



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.

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Course ID: 11

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!)

Duration:

09:00 – 17:00

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)

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

Course ID: 13

NFC/ Reader Library Training

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)

Duration:

09:00 – 17:00

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

Course ID: R1

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

- t RFID development engineers
- t Technical oriented managers,

Prerequisites

- t 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

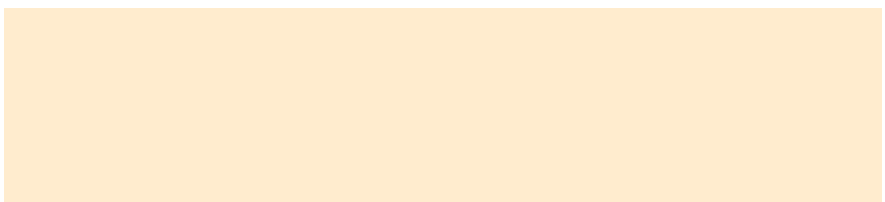
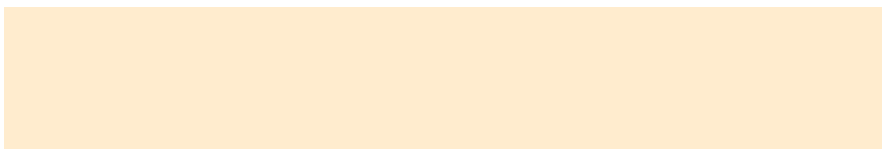
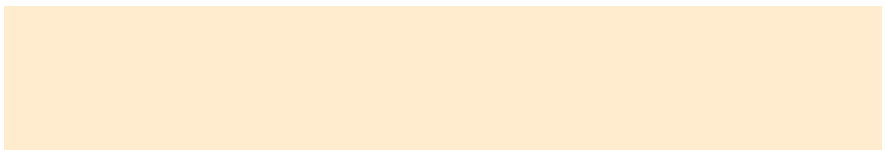
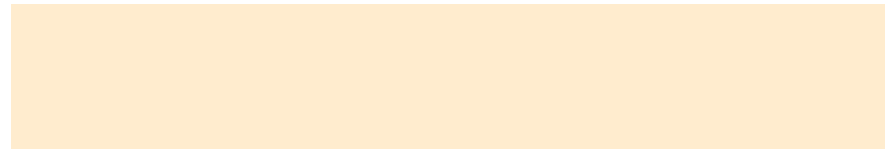
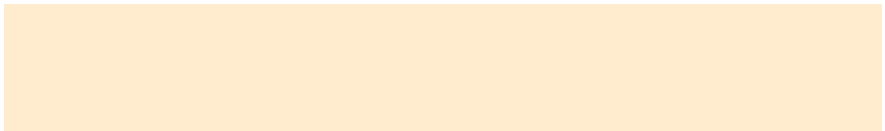
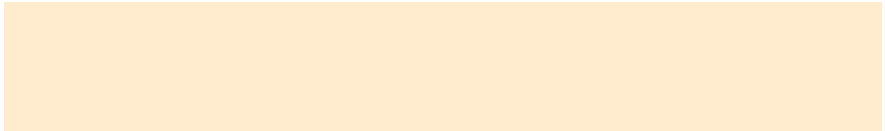
M3: MIFARE DESFire EV2 (Duration: 1 day)

- 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)

- MIFARE SAM AV2 positioning and benefits
 - Features & Functionalities
 - Design hints of using MIFARE SAM
- Workshop on usage of MIFARE SAM AV2 for MIFARE products



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

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

Duration:
09:00 – 17:00

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

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

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

Duration:

09:00 – 17:00

Course Contents

MIFARE Plus Introduction

MIFARE Plus evolutions and positioning
MIFARE Plus implementation on SmartMX2 and licensing
MIFARE Plus and convergence
MIFARE Plus Support Package and ordering information

Software and Hardware Installation

Pegoda (RD710), RFIDDiscover

Overview of new features

Comparison MIFARE Puls & MIFARE Plus EV1

MIFARE Plus EV1 Architecture

Communication protocol
Memory mapping
Security Level concept

MIFARE Plus EV1 Security Level 0 (SL0)

MIFARE Plus SL0 functionalities
Workshop: Pre-personalization at MIFARE Plus SL0

MIFARE Plus EV1 Security Level 1 (SL1)

Compatibility to MIFARE Classic 1K/4K
Additional security and commands
Workshop: Switching to MIFARE Plus SL3

MIFARE Plus EV1 Security Level 3 (SL3)

MIFARE Plus EV1 SL3 functionalities
MIFARE Plus EV1 SL3 secure protocols and options
Workshop: switching to MIFARE Plus in SL3
Optimization of security and transaction in SL3
Example migration (MIFARE Classic to MIFARE Plus EV1 SL3) scenario

Additional Features in MIFARE Plus

Originality check
Virtual Card Architecture
Proximity Check
SL1SL3Mix mode (MIFARE Classic & SL3 on one card)

Course ID: M3

MIFARE DESFire EV2 Training

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.

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

Duration:
09:00 – 17:00

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

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

- t MIFARE System designers
- t MIFARE Solution developers

Prerequisites

- t Knowledge of M2 and/or M3
- t Watching MIFARE SAM AV2 Introduction video from www.mifare.net
- t 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 I2C)
- 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

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

Duration:

09:00 – 17:00

MIFARE Workshop Package



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

J1: JCOP for smartcards Introduction

(Duration: 1 day)

- Products portfolio
- JCOP specific features
- Roadmap
- Java Card and GlobalPlatform
- Tools
- Smart card security

J2: JCOP for smartcards Administration

(Duration: 1 day)

- JCShell Standalone
- GlobalPlatform
- Content management
- OS initialization
- Secure messaging
- Business models

J3: JCOP for smartcards Applet Development

(Duration: 1 day)

- JCOP Tools
- Applet optimization
- Java Card crypto
- Java Card development
- specific features
- Memory and atomicity

J4: JCOP for smartcards eGovernment Solutions

(Duration: 1 day)

- ICAO introduction
- JCOP OS initialization
- Applet personalisation
- Product portfolio

J5: JCOP for smartcards Banking Smart Card Solutions

(Duration: 1 day)

- EMV introduction
- NXP's M/Chip management
- VSDC and PayPass M/Chip
- Amex, Discover
- Product portfolio

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

- Marketin, 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

Course ID: J3

JCOP for smartcards Applet Development

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**JCOP 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

Course ID: J4

JCOP for smartcards eGovernment Solutions

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 perso
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

