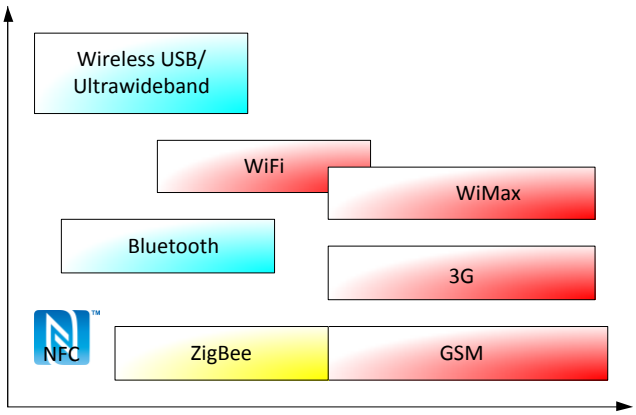
NFCStack+

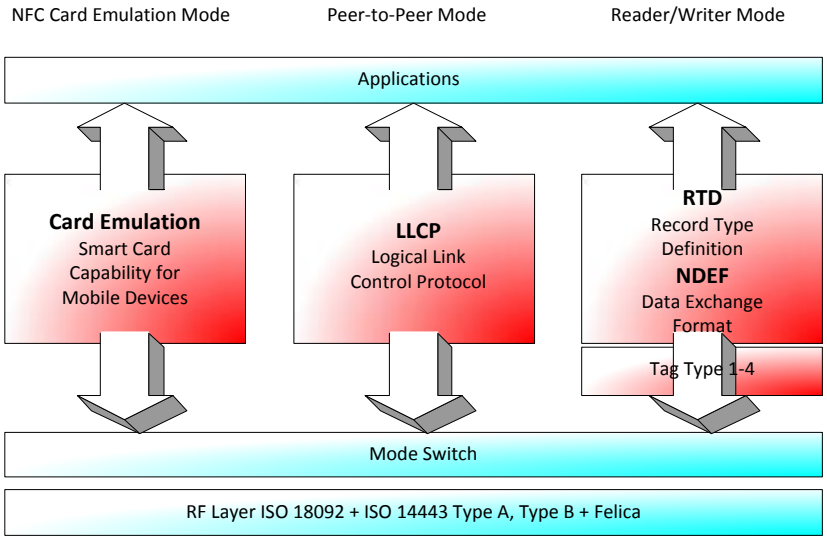
Near Field Communication Protocol Stack

Near Field Communication is a wireless technology operating at 13.56 MHz in a range up to 10cm. The standards are specified within the NFC Forum, founded 2006, more information under www.nfc-forum.org. The Forum announced four initial tag formats based on ISO14443 standards (ISO 14443 is a four-part international standard for contactless smart cards operating at 13.56 MHz in close proximity with a reader antenna) and on the NFC standard ISO 18092. The NFC Forum tag types include popular smartcards like MIFARE and FeliCa. NFC Forum-compliant devices must support standard data formats to ensure the compatibility across several card types and devices. These specifications are e.g.:

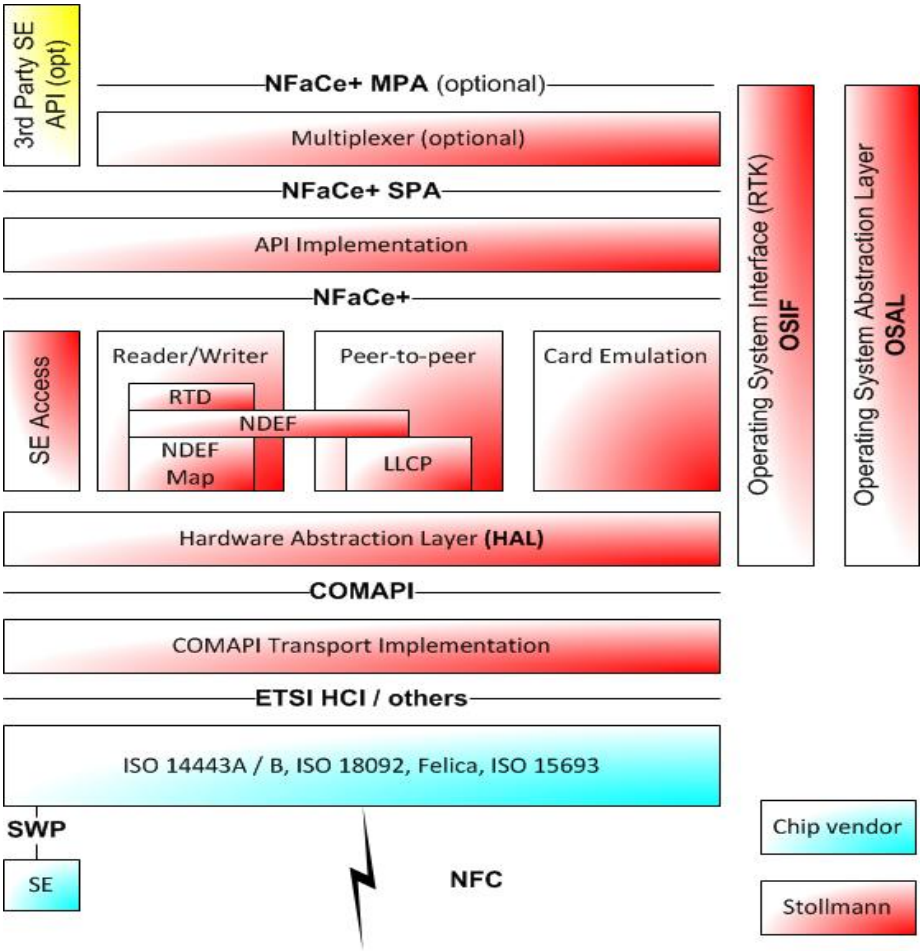
- **NFC Data Exchange Format (NDEF)**
- **NFC Record Type Definition (RTD)**
- **NFC Uniform Resource Identifier (URI) Service Record Type Description**
- **NFC Text Record Type Description**
- **NFC Smart Poster Record Type Description**



