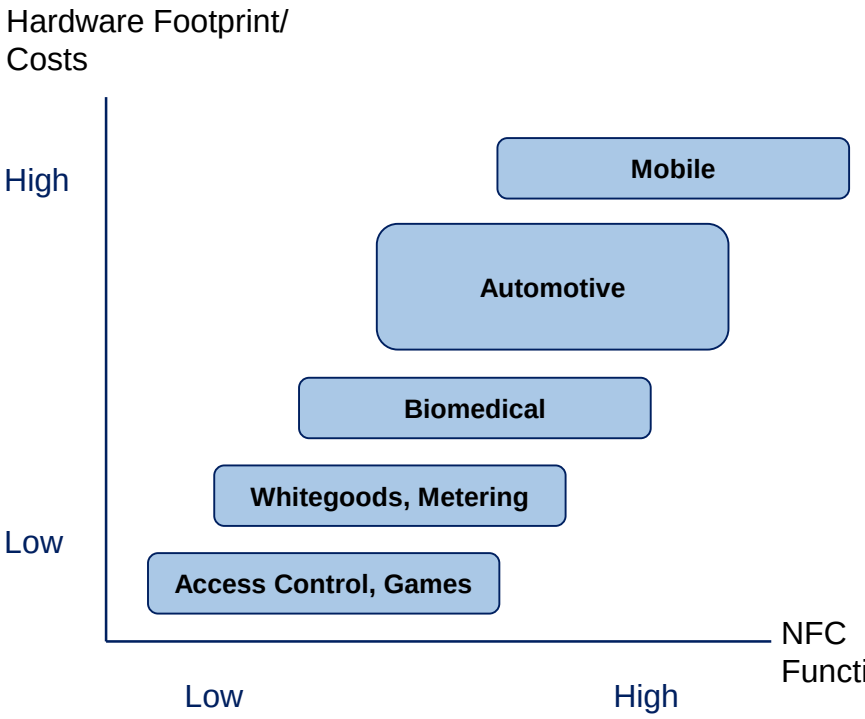
Lean NFC – Kronegger NFC Library

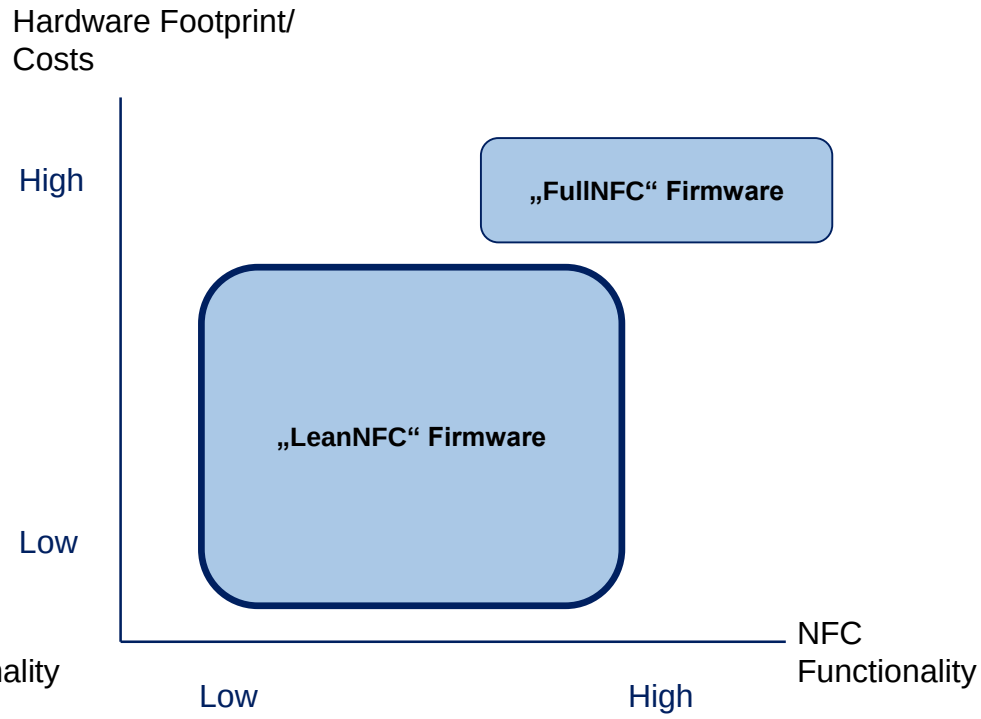
Kronegger GmbH
We enable NFC for you!

