2018
Technical Identification Trainings

Customer Application Support
Business Unit Security & Connectivity
Customer Trainings
Contents

General Information ........................................................................................................................................ 3
Contactless Proximity Reader Training ........................................................................................................ 4
Contactless Proximity Reader Antenna Training ............................................................................................. 5
NFC/ Reader Library Training .......................................................................................................................... 6
RFID technical Training .................................................................................................................................. 7
RFID technical Training .................................................................................................................................. 8
NTAG technical Training .................................................................................................................................. 9
MIFARE module overview ............................................................................................................................... 10
MIFARE module overview ............................................................................................................................... 11
MIFARE Day 1 ................................................................................................................................................ 12
MIFARE Plus EV1 Training .............................................................................................................................. 13
MIFARE DESFire EV2 Training ......................................................................................................................... 14
MIFARE SAM AV2 Training .............................................................................................................................. 15
MIFARE Workshop Package ........................................................................................................................... 16
JCOP for smartcards module overview .......................................................................................................... 17
JCOP for smartcards Introduction ................................................................................................................... 18
JCOP for smartcards Administration ............................................................................................................... 19
JCOP for smartcards Applet Development ..................................................................................................... 20
JCOP for smartcards eGovernment Solutions .................................................................................................. 21
JCOP for smartcards Banking Smart Card Solutions ..................................................................................... 22
General Information

General

Technical Identification Trainings are held in Europe, USA and Asia. All are in English language. We provide a good mixture of theoretical basics and practical exercises for system-design and application engineers in the identification business.

Personal Notebook Computers with administration rights are recommended but not absolutely required.

Please contact the appropriate contact person for seminar fees, payment procedures and location details.

Registration

Registrations can be made online
https://www.nxp.com/support/training-events/nxp-technology-days:NXP-TECH-DAYS

The registration becomes valid after written confirmation by NXP and requires a signed NDA – NON DISCLOSURE AGREEMENT.

Fee & Payment

NXP charges a regionally fee per training day and person. Refreshments, lunch, full documentation and SW / libraries are included.

Please contact the appropriate contact person for seminar fees, payment procedures and location details.

Local Contacts

EUROPE:

CAS training team
NXP Semiconductors Austria GmbH
Mikron-Weg 1, 8101 Gratkorn, Austria
Phone: (+43) 3124 299 277
cas.trainings@nxp.com

USA:

Mr. Mike Zercher
NXP Semiconductors San Jose
411 East Plumeria Drive
CA 95134 San Jose
Phone: (+1) 717 431 9283
mike.zercher@nxp.com

ASIA (Singapore):

Ms. Anne Goh
NXP Semiconductors Singapore
1 Fusionopolis Walk
#12-01/02 South Tower Solaris
Singapore 138628
Phone: (+65) 6434 8688
anne.goh@nxp.com

ASIA (China):

Steven CJ Chang
NXP Semiconductors Shanghai
19F, BM InterContinental Business Center
100 Yu Tong Ro
Shanghai P.R.C.
Phone: (+86) 21 2205 2617
steven.cj.chang@nxp.com
Course ID: I1

Contactless Proximity Reader Training

I1 Contactless Proximity Reader training introduces the principles of NFC, EMVCo and ISO/IEC 14443 reader & antenna design. It introduces the PN7462, the PN5180 and the CLRC663 plus and includes a workshop session on RFID & NFC PCD antenna design and tuning, covering new features like the Dynamic Power Control, to cover e.g. the EMVCo contactless POS design. A basic electrical engineering knowledge is required.

Audience
- Contactless reader designer
- Technical engineers
- Hardware and Software designer

Prerequisites
- Electrical engineering know how
- Laptop with WIN 2000, XP or WIN7 for the workshop session (administration rights required!)