Stollmann's higher-layer NFC protocol stack is the leading software solution worldwide which covers the complete NFC technology from chip level to the application interface. Reader/writer mode, card emulation and peer-to-peer mode consistent with NFC-Forum specification are fully supported and extended for specific use in operating systems (e.g. added functionality like NDEF push protocol).



The following drawing shows how the stack is organized:



Stollmann offers its NFCStack+ for use with various chip sets. The code size and performance can be optimized for integration with a specific chip. Porting to other operating systems is possible using a simple system interface.

OPERATING SYSTEM

The NFCStack+ is designed for easy portability.

- Portable to any 16/32/64 Bit OS, comes with its own micro-executive kernel
- Also possible to run directly on the silicon, without any intervening host OS
- Ready to be used on Linux, Android, Windows, QNX.

API

Dedicated, high performance API “NFaCe+SPA”, supporting all relevant use cases:

- Message oriented
- Event-driven (high efficient)
- Non-blocking (no busy waits)

Footprint

The footprint depends on platform and use case. Footprint can be streamlined / optimized for use cases (e.g. LLCP from footprint of not required). Typically 128-196 kBytes ROM, 32 kByte RAM (cortex M3 as reference platform).

Chips

Our stack supports open chip interfaces like ETSI HCI (ETSI TS 102 613) or NFC Forum NCI, plus proprietary chip architectures (e.g. PN532).

We support the following chips sets available on the market:

- STM ST21NFCA (single CLF and with embedded secure element)
- NXP PN532
- NXP PN544
- NXP PN65
- Broadcom BCM20791
- Broadcom BCM20792

Chip Interface: ETSI HCI + extensions, proprietary interface, NCI

Transport

Stack uses transport layer abstraction und operates independently from transport layer (e.g. UART / SPI / I2C). Therefore it’s easy adaptable to other chip transport layers.

CPU

- All 16/32/64 bit architectures (independent of word size / byte order or alignment)
- Even DSP architectures / Single Core / Multicore independent.

NFC and Bluetooth

NFC can be used as an enabling technology for easy and fast pairing between two Bluetooth 2.1 devices. Pairing between Bluetooth 2.1 is called Secure Simple Pairing (SSP). A variant of SSP supports a pairing method known as “Out-of-Band” (OOB) pairing. NFC is currently the only technology using OOB for SSP.

In order to demonstrate compliance of NFCStack+ with SSP using OOB, a proof of concept demonstrator was built using NFCStack+ and the iAnywhere Sybase Bluetooth stack*. The demonstrator contains of a set of libraries and Stollmann NFC hardware and can be used to interoperate with other remote devices (e.g. mobile phones) supporting SSP using OOB. The demonstrator shows a complete SSP using OOB procedure by exchanging NFC handover request NDEF messages.

The demonstrator is available on request.*

(*ARS Software GmbH, Starnberger Str. 22, D-82131 GAUTING/Munich, www.ars2000.com)

NFC Kits

An **evaluation kit** is available for demonstration and testing purposes. It includes the stack with its well-organized user interface for Windows PCs as well as a reader/writer USB adapter and a number of tags and smart cards, allowing a complete NFC system to be build that is also suitable for testing using third-party tags or cards.

Evalutation kit for free download: **http://www.stollmann.de/en/stacks/nfc/download-nfc-evaluation-kit-kostenlos/download.html**

Our **development kit** makes application development much easier and safer. The development kit is based on the evaluation kit, but additionally includes source code of the user interface, complete with documentation, which can then be used as the code foundation for the NFC applications to be developed.

“NFC – driven by Stollmann!”

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