.1 Reader/Writer
Mode Case Study: NFC Shopping 137 -- 4.7.2 Peer-to-Peer Mode Case
Study: NFC Gossiping 141 -- 4.7.3 Card Emulation Mode Case Study:
NFC Ticketing 142 -- 4.8 Chapter Summary 148.
Chapter Questions 148 -- References 148 -- 5 Developing NFC
Applications 151 -- 5.1 Initial Steps in NFC Application Development
151 -- 5.2 Why Java? 152 -- 5.2.1 Why did we Choose Java? 152 --
5.2.2 Why is Java the Favorite? 153 -- 5.3 Setting up the Environment
for Java ME and NFC Programming 155 -- 5.4 Introduction to Mobile
Programing 158 -- 5.4.1 Java ME Building Blocks 160 -- 5.4.2 MIDlets
161 -- 5.4.3 Package javax.microedition.lcdui 164 -- 5.4.4 Creating a
New MIDlet Project 165 -- 5.4.5 Inside a MIDlet Suite (MIDlet
Packaging) 168 -- 5.4.6 A More Detailed User Interface MIDlet 171 --
5.4.7 Push Registry 177 -- 5.5 NFC Application Development 179 --
5.6 Reader/Writer Mode Programing 179 -- 5.6.1 Package javax.
microedition.contactless 181 -- 5.6.2 Package javax.microedition.
contactless.ndef 183 -- 5.6.3 Package javax.microedition.contactless.rf
185 -- 5.6.4 Package javax.microedition.contactless.sc 185 -- 5.6.5 A
Reader/Writer Mode Application 185 -- 5.6.6 NFC Push Registry 199 --
5.7 Peer-to-Peer Mode Programing 200 -- 5.7.1 Package com.nokia.
nfc.p2p 200 -- 5.7.2 Package com.nokia.nfc.llcp 201 -- 5.7.3 A Peer-
to-Peer Mode Application 204 -- 5.8 Card Emulation Mode Programing
211 -- 5.8.1 Accessing Secure Element Using JSR 257 212 -- 5.8.2
Accessing Secure Element Using JSR 177 212 -- 5.9 Reader/Writer
Mode Case Study: NFC Shopping 215 -- 5.10 Peer-to-Peer Mode Case
Study: NFC Gossiping 223 -- 5.11 Chapter Summary 236 -- Chapter
Questions 238 -- References 239 -- 6 NFC Security and Privacy 241 --
6.1 Security in General 241 -- 6.1.1 Why is Security Important? 242 --
6.1.2 Primary Goals of Security Measures 243 -- 6.1.3 Vulnerability,
Threat, Attack, and Risk 248 -- 6.1.4 Principles of Security 253 -- 6.2
Security Tools and Mechanisms 257 -- 6.2.1 Cryptography 257 --
6.2.2 Symmetric Cryptography 258 -- 6.2.3 Asymmetric Cryptography
259 -- 6.2.4 Hashing 261 -- 6.2.5 Message Authentication Code (MAC)
and HMAC 261 -- 6.2.6 Digital Signature and Mobile Signature 261.
6.2.7 Comparing Security Mechanisms 262 -- 6.2.8 Digital Certificates
and Certificate Authority 263 -- 6.2.9 Do Not Keep Cryptographic
Algorithms Secret 263 -- 6.2.10 Key Types: Symmetric Key, Private
Key, Public Key, Master Key, and Session Key 264 -- 6.2.11 Key
Management and its Importance 264 -- 6.2.12 WEP (Wired Equivalent

