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Near Field Communication (NFC) and UEFI

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Agenda

- Introduction
- NFC Technology
- UEFI NFC Stack
- Conclusions

Introduction

Introduction

- Approximately two billion smartphones in the world read NFC Tags anytime, anywhere.
- Consumers will see an explosion of uses in IoT, retail, automotive and public transportation
- NFC is a horizontal technology like Bluetooth, Wi-Fi, etc.

NFC Technology

www.uefi.org

What is NFC

- Near Field Communication (NFC) is a short-range wireless connectivity technology that are used in contactless payment systems, similar to those used in credit cards and electronic ticket smartcards and allow mobile payment to replace/supplement these systems.

- NFC complements many popular consumer level wireless technologies, by utilizing the key elements in existing standards for contactless card technology (ISO/IEC 14443 A&B and JIS-X 6319-4).

- NFC enables devices to share information at a distance that is less than 4 centimeters with a maximum communication speed of 424 kbps.
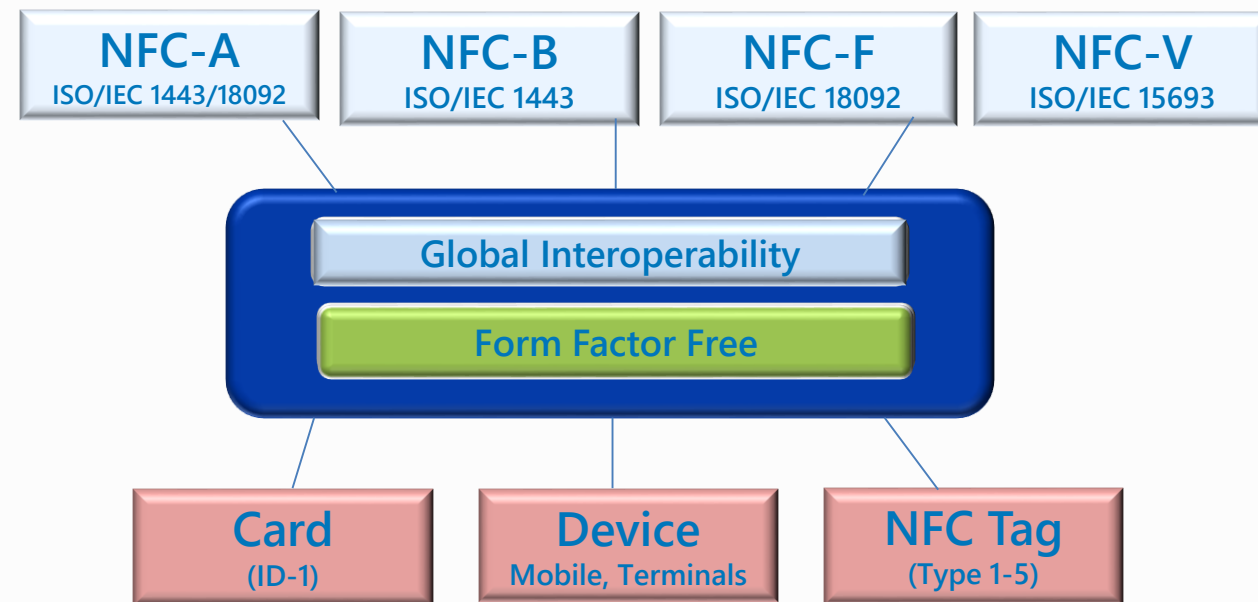
NFC Modes and Compatibilities
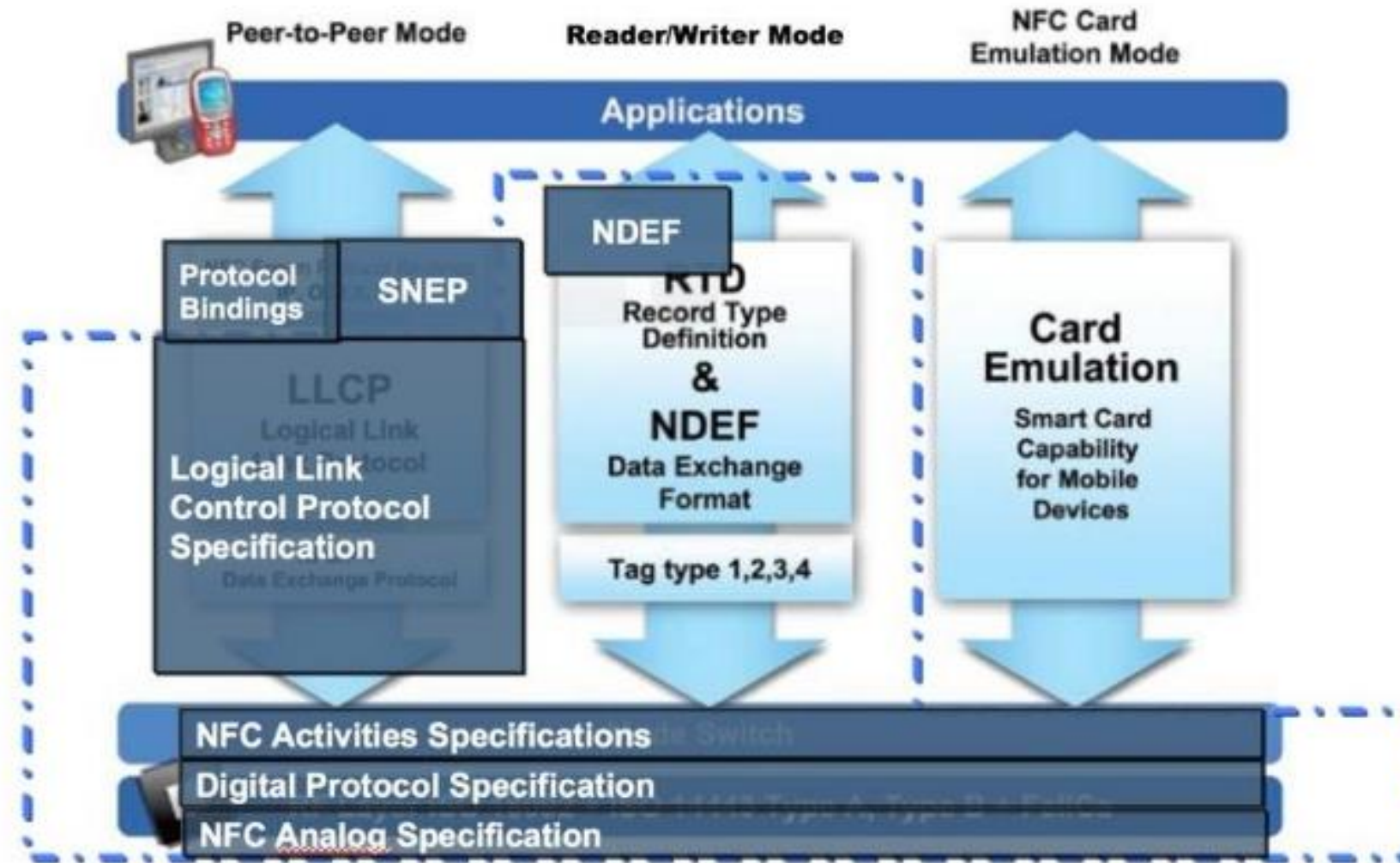
NFC Operates in Three Modes