Course Contents

Introduction
Introduction into NFC reader products
Technical overview & comparison CLRC663, PN5180 & PN7462
Introduction into Dynamic Power Control (DPC)

Use of PN5180 evaluation tool (workshop 1)
Installation of NFC Cockpit and drivers
Use of the NFC Reader evaluation board and NFC Cockpit Test & Evaluation of PN5180/PN7462/CLRC663 with contactless cards

NFC Magnetic Antenna Systems
Theory and 13.56MHz communication principle Antenna & transformer principle
Optimum antenna size & metal influence

NFC Antenna Tuning
Standard Antenna Design & Tuning Loading & detuning behavior
DPC Antenna tuning, especially for small antennas
EMC behavior & EMC-related design

Antenna design & tuning (workshop 2)
“Building an antenna”
Antenna coil measurement & tuning
Antenna calibration for DPC

Introduction into EMVCo, ISO/IEC 14443 & NFC
ISO/IEC 14443
NFC-Forum Specifications (analog layer) EMVCo Specification (L1 analog layer)

Duration:
09:00 – 17:00
Course ID: I2

Contactless Proximity Reader Antenna Training

This Training introduces into the practical tests and measurements of 13.56MHz contactless reader antennas. It describes the test methods of the different 13MHz RFID and NFC standards (ISO, EMVCo and NFC) and how to optimize the antenna system. It includes a measurement workshop session, targeting analog ISO and EMVCo POS compliance tests. Basic electro technical knowledge and knowledge about the NFC and reader system (i.e. the contents of I1) is required.

Audience
- Contactless reader designer
- Technical engineers
- Hardware designer

Prerequisites
- Knowledge of the contents of I1
- Electrical engineering (analog) know how
- Laptop with WIN 2000, XP or WIN7 for the workshop session (administration rights required)

Course Contents

**Proximity Antenna analysis & functional tests**
- Power transfer (Field strength)
- Tx Data transmission (Wave shapes)
- Rx Data transmission (Load modulation)
- Pragmatic antenna tests (EMVCo & ISO)
- Test & debugging signals

**Reader Antenna measurements**
- Comparison NFC, EMVCo & ISO/IEC 14443
- Test standards & tools
- Field strength & Pulse shape measurements
- DPC calibration & adjustment
- AWC & ARC handling
- Rx Matrix test and Rx optimization

**Workshop (> 3h) (qualifying an antenna)**
- Antenna Fine tuning & Analog optimization
- PCD shaping control
- Field strength & Pulse shape measurement

**Q&A**

There is also the possibility for participants to bring an own reader antenna for tuning, measurements and further discussions.

Duration:
09:00 – 17:00
L1 NFC/ Reader Library Training introduces the NFC Library for NXP's Contactless Proximity Reader ICs. This training module will show how NFC Library can be used with CLRC663, PN5180 and PN7462. The training consists of two parts, first part is reserved for the theoretical session and second part for hands-on workshop. A basic Software engineering knowledge is required.

**Audience**
- Technical engineers
- Software designer

**Prerequisites**
- Software engineering know how
- Pre-installed and activated latest LPCXpresso version
- Laptop for the hands-on session (administration rights required)

**Course Contents**

**Introduction**
- Introduction
- Introduction to the NFC contactless systems
- Overview of the NFC reader product portfolio

**Introduction to the NFC/ Reader Library**
- NFC Reader Library versions
- Library structure and initialization
- Using the Library (BAL, HAL, PAL, AL, Common layer)

**Introduction into EMVCo**
- EMVCo Specification (digital layer)
- How to tune library to be EMVCo compliant

**Hands on Workshop**
- Setting up the environment
- Use of the SW to evaluate different Contactless cards
- Debug session

**Support Material Documentation**
- NFC Reader Library
- Development Boards and samples

**Duration:**
09:00 – 17:00
RFID technical Training

1st part of the World of RFID Application

Audience
• RFID development engineers,
• Technical oriented managers
• RFID project manager
• RFID antenna designer

Prerequisites
• Basic technical knowledge

Course Contents

Introduction
RFID technology and frequency overview
Product selector NTAG, ICODE, MIFARE, UCODE

Product family
Overview on the UCODE product & delivery types

Application Overview

RFID UHF Technology:

EPC global (UHF)
Overview
Air interface protocol states & anti-collision
Memory structure Commands

Product overview
UCODE 8
UCODE DNA
UCODE 7 family
UCODEG2iL family
UCODE I2C

UHF tag antenna
UHF tag antenna design basics

UCODE PCB antenna
PCB antenna structure
Antenna simulation tool

Assembly guidelines
Tips & hints for using NXP IC’s
Wafer handling

All features will be explained in hands-on session and application demos.