Privacy) and WPA (Wi-Fi Protected Access) 264 -- 6.2.13 Other Security Components 264 -- 6.3 NFC Security Framework 265 -- 6.3.1 Security Issues on NFC Tag 266 -- 6.3.2 Security Issues on NFC Reader 268 -- 6.3.3 Security Issues on Smart Card 269 -- 6.3.4 Security Issues on Communication 270 -- 6.3.5 Middleware and Backend System Security 272 -- 6.3.6 Standardized NFC Security Protocols 272 -- 6.4 Privacy, Legal, and Ethical Aspects 277 -- 6.4.1 It is a Different World 278 -- 6.4.2 Some Examples on Privacy Issues 279 -- 6.4.3 Summary on Privacy and Countermeasures 280 -- 6.4.4 Some Proposals for Providing Privacy on Tags 280 -- 6.4.5 What to do for Protecting Privacy 281 -- 6.5 Chapter Summary 281 -- Chapter Questions 282 -- References 282 -- 7 NFC Business Ecosystem 283 -- 7.1 Business Ecosystem 283 -- 7.1.1 Generic Features of a Business Ecosystem 285 -- 7.1.2 Business Ecosystem of NFC 286 -- 7.2 Stakeholders in NFC Ecosystem 286 -- 7.2.1 Standardization Bodies and Other Contributors 287 -- 7.2.2 NFC Chip Set Manufacturers and Suppliers 288 -- 7.2.3 Secure Element Manufacturers and Suppliers 288 -- 7.2.4 Mobile Handset Manufacturers and Suppliers 290 -- 7.2.5 Reader Manufacturers and Suppliers 290 -- 7.2.6 Mobile Network Operators 290 -- 7.2.7 Trusted Service Managers 290 -- 7.2.8 Service Providers 292 -- 7.2.9 Merchants/Retailers 293 -- 7.2.10 Customers 293 -- 7.3 Business Models 293 -- 7.3.1 Key Indicators in NFC Business Models 295 -- 7.3.2 Business Model Alternatives 297 -- 7.3.3 General Revenue/Expenditure Flow Model 300 -- 7.4 Case Study: NFC Ticketing 301 -- 7.5 Additional Reading: Pay-Buy-Mobile Project by GSMA 304 -- 7.6 Chapter Summary 308. Chapter Questions 309 -- References 309 -- 8 Secure Element Management 311 -- 8.1 Introduction to OTA Technology 311 -- 8.1.1 OTA Technology and Mobile Device Management 312 -- 8.1.2 OTA Technology and UICC Based SEs 313 -- 8.2 GlobalPlatform Specifications 314 -- 8.2.1 GlobalPlatform Card Specification 314 -- 8.2.2 GlobalPlatform Messaging Specification 316 -- 8.3 Life Cycle Management of SEs 316 -- 8.3.1 TSM in NFC Environment 317 -- 8.3.2 Actors and Their Functional Roles in GlobalPlatform 318 -- 8.3.3 UICC Based SE: Security Domains and Hierarchy 320 -- 8.3.4 UICC Management Models 320 -- 8.4 Multiple SE Environments 325 -- 8.4.1 Architecture without Aggregation 325 -- 8.4.2 Architecture with Aggregation 326 -- 8.5 Alternative TSM Based OTA Management Model 326 -- 8.6 Chapter Summary 328 -- Chapter Questions 329 -- References 329 -- 9 NFC Cities and Trials 331 -- 9.1 NFC Cities 331 -- 9.1.1 City of Oulu 331 -- 9.1.2 City of Nice 337 -- 9.1.3 Smart Urban Spaces 339 -- 9.2 NFC Trials and Projects 341 -- 9.2.1 Contactless Payment Trials 341 -- 9.2.2 Transport and Other Ticketing Trials 345 -- 9.2.3 Other Trials 347 -- 9.3 Chapter Summary 349 -- References 349 -- Index 351.	
--	--

Sommario/riassunto

This book provides the technical essentials, state-of-the-art knowledge, business ecosystem and standards of Near Field Communication (NFC) by NFC Lab / Istanbul research centre which conducts intense research on NFC technology. In this book, the authors present the contemporary research on all aspects of NFC, addressing related security aspects as well as information on various business models. In addition, the book provides comprehensive information a designer needs to design an NFC project, an analyzer needs to analyze requirements of a new NFC based system, and a programmer needs to implement an application. Furthermore, the authors introduce the technical and administrative issues related to NFC technology, standards, and global stakeholders. It also offers comprehensive information as well as use case studies for each NFC operating mode to

give the usage idea behind each operating mode thoroughly. Examples of NFC application development are provided using Java technology, and security considerations are discussed in detail. This book will be an invaluable guide for business and ecosystem analysts, project managers, mobile commerce consultants, system and application developers, mobile developers and practitioners. It will also be of interest to researchers, software engineers, computer scientists, information technology specialists including students and graduates.

Key Features: . Offers a complete understanding of the NFC technology, including standards, technical essentials, operating modes, application development with Java, security and privacy, business ecosystem analysis. Provides analysis, design as well as development guidance for professionals from administrative and technical perspectives. Discusses methods, techniques and modelling support including UML are demonstrated with real cases. Contains case studies such as payment, ticketing, social networking and remote shopping.