Solution Space

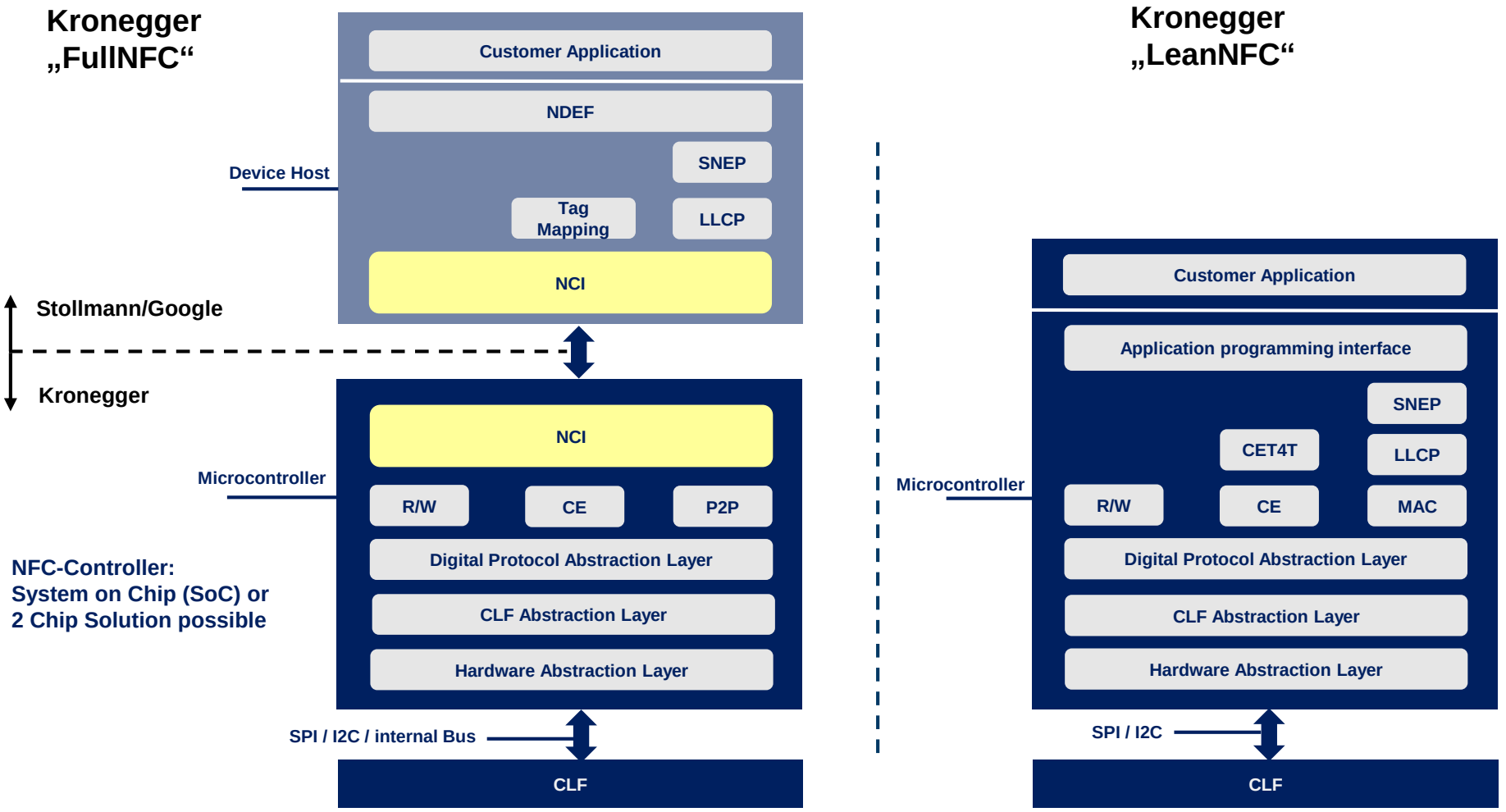
Market Need



Kronegger NFC Solutions



Lean NFC Solution

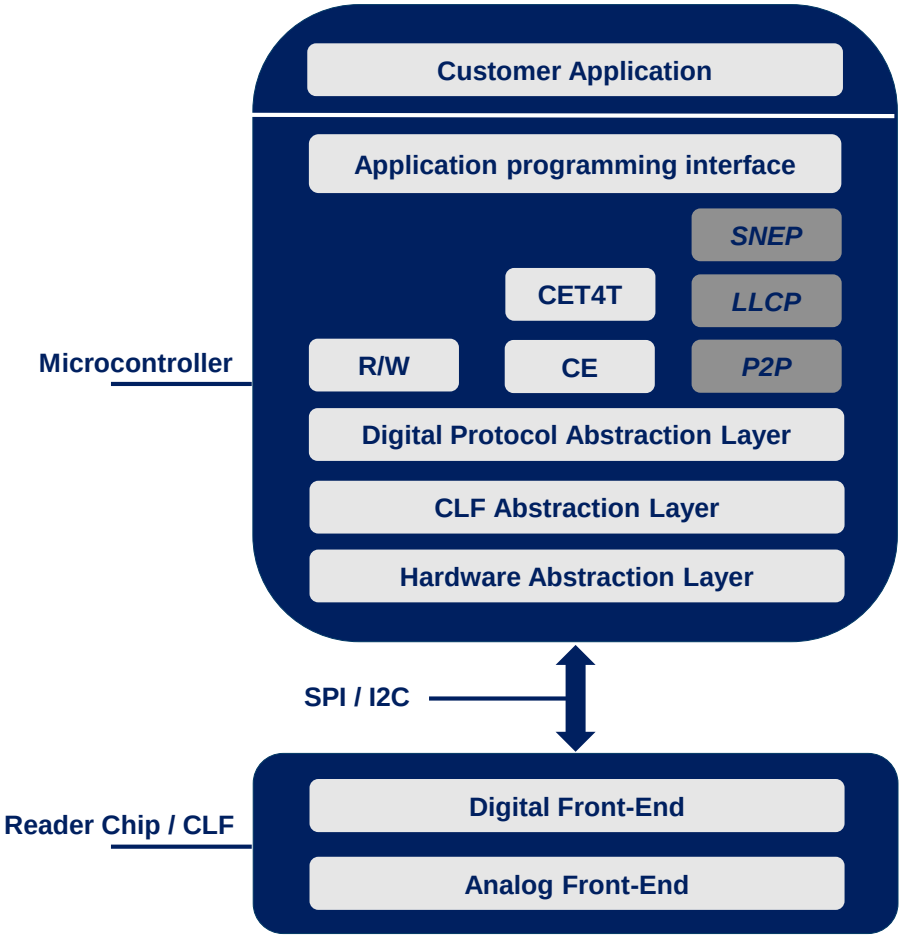


FullNFC vs. LeanNFC

	FullNFC	LeanNFC
BOM	**High** (ULS CPU + LLS CPU + CLF)	**Low** (CPU + CLF)
Scalability	**Low** (1 Package with R/W, CE, P2P)	**High** (Dedicated Configuration possible)
Memory Footprint	**High** (ULS 200k ROM / 40k RAM; LLS 128k ROM / 8k RAM)	**Low** (74k ROM / 14k RAM)

- Benefits:
  - Enables NFC for low memory applications (e.g. Whitegoods and Medical)
  - Flexible Platform that can be configured with available options (e.g. Memory Footprint, required CPU,…)
  - Possibility to offer only P2P mode (P2P on Roadmap)
  - Reader-Writer mode for only 20k ROM / 3 k RAM