Duration:
09:00 – 17:00
Course ID: R2
RFID technical Training

2nd part of the World of RFID Application

Audience
- RFID development engineers
- Technical oriented managers
- RFID project managers
- RFID antenna designers

Prerequisites
- Basic technical knowledge

Course Contents

Introduction
RFID technology and frequency overview

Product family
Overview on the ICODE product & delivery types

Application Overview

ICODE
- Standard ISO/IEC 15693
- ICODE SLIX2
- ICODE DNA

ICODE ILT
- Standard ISO/IEC18000-3M3 & EPC HF
- ICODE ILT

HF antenna
HF tag antenna design basics
PCB antenna basics
Antenna designs for document tracking and gaming applications

Assembly guidelines
Tips & hints for using NXP IC’s
Wafer handling

All features will be explained in hands-on sessions and application demos

Duration:
09:00 – 17:00
Course ID: N1

NTAG technical Training

1st part of the World of NTAG

Audience
- RFID development engineers
- Technical oriented managers,

Prerequisites
- Basic technical knowledge

Course Contents

Introduction
RFID technology and frequency overview, Product selector NTAG

Product family
Overview on the NTAG product & delivery types

Application Overview

NTAG
Technology introduction
NFC Forum
ISO14443 Standard

Focus products
NTAG 21x
NTAG 21x TT
NTAG 413 DNA
NTAG I2C plus

HF antenna
HF tag antenna design basics
PCB antenna basics
Antenna designs for document tracking and gaming applications

All features will be explained in hands-on session and application demos.

Duration:
09:00 – 17:00
## MIFARE module overview

### M1.1: MIFARE Introduction
(Duration: 1.5 hours)
- Products portfolio and positioning
- Introduction to MIFARE product Applications
- Introduction to RFIDDiscover, SW tool to explore MIFARE

### M1.2: Standards/Specifications
(Duration: 1 hour)
- List of standards/specifications related to MIFARE products and applications
- In depth of ISO/IEC 14443

### M1.3: MIFARE Classic EV1
(Duration: 0.5 hour)
- Features & Functionalities
- UID handling in MIFARE Classic
- Hands-on RFIDDiscover

### M1.4: TAPLINX SDK
(Duration: 1.5 hours)
- Introduction TapLinx SDK
- Developing apps using TapLinx SDK

### M1.5: MIFARE Ultralight
(Duration: 2.5 hours)
- MIFARE Ultralight evolutions (UL C, UL EV1, UL Nano)
- Features & Functionalities
- Design hints for smart paper ticketing with MIFARE Ultralight EV1 & C
- Hands-on RFIDDiscover, UL Nano

### M2: MIFARE Plus EV1
(Duration: 1 day)
- MIFARE Plus EV1 positioning
- Features & Functionalities
- Optimization of security and transaction time using MIFARE Plus
- System design and security using MIFARE Plus
- Differences MIFARE Plus & Plus EV1
- Workshop on solution development

### M3: MIFARE DESFire EV2
(Duration: 1 day)
- MIFARE DESFire positioning
- Features & Functionalities of MIFARE DESFire EV2
- Differences MIFARE DESFire EV1 & EV2
- System design and security using MIFARE DESFire EV2
- Workshop on solution development using MIFARE DESFire EV2
## MIFARE module overview

**M4: MIFARE SAM AV1**  
(Duration: 1 day)

<table>
<thead>
<tr>
<th>Features &amp; Functionalities</th>
<th>Workshop on usage of MIFARE SAM AV2 for MIFARE products</th>
</tr>
</thead>
</table>

- MIFARE SAM AV2 positioning and benefits
- Design hints of using MIFARE SAM
Course ID: M1

MIFARE Day 1

M1.1 MIFARE Introduction / M1.2 MIFARE Standards/Specifications
M1.3 MIFARE Classic EV1 / M1.4 MIFARE SDK / M1.5 MIFARE Ultralight

The M1 MIFARE introduction training introduces the technical basics of the complete MIFARE product family with a focus on MIFARE Ultralight, MIFARE Ultralight C and MIFARE Classic. It introduces the basics of symmetrical crypto and a secure contactless system design. Basic technical knowledge is required.