1 Tag Reader/Writer
Connect the world of apps with the physical world

2 Peer to Peer
Connect devices through physical proximity

3 Card Emulation
Connect to a common infrastructure

NFC is Compatible with Global Communications Standards

NFC-A	NFC-B	NFC-F	NFC-V
ISO/IEC 1443/18092	ISO/IEC 1443	ISO/IEC 18092	ISO/IEC 15693

Global Interoperability

Form Factor Free

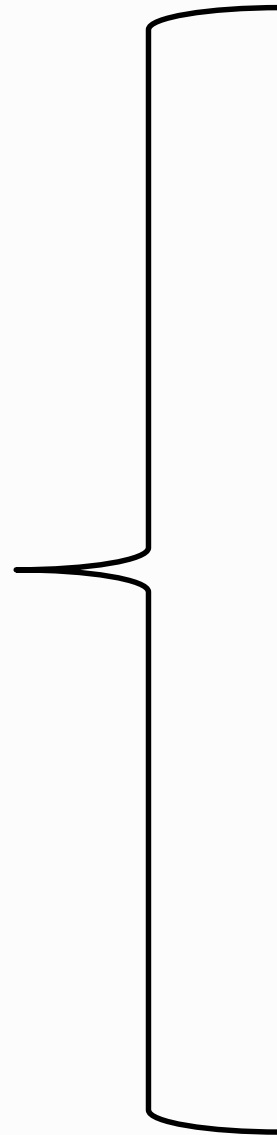| Card	Device	NFC Tag
(ID-1)	Mobile, Terminals	(Type 1-5)

ToDo: These two charts will be refined.