LeanNFC Solution

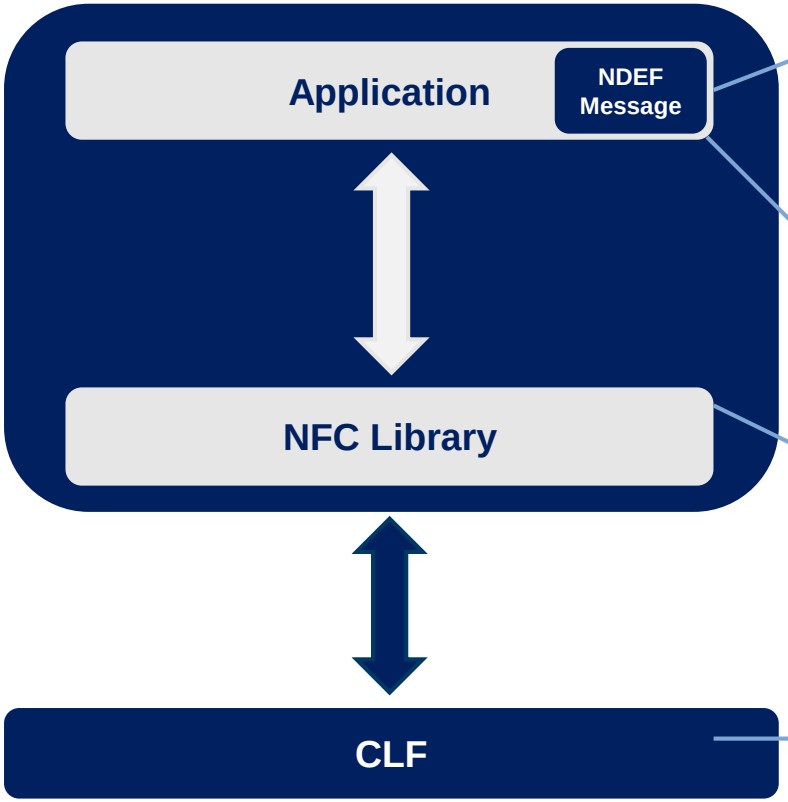


Features:

- memory optimized solution
- modular and flexible solution to use and adopt
- independent and individual configuration of different modules
- based on certified and reliable IP
- portable solution in C++
- customer application running on NFC-Controller

- P2P+LLCP+SNEP is optional Implementation will be customer driven

LeanNFC



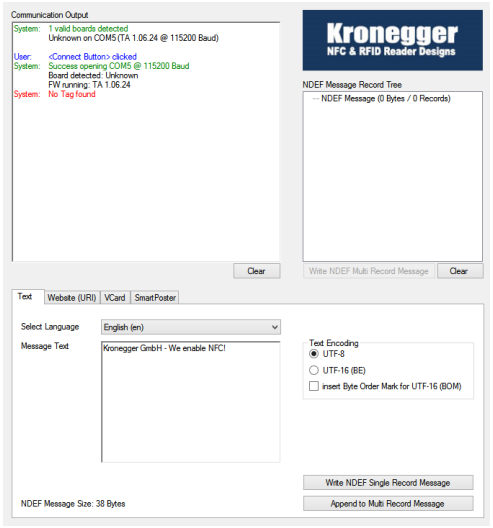
MCU
- Cost effective due to deep integration of application and NFC stack
- Compact size, low BOM count

NDEF Message
- Provided by Application Layer

NFC Application programming interface
- Exchange of NDEF Messages
- Support of all NFC Modes (RW, CE, P2P)
- Highly interoperable to devices and tagtypes

Contactless Frontend
- Choice of preferred CLF hardware available

NDEF Format Tool



The NDEF Format Tool creates an ease to use NDEF message format

It allows the user to simply copy the NDEF message format to the customer application on the microcontroller

External PC Application

```
MESSAGE:
Kronegger GmbH - we enable NFC!

Header:
C1010000002254

Payload:
02656E4B726F6E656767657220476D6248202D20776520656E61626C65204E464321

Code Implementation:
0xc2, //Header Info
0x01, //Type Length
0x00, 0x00, 0x00, 0x22,  //Payload Length 0x54, //Type //Payload 0x02, 0x65, 0x6e, 0x4b,
0x72, 0x6f, 0x6e, 0x65, 0x67, 0x67, 0x65, 0x72, 0x20, 0x47, 0x6d, 0x62, 0x48, 0x20, 0x2d,
0x20, 0x77, 0x65, 0x20, 0x65, 0x6e, 0x61, 0x62, 0x6c, 0x65, 0x20, 0x4e, 0x46, 0x43, 0x21
```