Audience
- Technical managers
- Sales engineers
- Business Development managers
- MIFARE solution developers

Prerequisites
- Basic technical knowledge of smart card and its applications
- Laptop WIN 2000, XP or WIN7 for the workshop session (administration rights required!)
- Watching the MIFARE Introduction video from www.mifare.net
- Knowledge of basic cryptography e.g. TDES, AES, CMAC, CRC for M1.3 and M1.4

Course Contents

M-1.1 MIFARE Introduction
Introduction
Welcome to MIFARE World
Introduction to MIFARE systems

MIFARE Product Portfolio and positioning
Positioning of all MIFARE products (including MIFARE implementations on SmartMX/SmartMX2)
MIFARE from 3rd party manufactures (Licensees)

MIFARE Applications
Success stories and challenges
MIFARE application architectures and requirements

M-1.2 MIFARE Standards / Specifications
List of Standards / Specifications in this field
In depth of ISO/IEC 14443
Designing an interoperables system
MIFARE certification

M-1.3 MIFARE Classic
MIFARE Classic Functionalities & MIFARE Classic 1k/4k (EV1)
UID Handling
Different UID types (UID, RID, ONUID, FNUID) in MIFARE Classic

Workshop
MIFARE Classic workshop using RFIDDiscover

M-1.4 TAPLINX SDK
Introduction TAPLINX SDK
Developing apps using TAPLINX SDK

M-1.5 MIFARE Ultralight
MIFARE Ultralight Functionalities
MIFARE Ultralight, MIFARE Ultralight EV1, MIFARE Ultralight C, MIFAREUltralight Nano

Workshop
Personalization of MIFARE Ultralight EV1, C and validation

Smart paper ticket design hints
Design hints for coils and applications

Duration:
09:00 – 17:00

This course includes the MIFARE Workshop Package! (Details on page 16)
Course ID: M2

MIFARE Plus EV1 Training

This one day training presents the technical detail of MIFARE Plus EV1 with the hints for optimum usages. It includes practical workshop sessions and application specific hands-on.

Audience
- MIFARE System designer
- MIFARE solution developers

Prerequisites
- Knowledge of M1.1 and M1.2
- Knowledge of basic cryptography e.g. TDES, AES, CMAC, CRC

Recommendations
At least a ‘quick going through’ of MIFARE Plus data sheet

Course Contents

<table>
<thead>
<tr>
<th>MIFARE Plus Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIFARE Plus evolutions and positioning</td>
</tr>
<tr>
<td>MIFARE Plus implementation on SmartMX2 and licensing</td>
</tr>
<tr>
<td>MIFARE Plus and convergence</td>
</tr>
<tr>
<td>MIFARE Plus Support Package and ordering information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software and Hardware Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pegoda (RD710), RFIDDiscover</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overview of new features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison MIFARE puls &amp; MIFARE Plus EV1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIFARE Plus EV1 Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication protocol</td>
</tr>
<tr>
<td>Memory mapping</td>
</tr>
<tr>
<td>Security Level concept</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIFARE Plus EV1 Security Level 0 (SL0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIFARE Plus SL0 functionalities</td>
</tr>
<tr>
<td>Workshop: Pre-personalization at MIFARE Plus SL0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIFARE Plus EV1 Security Level 1 (SL1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility to MIFARE Classic 1K/4K</td>
</tr>
<tr>
<td>Additional security and commands</td>
</tr>
<tr>
<td>Workshop: Switching to MIFARE Plus SL3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIFARE Plus EV1 Security Level 3 (SL3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIFARE Plus EV1 SL3 functionalities</td>
</tr>
<tr>
<td>MIFARE Plus EV1 SL3 secure protocols and options</td>
</tr>
<tr>
<td>Workshop: switching to MIFARE Plus in SL3</td>
</tr>
<tr>
<td>Optimization of security and transaction in SL3</td>
</tr>
<tr>
<td>Example migration (MIFARE Classic to MIFARE Plus EV1 SL3)</td>
</tr>
<tr>
<td>scenario</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Features in MIFARE Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originality check</td>
</tr>
<tr>
<td>Virtual Card Architecture</td>
</tr>
<tr>
<td>Proximity Check</td>
</tr>
<tr>
<td>SL1SL3Mix mode (MIFARE Classic &amp; SL3 on one card)</td>
</tr>
</tbody>
</table>