NFC Technical Specification

5 NFC Tag Types

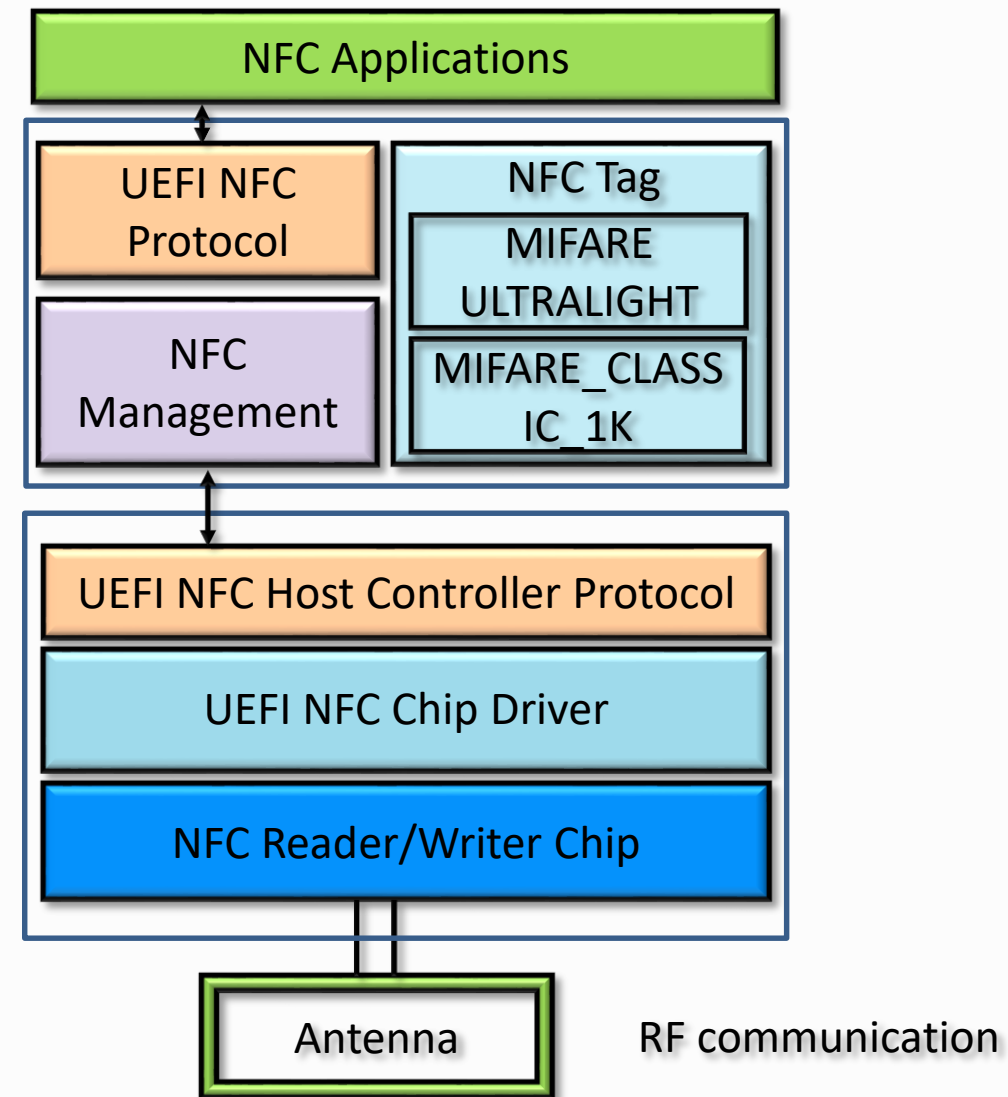
MIFARE Ultralight®

MIFARE® DESFire®

MIFARE Classic®

UEFI NFC Stack

UEFI NFC Stack
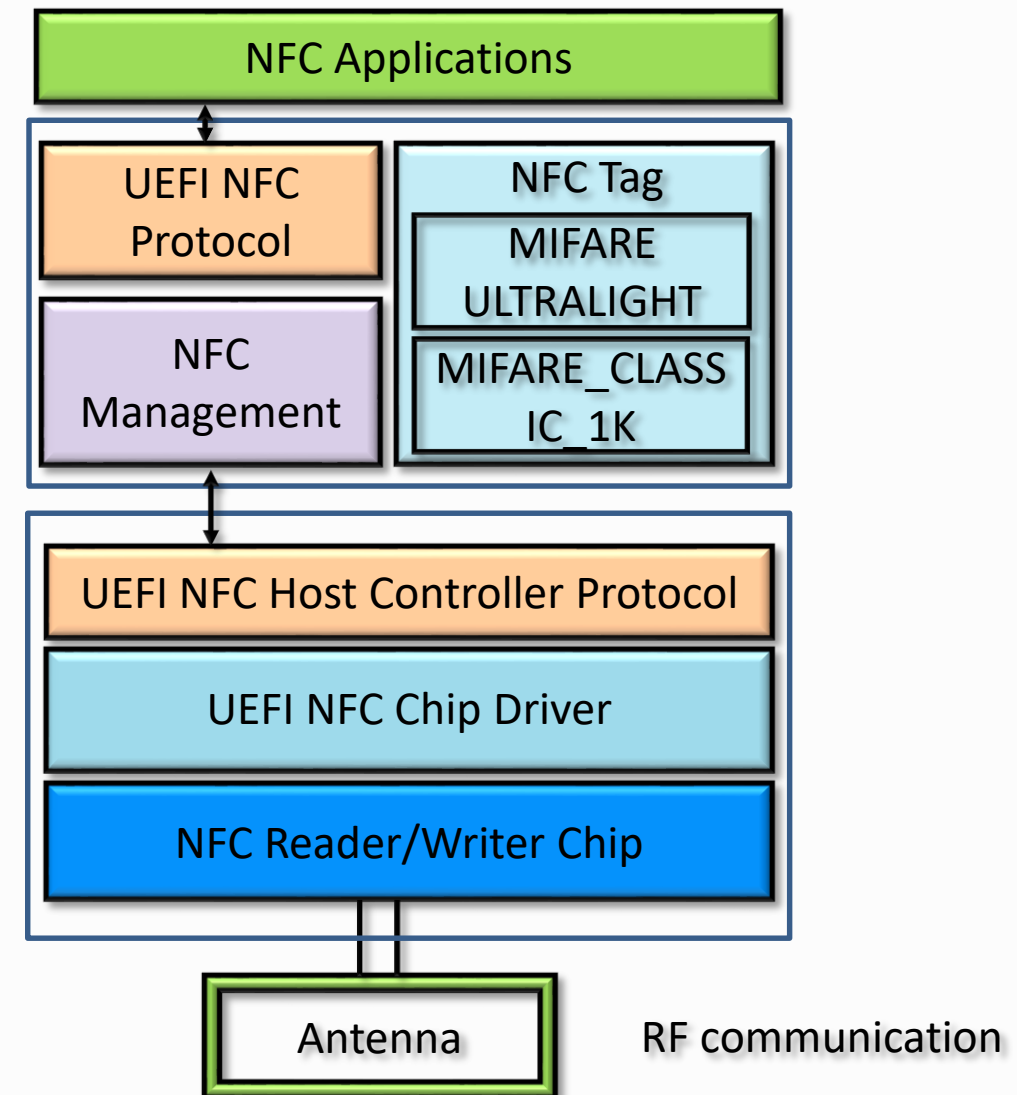
Blocks Description

