Workshop:
NEAR FIELD COMMUNICATION TECHNOLOGY

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Customer Application Support – NFC/RFID Europe
NXP Semiconductors Italia SpA
RF Wireless Forum – Milano - 14 Febbraio, 2008

NXP founded by Philips

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NXP Automotive & Identification

Smart Cards	eGovernment	NFC	Car Access Immobilizer	Tire Pressure Monitoring	RFID
					
Application • **Banking** • **SIM Cards** • **Smart ID (Access, Pay TV)**	Application • **Passports** • **ID cards** • **Health Card**	Application • **Mobile** • **Infrastructure** • **Consumer** • **Computing**	Application • **Immobilizer** • **Keyless entry**	Application • **Tire pressure monitoring**	Application • **Supply chain management** • **Transport** • **Animal ID**
100% sales growth in 2005 and another 100%+ targeted for 2006	**Won 85% of all ePassport projects globally (June 2006)**	**Co-inventor of NFC** **Shaper of new global standard** **Widespread Trials and commercial test WW**	**50% of all new vehicles worldwide use our immobilization technology**	**First to offer a chip solution for tire pressure monitoring systems**	**Developed MIFARE, the leading contactless interface for public transportation** **70% Market Share** **Over 1 Billion card**

NFC TECHNOLOGY

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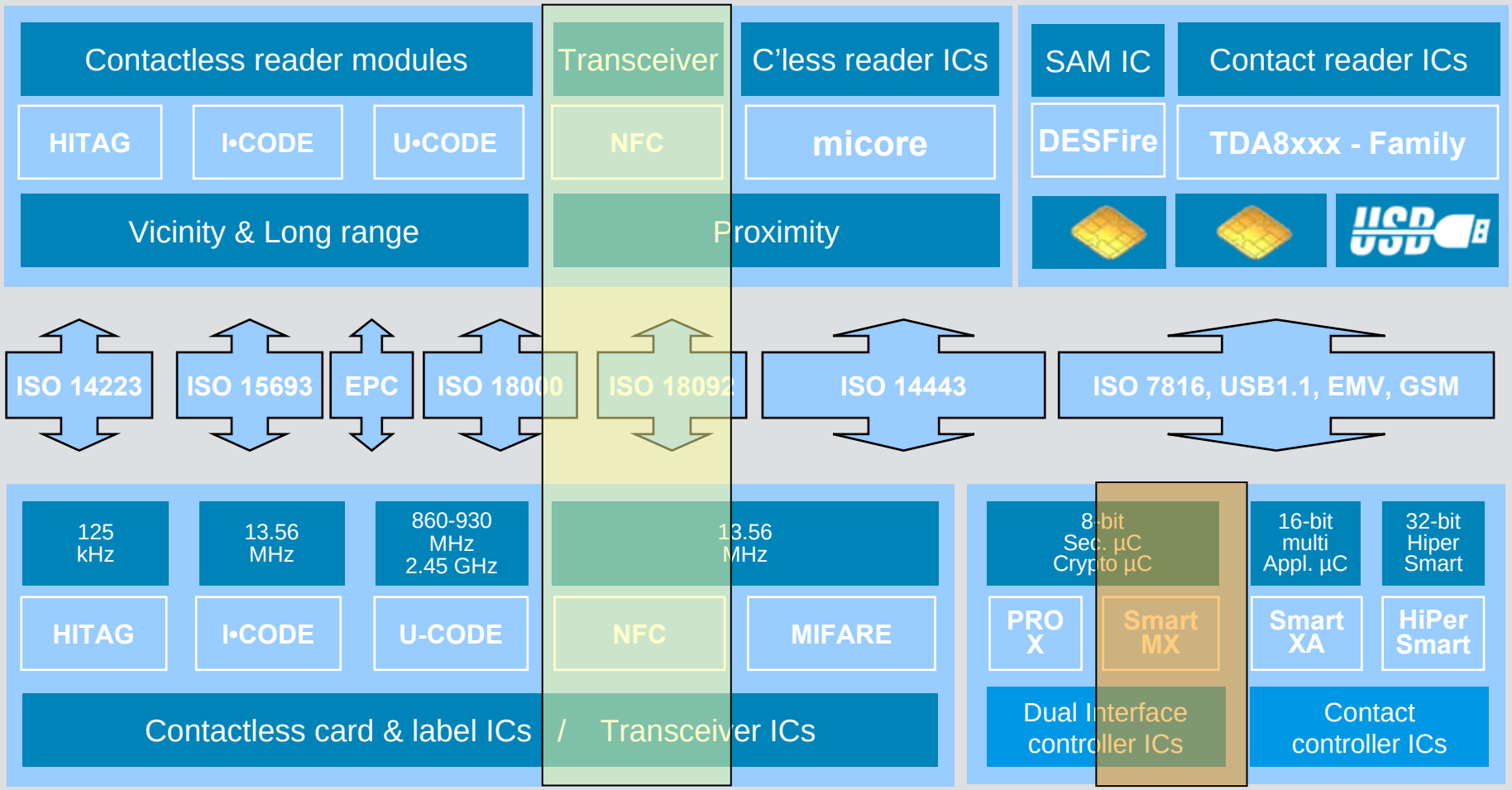
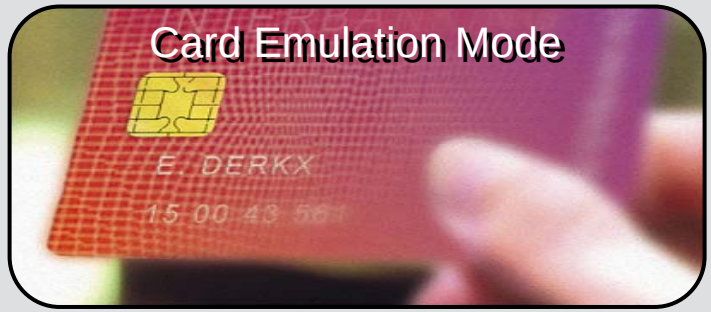
NXP Identification Full portfolio