This course includes the MIFARE Workshop Package! (Details on page 16)

Duration: 09:00 – 17:00
This one day training presents the features of MIFARE DESFire EV1 with the hints for optimum usages. It includes practical workshop sessions and application specific hands-on for solution developers.

Audience
- MIFARE System designers
- MIFARE Solution developers

Prerequisites
- Knowledge of M1.1 and M1.2
- Knowledge of basic cryptography e.g. TDES, AES, CMAC, CRC

Recommendations
At least a quick ‘going through’ of the product data sheet.

Course Contents

Introduction
Welcome and team Introduction
Proximity system architecture
MIFARE DESFire introduction and positioning
MIFARE DESFire Evolution
MIFARE DESFire Implementation and convergence
MIFARE DESFire applications

Software and Hardware Installation
RD710, RFIDDiscover

Overview of new features
Comparison MIFARE DESFire EV1 & EV2

MIFARE DESFire EV2 Architecture
Memory, PICC Level, Configuration,
Keys Application Level, Delegated Application,
Application sharing, KeySettings, Multiple Key Sets
KeySet Rolling, Multiple Access Rights, Different Files.

MIFARE DESFire EV2 Commands
Quick going through all the commands and purposes Use of native and ISO/IEC 7816 modes,
Workshop: Practicing commands

MIFARE DESFire EV2 Cryptography and Secure Messaging
Different crypto options, Authentication, Confidentiality
Transaction MAC
HW and SW security

Workshop
Personalization and validation of Applications using
MIFARE DESFire EV2 (AFC and Access control)
Creation of delegated application
Application sharing Rolling of key set Transaction MAC handling.

MIFARE DESFire EV2 – Additional Security and design hints
Design Considerations for optimum security, transaction time and interoperability
Product Support Package

This course includes the MIFARE Workshop Package! (Details on page 16)

Duration:
09:00 – 17:00
Course ID: M4

MIFARE SAM AV2 Training

This one day training presents the features of MIFARE SAM AV2 with the hints for optimum usages. It includes practical workshop sessions and application specific hands-on for solution developers.

Audience
- MIFARE System designers
- MIFARE Solution developers

Prerequisites
- Knowledge of M2 and/or M3
- Watching MIFARE SAM AV2 Introduction video from www.mifare.net
- Knowledge of basic cryptography e.g. TDES, AES, CMAC, CRC

Recommendations
At least a quick ‘going through’ of the product data sheet.

Course Contents

- **MIFARE SAM Introduction**
  - Welcome and Introduction
  - MIFARE SAM evolutions
  - MIFARE SAM AV2 positioning and feature overview
  - MIFARE SAM AV2 operative modes
  - SAM AV2 communication interfaces (ISO/IEC 7816 and 12C)
  - HW/SW tools installation and introduction
  - Workshop: Switching MIFARE SAM AV2 to AV2 mode

- **MIFARE SAM AV2 Architecture**
  - Features & functionalities, 4-logic channels
  - Secure Key storage, key types and configuration
  - Key usage counters, Key versioning and diversification

- **MIFARE SAM AV2 Host Communication and Personalization**
  - MIFARE SAM AV2 commands
  - Key management, usage of PKI from MIFARE SAM AV2
  - Workshop: Personalization of MIFARE SAM AV2

- **MIFARE SAM AV2 & MIFARE DESFire**
  - Principles of using MIFARE SAM AV2 for MIFARE DESFire
  - Configuration of key entries for MIFARE DESFire
  - Workshop: Personalization and validation of MIFARE DESFire using MIFARE SAM AV2
  - Use of MIFARE SAM AV2 for MIFARE Ultralight C authentication