- ## NFC Reader/Writer Chip
  - *The physical hardware to support NFC operation.*
- ## UEFI NFC Chip Driver
  - *The UEFI driver initializes the NFC Reader/Writer chip and produces the UEFI NFC Host Controller Protocol for sending NFC commands to the NFC chip.*
- ## UEFI NFC Host Controller Protocol
  - *The UEFI NFC Host Controller Protocol is for sending commands to NFC chip or read/write the NFC tag data from/to the NFC chip.*
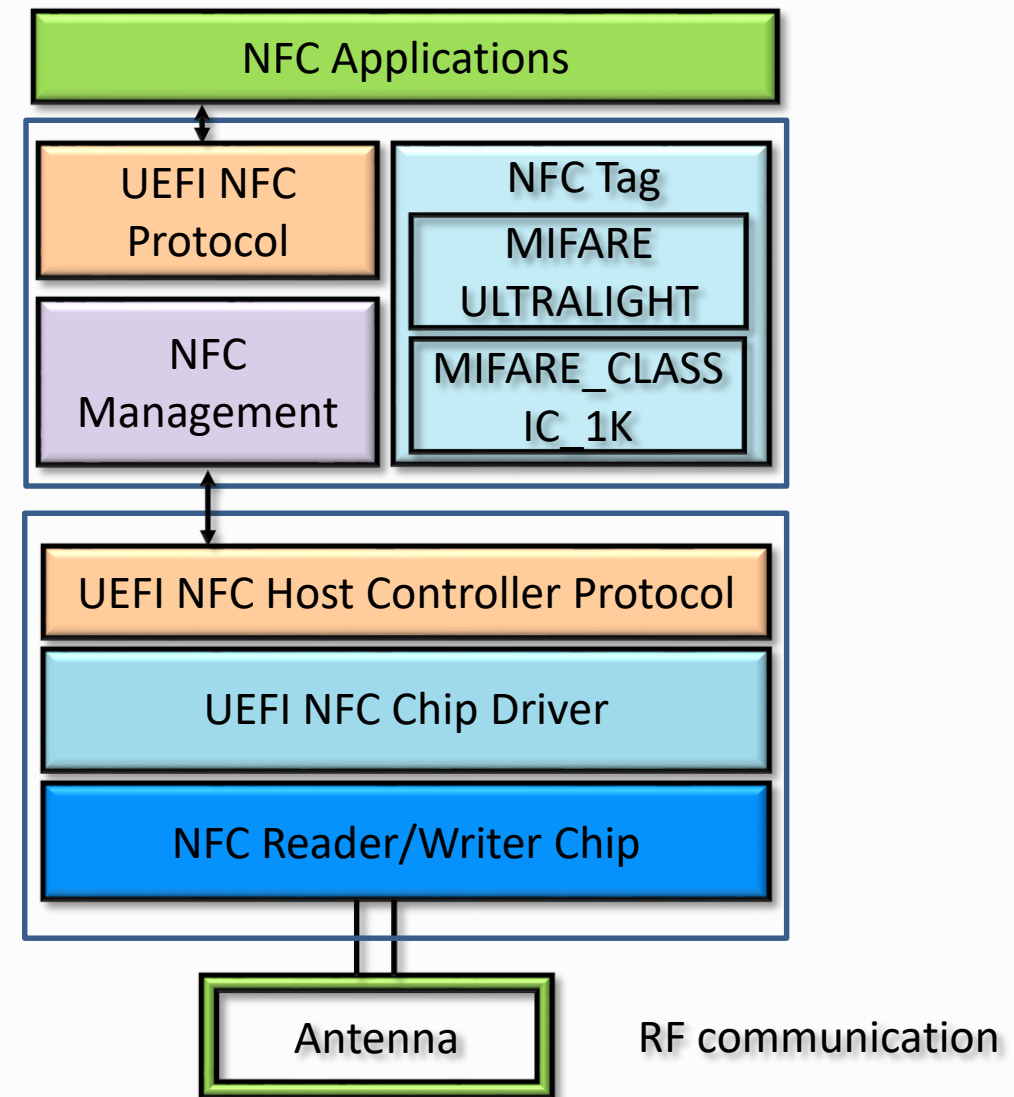
Blocks Description