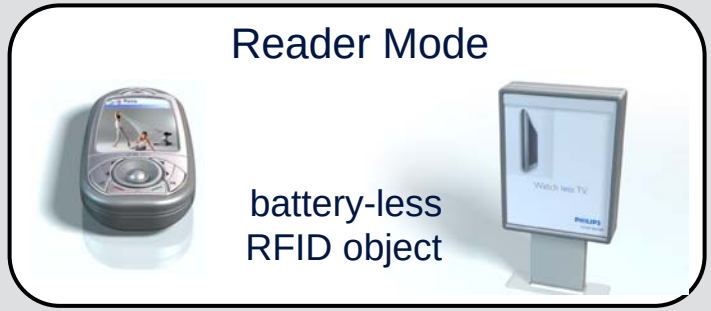


NFC three modes of operation

Secure

In combination with Smart Card Technology



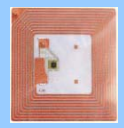


NXP NFC & RF-ID & Smart Card Technology

NFCIP-2

NFCIP-1

Cards, Smart Labels



I•CODE SLI

Ultra Light
Standard 1K/4K
DESFire

PN51x
PN53x

PN544

Type-B PICC

I•CODE

MIFARE

NFC

PN65x

Security

13.56 MHz

Access

Card Interface Mode

Cards

Peer to Peer Mode

RF

ISO 14443-B

ISO 15693

ISO 14443-A

ISO 18092

Contact Smart Card Controller

Smart MX

8-bit
Sec. µC
Crypto µC

ISO 7816, GSM

Reader

Proximity

Vicinity

Proximity

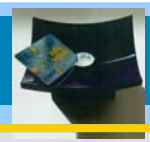
Vicinity

Type-B PCD

I•CODE

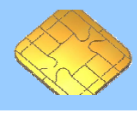
MIFARE

NFC



Contactless reader ICs

PN5xx, PN65x



USB

TDA8xxx - Family

Contact reader ICs

NFC compared with Bluetooth and IrDa

	NFC	NFC Benefits	Bluetooth	IrDa
Network Type	**peer-to-peer**	**Easy set-up, pairing = bringing close**	**Point-to-multipoint**	**peer-to-peer**
Range	**Up to 0.1 m**	**Safe, suitable for crowded areas**	**Up to 10 m**	**Up to 1 m**
Speed	**Up to 424 kbps**	**Lightweight and low overhead**	**721 kbps**	**115 kbps**
Set-up time	**< 0.1 s**	**Fast transactions, e.g. for public transport**	**6 s**	**0.5 s**
Security	**yes, hardware in combination with secure card IC**	**Flexible architectures possible**	**yes, software**	**no, except IRFM**
Communication modes	**active-active active-passive**	**Card-emulation, peer-to-peer, and reader modes**	**active-active**	**active-active**
Infrastructure	**yes, contactless ticketing, e-payment** **Works with MIFARE; Felica**	**Low roll-out costs, compatible with existing infrastructure**	**yes, mobile phones, CE**	**yes, CE &PCs & mobile phones**
Costs	**Low**	**Affordable for most devices**	**Moderate**	**Low**