- **MIFARE SAM AV2 & MIFARE Plus**
  - Principles of using MIFARE SAM AV2 for MIFARE Plus
  - Configuration of key entries for MIFARE Plus
  - Workshop: Personalization and validation of MIFARE Plus using MIFARE SAM AV2

- **X – Functionalities**
  - Design of X – Interface, Advantages of using X – Functionalities
  - Workshop: Use of MIFARE SAM AV2 in X – interface for MIFARE DESFire and MIFARE Plus

Duration:
09:00 – 17:00

This course includes the MIFARE Workshop Package! (Details on page 16)
Content of MIFARE Workshop Package:

**Pegoda Evaluation Kit MF EV710**
- RD710 (Pegoda), NXP's contactless evaluation reader.
- 1 pc MIFARE 4KB
- 1 pc MIFARE Ultralight C
- 1 pc MIFARE Plus S
- CD Technical documentation and software

**Additional ID-1 size sample cards (related to the training module)**
- e.g. MIFARE DESFire EV1 and/or MIFARE SAM AV2

**The evaluation tools and software in CD or USB stick.**

**Documents:**
- Public and confidential datasheets and application notes
- Confidential documents must be requested separately

The participants are required to bring their own laptops with Windows operating system (XP/7/10) and administration right.
# JCOP for smartcards module overview

<table>
<thead>
<tr>
<th>J1: JCOP for smartcards Introduction</th>
<th>Duration: 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products portfolio</td>
<td>Tools</td>
</tr>
<tr>
<td>JCOP specific features</td>
<td>Smart card security</td>
</tr>
<tr>
<td>Roadmap</td>
<td></td>
</tr>
<tr>
<td>Java Card and GlobalPlatform</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J2: JCOP for smartcards Administration</th>
<th>Duration: 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCOP Shell Standalone</td>
<td>OS initialization</td>
</tr>
<tr>
<td>GlobalPlatform</td>
<td>Secure messaging</td>
</tr>
<tr>
<td>Content management</td>
<td>Business models</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J3: JCOP for smartcards Applet Development</th>
<th>Duration: 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCOP Tools</td>
<td>Memory and atomicity</td>
</tr>
<tr>
<td>Applet optimization</td>
<td></td>
</tr>
<tr>
<td>Java Card crypto</td>
<td></td>
</tr>
<tr>
<td>Java Card development</td>
<td></td>
</tr>
<tr>
<td>specific features</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J4: JCOP for smartcards eGovernment Solutions</th>
<th>Duration: 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICAO introduction</td>
<td>Applet personalisation</td>
</tr>
<tr>
<td>JCOP OS initialization</td>
<td>Product portfolio</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J5: JCOP for smartcards Banking Smart Card Solutions</th>
<th>Duration: 1 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMV introduction</td>
<td>Amex, Discover</td>
</tr>
<tr>
<td>NXP's M/Chip management</td>
<td>Product portfolio</td>
</tr>
<tr>
<td>VSDC and PayPass M/Chip</td>
<td></td>
</tr>
</tbody>
</table>
Course ID: J1

**JCOP for smartcards Introduction**

JCOP product introduction includes important concepts about Java Card and GlobalPlatform, as well as basics about card management, applet development, smart card I/O and security. The training concludes with a JCOP Tools introduction.

**Audience**
- Marketing, Managers, Sales

**Prerequisites**
- Smart card basics

**Course Contents**

- **JCOP concepts**
  - Java Card GlobalPlatform
  - JCOP specific features pre-personalization

- **Java Card development**
  - Object oriented programming
  - Java Card applet structure
  - Smart-card communication

- **GlobalPlatform**
  - CardManager, Security Domain
  - Secure channels
  - Content management
  - Life cycles

- **JCOP specific features**
  - Public transport (MIFARE emulations)
  - eGov (SecureBox, BAC/SAC, EAC, ECC, FIPS) mobile (eSE for NFC support)
  - Banking
  - Industry specific extensions
  - Overview on card concepts (system architecture, configuration and use)

- **JCOP security concept**
  - Countermeasures
  - Java Card security concept evaluation

- **JCOP Tools introduction**
  - JCOP Tools for development & administration

**Roadmap**
- JCOP platform
- Standard Java Card Applications

**Duration:**
09:00 - 17:00
### Course ID: J2

**JCOP for smartcards Administration**

This module starts with the introduction and installation of JCShell. The emphasis will be on the open standard GlobalPlatform, covering CardManager functionality, secure messaging, loading & installation of Java Card applets and privileges.