- ## NFC Management
  - *This driver manages the NFC chip and sensed NFC Tag. The UEFI NFC protocol is produced by this driver.*

- ## NFC Tag
  - *This part supports the NFC MIFARE Tag standard.*

- ## UEFI NFC Protocol
  - *The UEFI NFC Protocol provides the NFC Tag Read/Write function and NFC operation mode change.*

NFC Applications

UEFI NFC Protocol

NFC Tag

MIFARE ULTRALIGHT

NFC Management

MIFARE_CLASS IC_1K

UEFI NFC Host Controller Protocol

UEFI NFC Chip Driver

NFC Reader/Writer Chip

Antenna

RF communication

UEFI NFC Protocol

- ## Protocol Interface Structure

Typedef struct _EFI_NFC_PROTOCOL {

EFI_NFC_PROTOCOL_GET_CAPABILITY*GetCapability;*

EFI_NFC_PROTOCOL_IS_TAG_SENSED *IsTagSensed;*

EFI_NFC_PROTOCOL_READ_BYTE *ReadByte;*

EFI_NFC_PROTOCOL_WRITE_BYTE *WriteByte;*

EFI_NFC_PROTOCOL_READ_BLOCK *ReadBlock;*

EFI_NFC_PROTOCOL_WRITE_BLOCK *WriteBlock;*

EFI_NFC_PROTOCOL_CARD_EMULATION *CardEmulation;*

}EFI_NFC_PROTOCOL;

UEFI NFC HC Protocol

- Protocol Interface Structure

Typedef struct _EFI_NFC_HC_PROTOCOL {

      EFI_NFC_HC_PROTOCOL_CHIP_INFO *ChipInfo;*

      EFI_NFC_HC_PROTOCOL_IS_TAG_SENSED *IsTagSensed;*

      EFI_NFC_HC_PROTOCOL_READ_DATA *ReadData;*

      EFI_NFC_HC_PROTOCOL_WRITE_DATA *WriteData;*

      EFI_NFC_HC_PROTOCOL_CARD_EMULATION *CardEmulation;*

**}*EFI_NFC_HC_PROTOCOL;*

UseCase: Power On Password Check

Get password from NFC tag and consume it for system power on password check.

Conclusions

Summary

- The NFC is a popular contactless technology for information sharing and identification.

- There are various NFC based applications can be implemented in UEFI if the UEFI NFC stack is available.

References

- NFC Forum https://nfc-forum.org/

Call to Action

- Review the proposed UEFI NFC STACK and contribute the discussion for adding the NFC support to specification.

- Invite NFC Reader/Writer Chip vendor to join the discussion.

Thanks for attending the Fall 2017
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For more information on the Unified
EFI Forum and UEFI Specifications,
visit http://www.uefi.org

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