Available LeanNFC Packages

- Flexible solution due to modular, reusable packages:
  - Reader/Writer (R/W) Library
  - Card Emulation (CE) Library
  - Peer2Peer (P2P) Library (incl. LLCP+SNEP) (Roadmap)
  - Contactless Frontend (CLF) Library
  - Mifare Crypto Support ready

- Each Solution is scalable to the requirements of the customers, e.g.
  - Reader/Writer Type A only or
  - Reader/Writer Type A+B+F+V or
  - Reader/Writer Type A+B+F+V + Card Emulation

Hardware Options

- Flexible solution to use with several Hardware Options
- CLF
  - TI TRF7970
  - NXP PN512
  - NXP PN501
  - NXP MFCR630
  - NXP RC663
  - Melexis MLX90132
- MCU
  - TI MSP430 Series
  - TI Stellaris Series
  - NXP LPC 12XX Series
  - ST Microsystems STM32F1XX Series
  - Freescale MC56F84XX Series

Easy to adopt to your Hardware Requirements!

Memory Footprint

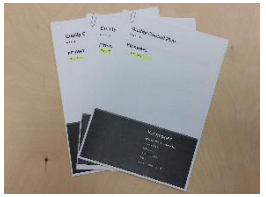
- Scalable to the requirements of the customer
- Depends on the final setup (Compiler and CPU)
- Example:
  - Card-Emulation Mode: 18k ROM / 2k RAM
  - Reader-Writer Mode: 20k ROM / 3k RAM
  - Reader-Writer + Peer2Peer (incl. LLCP+SNEP) Mode: 55k ROM / 12k RAM
- Assumption:
  - Cortex M3 CPU
  - IDE: IAR ARM Workbench 6.x
  - Code optimisation: Size Optimized

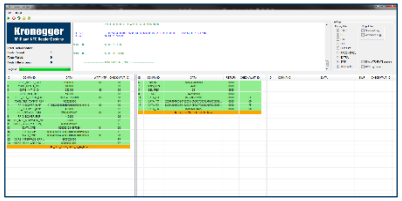
Overview Memory Footprint

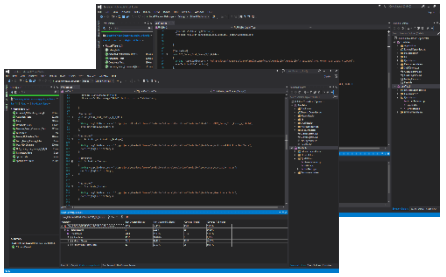
Reader/Writer total	**20k ROM / 3k RAM**	
Only	Type A / T4TA / T2T/ T1T	13,7k ROM / 2,6k RAM
Only	Type B / T4TB	11k ROM / 2,7k RAM
Only	Type F / T3T	9,1k ROM / 2,6k RAM
Only	Type V	9,1k ROM / 2,6k RAM
Card Emulation total	**18k ROM / 2k RAM**	
Only	Type A/B	17k ROM / 2k RAM
Only	Type F	18k ROM / 2k RAM
Peer2Peer (incl. LLCP + SNEP) total	**35k ROM / 11k RAM**	**(Roadmap)**
Only	LLCP	9k ROM / 3k RAM
Only	SNEP	5k ROM / 3k RAM

Quality Software Development

Layer	Test Tools	Certification
Application Programming Interface (API)	• Kronegger Test Plan	No Certification available
Simple NDEF Exchange Protocol (SNEP)	• Kronegger Test Plan (according to NFC Forum Specification) • Microprossx	NFC Forum Certification
Logical Link Control Protocol (LLCP)	• Kronegger Test Plan (according to NFC Forum Specification) • Microprossx	NFC Forum Certification
Digital Protocol Abstraction Layer	• Kronegger Firmware Emulator • Microprossx	NFC Forum Certification
Hardware Abstraction Layer	• Kronegger HAL Tester	No Certification available
Contactless FrontEnd Abstraction Layer	• Kronegger HAL Tester	No Certification available
Analoge FrontEnd	• Kronegger Test Plan • Microprossx	NFC Forum Certification







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