NFC compared with RFID

	RFID	NFC
Purpose	identify and track objects or goods, by means of storage and retrieval of small amounts of data.	easy-to-use contactless interface for consumer electronics, communication and computing devices.
Operating Distance	many RFID systems operate at 50-100cm and above. RFID can often be read without special positioning of the transponder towards the reader.	NFC technology operates at about 10cm, and therefore the user needs to intentionally, actively hold the NFC device towards the other NFC device or RFID reader.
Operating Modes	an active interrogator (reader/writer) talks to one or more transponders	both NFC terminals are capable of actively initiating communication with their peer.
Processor	transponder has only a read-only or read/write memory, but no microprocessor or calculation unit	NFC-enabled devices are usually smart, e.g. they have a microprocessor on board, and their primary purpose is not just storage and retrieval of small amounts of data.
Security	access to data on the RFID chip works with or without passwords, or with simple encryption.	secure NFC employs smart card technology which uses secure hardware and advanced encryption technology (3DES, PKI,…), able to safeguard, manage, store and provide access to data on the card, perform complex functions such as encryption or protection from hacking.
Standards	Compliant to RFID standards	Compliant to ISO 18092, ISO 21481 and future NFC Forum Specifications

NFC Applications, Market and Demos

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Products tailored to various Market segments