**Audience**
- Developers

**Prerequisites**
- Knowledge of J-1 contents
- Notebook (Windows or Mac or Linux)

**Course Contents**

**JCShell Standalone**
- introduction & installation command set
- plugin architecture scripting

**OS initialization**
- scope and principles APDU interface

**GlobalPlatform**
- smartcard infrastructure card architecture APDU & API interface

**Card and content management**
- CardManager
- secure channel protocols
- life cycle
- loading and installation

**JCOP specific GlobalPlatform features**
- supported options & limitations

**GlobalPlatform advanced**
- Supplementary Security Domain extradition
- Data Authentication Pattern Delegated Management

**Trust provisioning**

**Duration:**
09:00 - 17:00
This module covers Java Card applet development with JCOP Tools. Most of the time is dedicated to practical exercises and discussion of source code. It shows how to make an applet.

**Audience:**
- Developers

**Prerequisites**
- module J-1 (recommended)
- GlobalPlatform basics
- Java programming skills at Intermediate level
- notebook (Windows or Mac or Linux)

**Course Contents**

**JOCP Tools**
- Introduction & installation

**Java Card Introduction**
- package, class, applet development flow
- Java Card specifications

**Java Card essentials**
- applet structure
- APDU processing
- memory handling
- atomicity & transaction mechanism

**Java Card crypto**
- crypto and security package
- on-card key generation

**JCOP specific Java Card features**
- BAC, EAC, SAC support
- MIFARE Classic, Plus & DESFire emulations
- ISO 14443 static and random UID
- EDC protected array industry specific extensions
- supported options & limitations

**Java Card advanced**
- library and Shareable Interface Object
- extended length APDU
- applet security and performance recommendations
- ISO7816 file system
- GlobalPlatform API

**Hands-on session**

**Duration:**
09:00 - 17:00
Module J-4 is dedicated to e-government applications available in NXP portfolio. The training is focused on specific pre-personalization, instantiation and personalization of eGov applet offering.

**Audience:**
- Developers

**Prerequisites**
- module J-1 (required)
- module J-2 (recommended)
- ICAO knowledge (recommended)

**Course Contents**

**Introduction**
- ICAO specification
- Security features
- LDS file structure

**E-government application**
- introduction
- applet presentation

**Preparation**
- JCOP OS initialization privacy
- FIPS
- configuration for ICAO compliance cryptovision ePassletsuite pre-personalization: NXP chipdoc suite
- Match on Card Biometry

**Personalization**
- mutual authentication
- APDU commands
- personalization data
- cryptovision perso tool
- NXP Chipdoc suite tool

**Demonstration**

**Duration:**
09:00 - 17:00
Course ID: J5

JCOP for smartcards Banking Smart Card Solutions

Banking solutions module is dedicated to banking applications available in NXP portfolio with thorough introduction into EMV. The training is focused on specific pre-personalization, instantiation and personalization of banking applet offering.

Audience
• Developers

Prerequisites
• module J-1 (required)
• EMV basics (recommended)

Course Contents

EMV Introduction
card payment ecosystem
EMV specifications

EMV Transaction
functional architecture (contact & contactless)
contact transaction flow
contactless transaction flow (M/Chip & qVSDC)

Banking Applications on card
MasterCard, Visa, American Express and Discover payment systems

JCOP banking solutions
IC & module
JCOP platform
applets

Preparation
JCOP OS initialization with EMV requirements
applet instantiation

Personalization
secure messaging
APDU commands

Demonstration

Duration:
09:00 - 17:00