Mobile phones

Computing

Health care

Consumer electronics

Infrastructure

NFC-enabled Products

NOKIA
6131 and 3220

SAMSUNG
D500, Onyx 700 and SPH250

Motorola
SLVR L7 and IA 870

Sony Erricson
HB07 and HB08

Tefefunken

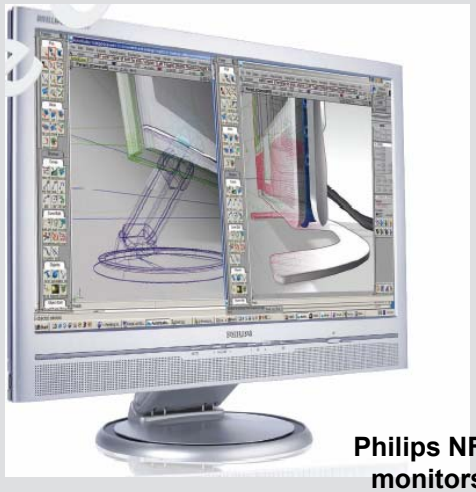
Axia
NFC PDA

Sandisk SmartMX+Memory

WDI SD cards

BENQ
M 700

E21



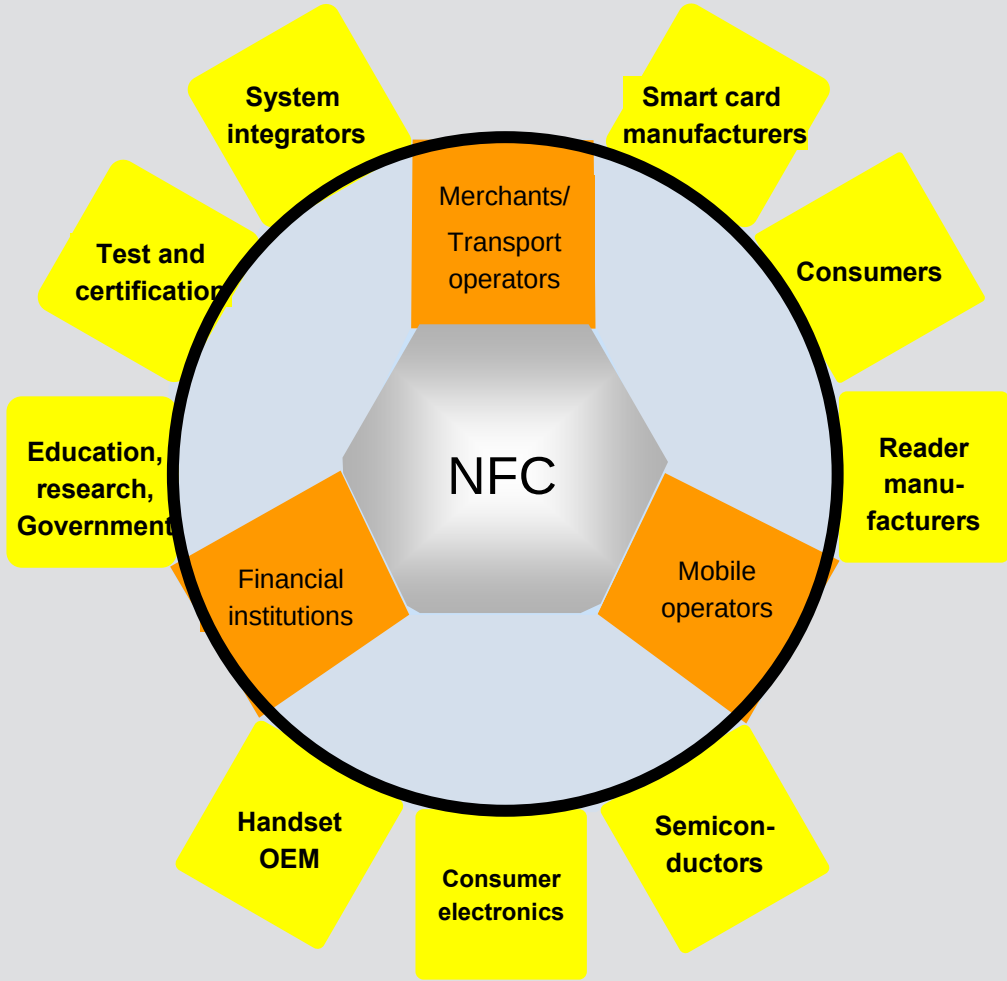
Philips NFC
monitors

Macally
eNetMouse

Windows OS
Palm OS
PHONES
Windows OS
PDAS
NFC
SD CARD

Key players need to align to make NFC happen

- Merchants, banks and mobile operators are the key drivers within the NFC ecosystem
- The impact of the other players on market take-off and success is limited



NFC Products and Development/Supporting Tools

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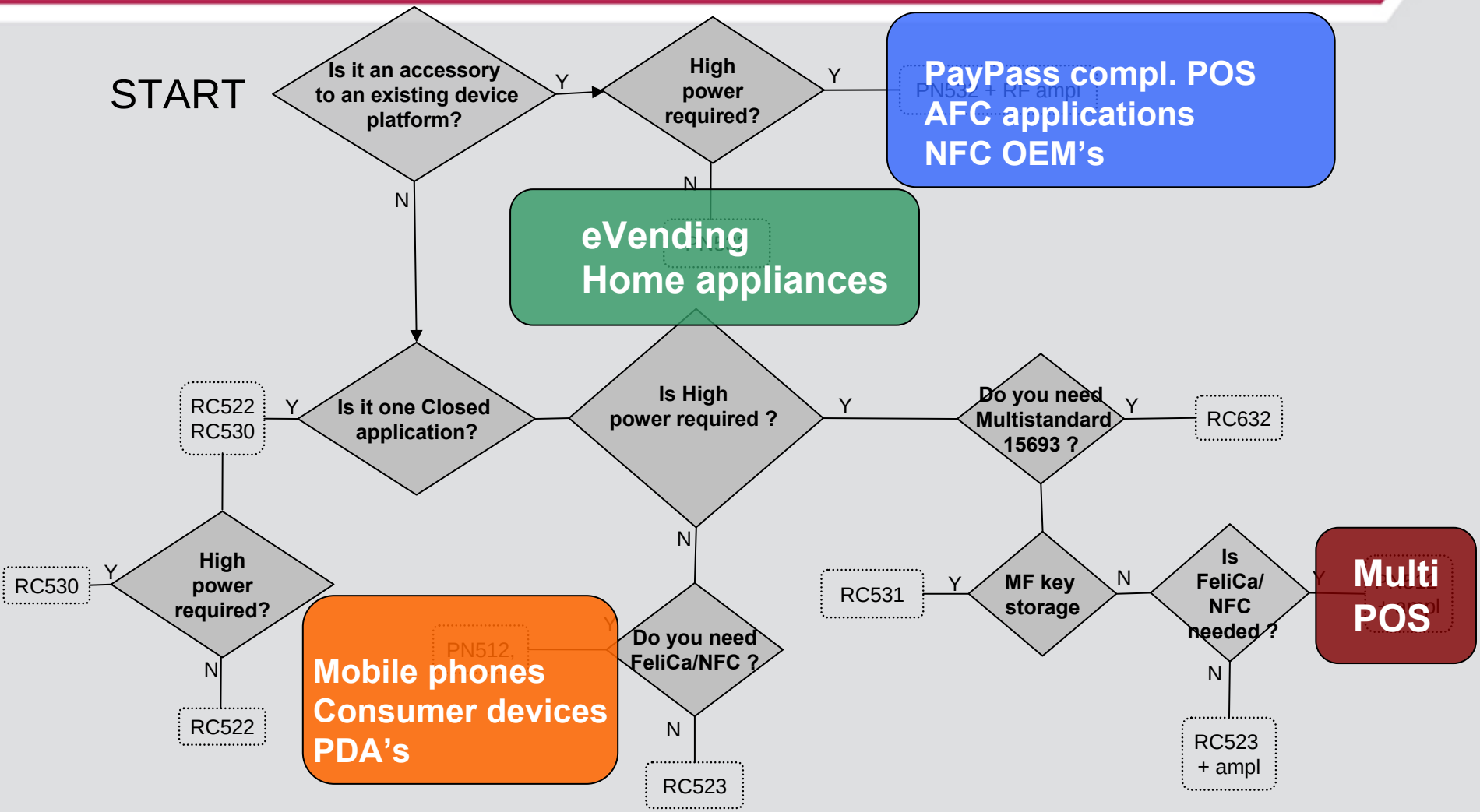
NFC & Reader IC's

	MF RC 500	MF RC 530	MF RC 531	CL RC632	MF RC 522	MF RC 523	PN511	PN512	PN531	PN532	PN533
Operating Distance	up to 10cm										
ISO 14443 A	yes										
ISO 14443 B	-	yes			-	yes	-	yes	-	yes	
ISO 15693	-	yes			-						
RF Interface	Up to 500mW				Up to 250mW						
ISO 18092 (P2P)	-						yes				
MIFARE crypto support	yes										
Higher Data rates	-	yes					Yes (up to 424kbaud)				
Controller implemented	-								yes		
MIFARE key storage	yes				-						
Host interface	8 bit parallel	8 bit parallel, SPI, 3.3 V digital supply			RS232, SPI, I²C, 3.3V digital supply		8 bit parallel, RS232, SPI, I²C		RS232, SPI, I2C, USB	RS232, SPI, I²C	RS232, USB
Housing	Pin compatible, SO 32				Pin compatible , HVQFN32		HVQFN32, HVQFN40, (PN51x pin compatible with MF RC 52x)				
	Terminal				Low Cost		NFC		NFC + uC		

Product selection Decision tree & applications



Complete NFC chipset list

	NFC Transceivers		NFC Controllers		
Product features	**PN511**	**PN512**	**PN531**	**PN532**	**PN533**
Operating distance typ [mm]	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...	Up to 100 depending on mode, coil...
Interfaces					
Serial interface [Mbits/s]	up to 1.228	up to 1.228	up to 1.228	up to 1.228	up to 1.228
I²C interface [bits/s]	400k /3.4 M	400k /3.4 M	400k	400k	-
SPI interface [Mbits/s]	up to 5	up to 5	up to 5	up to 5	-
8 bits parallel interface	yes (with HVQFN40)	yes (with HVQFN40)	-	-	-
USB 2.0 (full speed) interface	no	no	yes	-	yes
CL FIFO depth [bytes]	64	64	64	64	64
Serial/SPI FIFO [bytes]	-	-	180	180	180
S²C interface	yes	yes	yes	yes	yes
CPU	no	no	80C51	80C51	80C51
RAM/ROM [bytes]	-	-	1k / 32k	1k / 40 k	1.2k / 44 k
RF interface					
Carrier Frequency [MHz]	13.56	13.56	13.56	13.56	13.56
Analog Interface	fully integrated	fully integrated	fully integrated	fully integrated	fully integrated
Standard and Protocols					
ISO 18092 Peer-to-peer (active/passive)	yes	yes	yes	yes	yes
ISO 14443-A Reader/Writer	yes	yes	yes	yes	yes
ISO 14443-B Reader/Writer	no	yes	no	yes	yes
Felica Reader/Writer	yes	yes	yes	yes	yes
Card emulation	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE	FeliCa RF, ISO 14443-A, MIFARE
Baudrate [kbits/s]	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424	106 / 212 / 424
Security features					
MIFARE classic	yes	yes	yes	yes	yes
Interface to smart card controller	S²C	S²C	S²C	S²C	S²C
Additionnal Product information					
Embedded firmware	no	no	yes	yes	yes
Middleware	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation	HAL, NFC forum reference implementation
Integrated LDO voltage regulator	no	no	no	yes	no
Low battery mode	no	no	no	yes	no
Supply voltage [V]	2.5 - 3.6	2.5 - 3.6	2.5 - 4.0	2.7 - 5.5	2.5 - 3.6
Min. Host Interface voltage[V]	1.6	1.6	1.6	1.6	1.6
USB bus power supply [V]	-	-	4.2 - 5.5	-	4.2 - 5.5
Supply voltage for secure device integrated	no	no	yes	yes	yes
Power down mode typ. [uA]	5	5	10	12	12
Power down mode with RF level detector on [uA]	10	10	30	15	30
Transmitter supply current typ. [mA]	60	60	60	60	60
Temperature range [C]	-25 / +85	-25 / +85	-25 / +85	-25 / +85	-25 / +85
Package thickness	0.85 mm	0.85 mm	0.85 mm	0.85 mm	0.85 mm
Package size	5x5 or 6x6 mm²	5x5 or 6x6 mm²	6x6 mm²	6x6 mm²	6x6 mm²
Package type	HVQFN32 or HVQFN40	HVQFN32 or HVQFN40	HVQFN40	HVQFN40	HVQFN40
Design in kit	OM5561	OM5571	OM5555	OM5581	planned

NFC Tools and Support

- **NFC Design-in packages easing testing and development**
  - Design kits for PN53X and PN51X; provide table with NFC evaluation kit prices to your customers; depending on business potential, NXP can request eval. kits for free.
- **Software Development Kit**
  - **BFL - Basic Function Library – for PN51X families:** can be requested through NXP FAE by qualified customers
  - HAL: can be requested through NXP FAE by qualified customers
  - NFC-FRI: not yet released for customers, it will be available for purchasing in Q3-2008
- **SW Services**
  - Support and Maintenance
  - Integration Support
- **Design-in support**
  - Provided by 35 Customer Application Support engineers located at 11 locations
  - Supporting various platforms and applications
  - Support is based on potential business and shall be analyzed case by case

Design in Kit / Ref design

- **Design in Kit PN512**
  - ISO 14443 A&B R/W
  - ISO 18092 NFC
  - Mifare and Felica RF support
  - BFL (Basic Function Library) in host
  - Serial link

- **Design in Kit PN532**
  - ISO 14443 A&B R/W
  - ISO 18092 NFC
  - Mifare and Felica RF support
  - Integrated uc running BFL
  - Serial link

- **Design in Kit PN531**
  - ISO 14443 A R/W
  - ISO 18092 NFC
  - Mifare and Felica RF support
  - Integrated uc running BFL
  - USB or Serial link

PN51X design kits

Product	PN511		PN512	
Reference Name	OM5561/N5112S01	OM5562/N5115S01	OM5571/N5122S01	OM5572/N5125S01
12NC	935281859699	935281862699	935281858699	935281861699
serial board	2	5	2	5
serial cable	2		2	
Power Supply Egstone	2		2	
Smart cards	yes	no	yes	no
cardboard box	1	1	1	1
Data sheet*	82732	82732	111331	111331
BFL *	109141	109141	109141	109141
application note*	110020	110020	110020	110020
kit driver*	119421	119421	119421	119421
status	available	available	available	available

PN53X design kits

Product	PN531			PN532	PN533
Reference Name	OM5555/N531US02	OM5552/N5315S02	OM5554/N5315U02	OM5581/N5322S01	OM5588/N5332U01
12NC	935282137699	935282151699	935282149699	935283896699	935283912699
serial board	1	5		2	
USB board	1		5		2
USB cable	1				2
serial cable	1			2	
Power Supply Egstone	1			2	
Smart cards	yes	no	no	no	no
cardboard box	1	1	1	1	1
Data sheet*	111930	111930	111930	115430	NA
user manual*	111802	111802	111802	126606	NA
application note*	115316	115316	115316	133910	NA
kit driver*	123110	123110	123110	NA	NA
status	available	available	available	available	Q4 2007

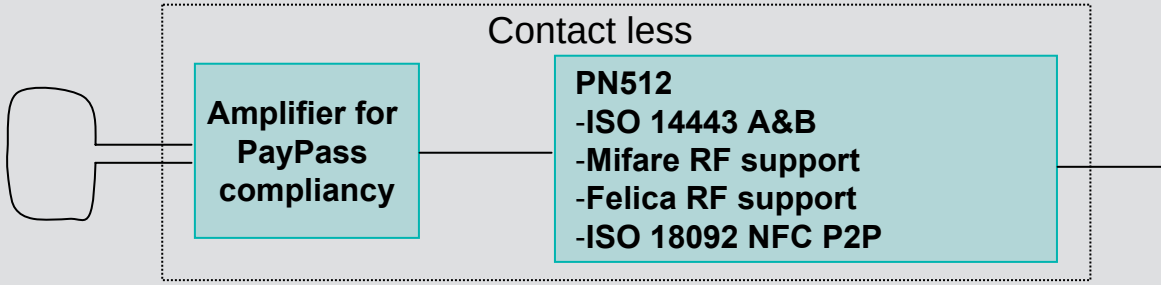
PN65x design kits

Product	PN65K		PN65L	
Reference Name	OM7226/5K101203006	OM7726/5K101203015	OM7226/5L402104006	OM7226/5L402104015
12NC	935282152598	935283922598	935281858699	935281861699
serial board	2	5	2	5
serial cable	2		2	
Power Supply Egstone	2		2	
Smart cards	yes	no	yes	no
cardboard box	1	1	1	1
Data sheet*	127520	127520	122520 (SFS)	122520 (SFS)
User Manual *	--	--	--	--
Application Note*	--	--	--	--
kit driver*	123110	12310	123110	123110
status	available	available	available	available

Design in Kit / Ref design – Coming soon

- **Design in Kit PN533**
  - **As PN532 +** USB

- **Universal Point of Sales**
  - **ISO14443 A&B R/W**
  - **Mifare RF support**
  - **Felica RF support**
  - **ISO 18092 NFC**
  - **PayPass Compliancy**



MF EV700 design in package

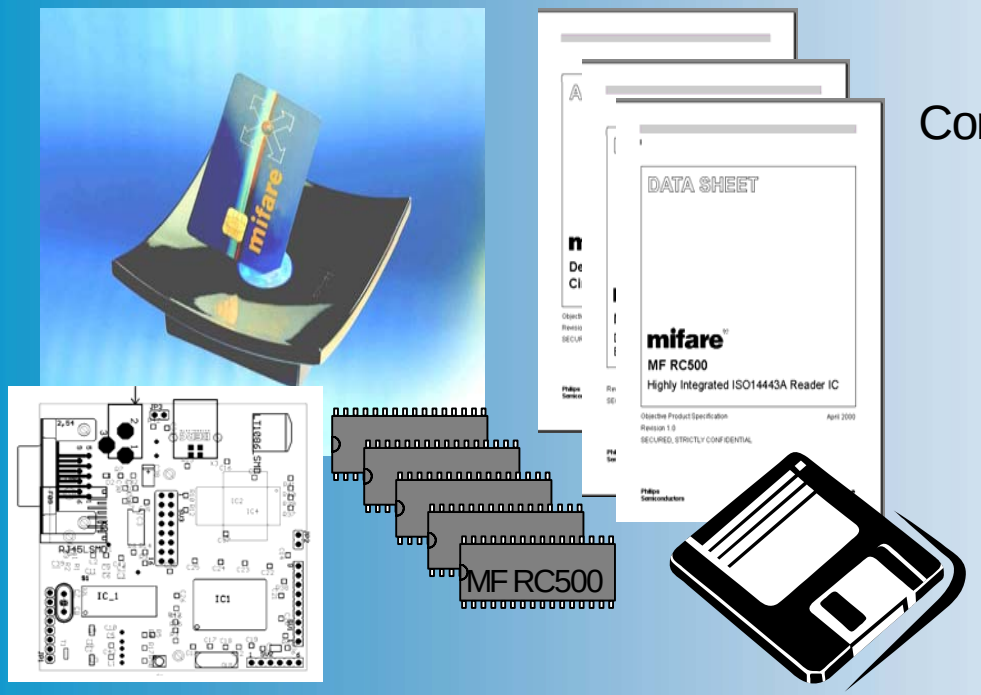
Contents

Mifare® Pegoda: USB Reader based on MFRC500 (CLRC632) (ISO 14443 Reader devices)
5 mifare® Cards (UL/1K/4K)
CDROM including

- Documentation
- Spec. Antenna Design Guide
- Software Libraries
- Application program
- PC demoprogram

• design-in package tailored to support software development for PC based applications based on mifare® and ISO14443 A

MF EV800 Full design in package



Contents

Mifare® Pegoda: USB Reader
MF RC500 IC Samples
additional Reader PCB supporting RS232, card size antenna & 50 Ohm matching circuit
5 mifare® Cards & 1watch
CDROM including
- Documentation
- Software Libraries
- Application program
- PC demoprogram

- full design-in package tailored to support software and hardware development for mifare® and ISO14443 A installations.
- full design-in package for mifare® and ISO14443 A reader development. (Reference Designs, own HW Designs, SW for Appl. Testing)

MFRC5xx/MFRX6xx/CLRC6xx design kits

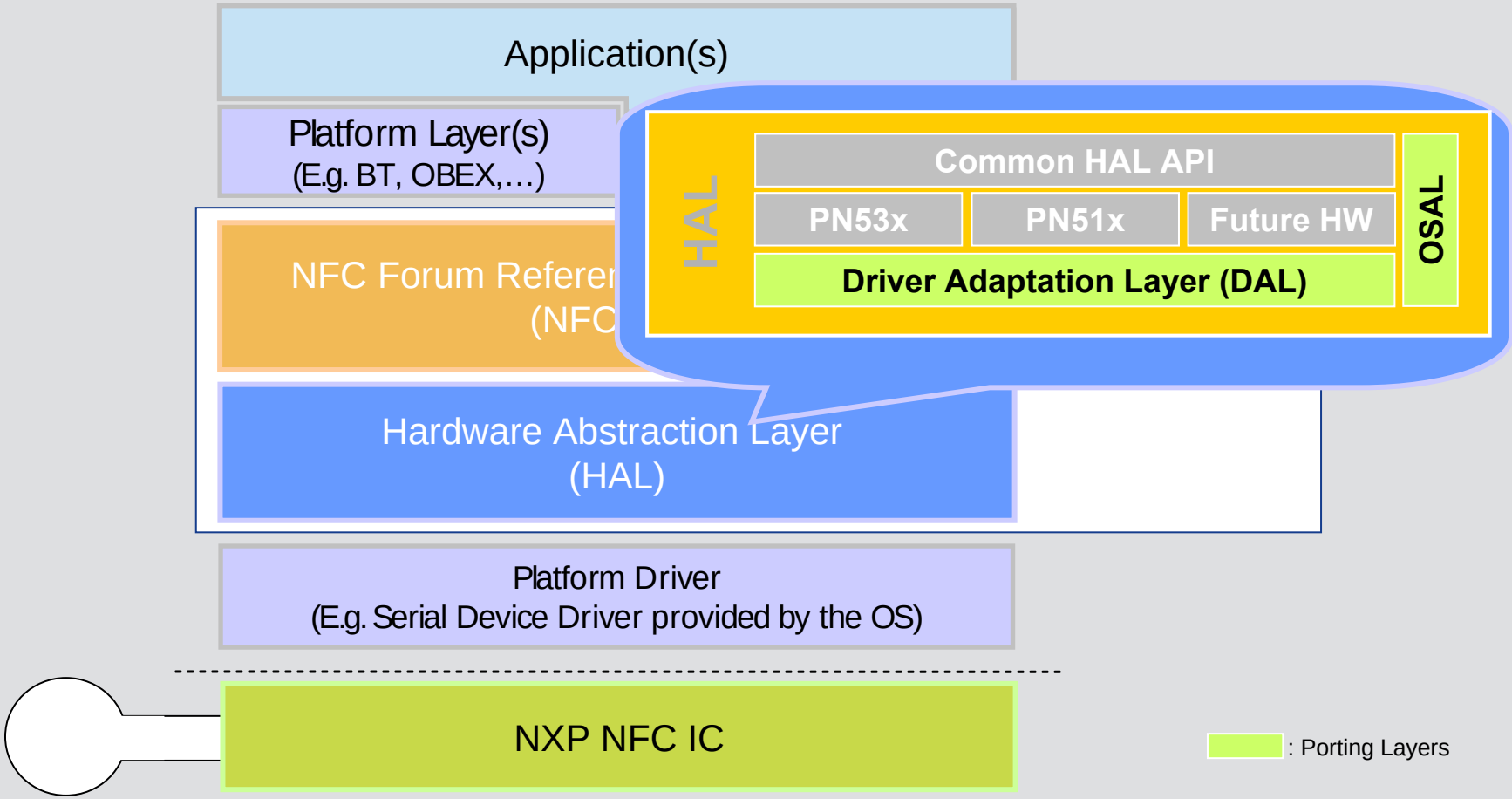
Product	MFRC500 / MFRC53x / CLRC632			MFRC522 / MFRC523	MFRX623	CLRC660
Reference Name	**MFEV700**	**MFEV800**	**CLEV701**	**MFEV523**	**MFEV623**	**CLEV660**
12NC	**935269928122**	**935269927122**	**935276408122**	**NA**	**NA**	**NA**
Demo Reader	**Pegoda**	**Pegoda**	**Pegoda**			**1**
USB Cable	**1**	**1**	**1**			**1**
Antenna kit		**1**				
serial board				**1**	**1**	
serial cable				**1**		
SC adapter					**1**	
Power Supply				**no**	**no**	
Smart cards	**yes**	**yes**	**yes**	**no**	**no**	**yes**
Data sheet*	**included**	**included**	**included**	**112132/115231**	**126306**	**NA**
user manual*	**included**	**included**	**included**	**119321**	**NA**	**NA**
application note*	**included**	**included**	**included**	**119221**	**NA**	**NA**
kit driver*	**SW CD**	**SW CD**	**SW CD**	**141010/119121/119010**	**NA**	**NA**
status	**available**	**available**	**development**	**on request**	**on request**	**development**

* document control reference

NFC Software Overview

NFC Applications	Java Application	Native application
NFC Forum Reference Implementation [NFC-FRI Product]	NFC Forum Functions & Services	Interoperability between Services & Devices
Hardware Abstraction Layer [HAL Product]	Common API to abstract NXP NFC HW interfaces	High level API supporting NFC P2P & R/W modes
NFC Hardware	PN51X & PN53X	PN54X

Hardware Abstraction Layer (HAL)



HAL Package contents

- Free of charge source code (“C”) delivery including
  - Easy set up using an install shield
  - Embedded BFL V4.1 source code for PN51x products
  - User Manual documentation including APIs definitions
  - Mifare & P2P examples including Visual Studio (VC7 and VC8) project files and Linux Makefiles
  - Windows & Linux porting layer (DAL) for Serial and USB links
- Integration work into customer platform
  - Only the DAL layer required to be ported/changed on customer platform, the remaining part only requires to be re-compiled
- Required for Windows evaluation

Contained in the NFC Design-in Kit

  - PN53X USB/serial or PN51X serial demo Board(s)
  - PN531_USB.sys driver
  - Mifare Standard, Mifare ULTRALight cards
  - Microsoft Visual studio (.net)

Grazie Mille!
Per ulteriori informazioni:
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