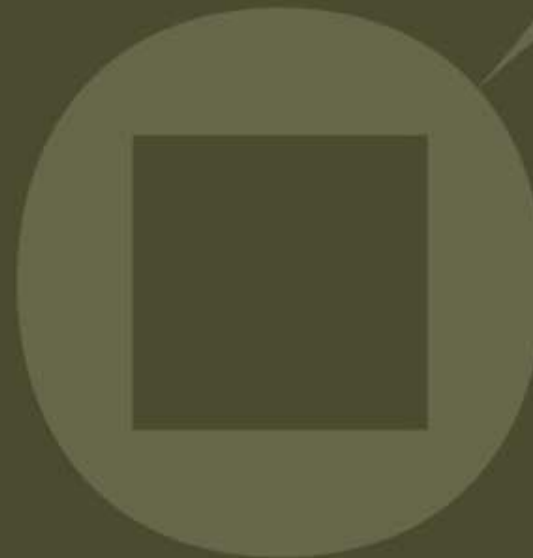


Proximera

Proximera is the Gemalto System for USIM Card
handling both Contact and Contactless transactions in a mobile phone

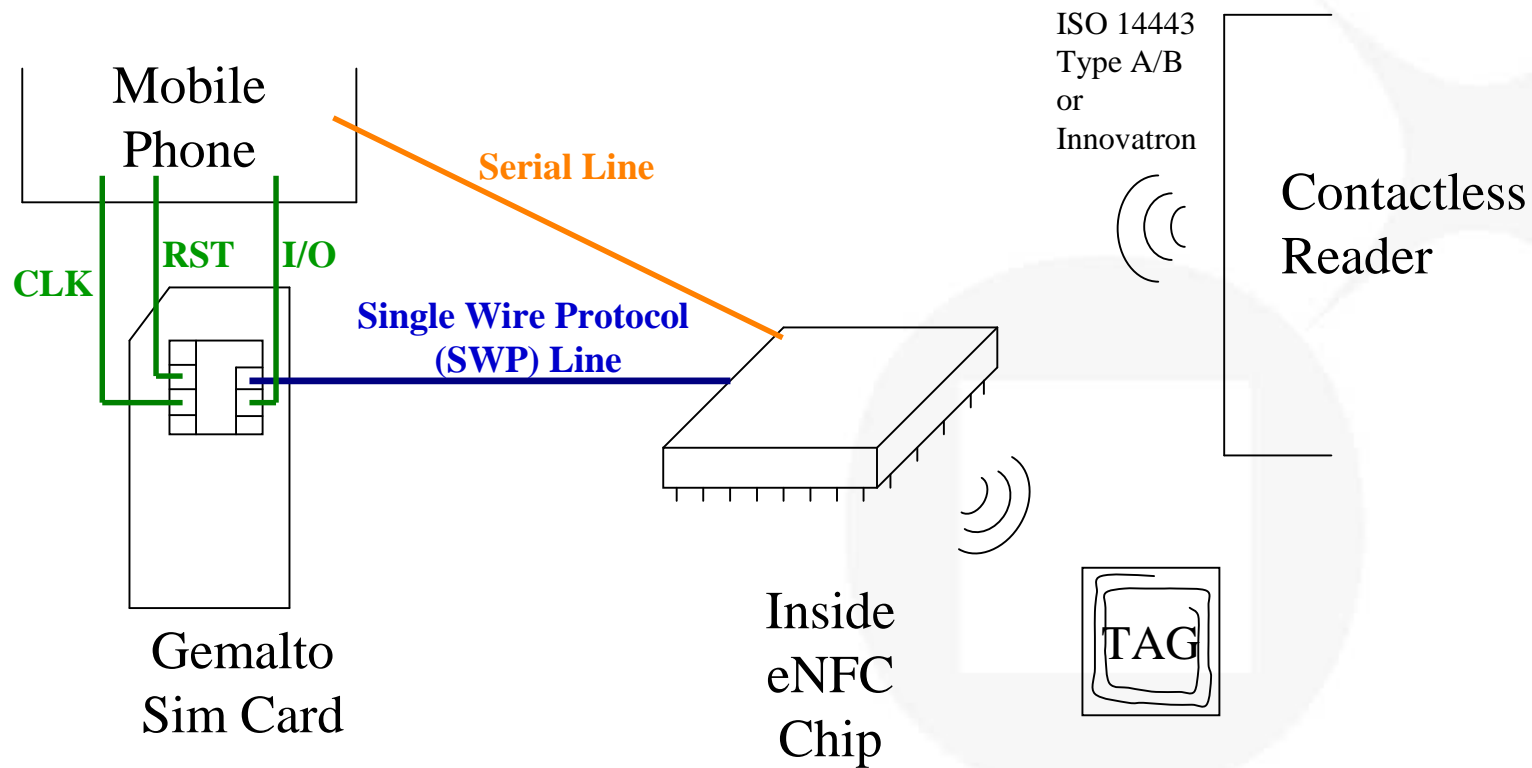
Xavier Appé

12th November 2007



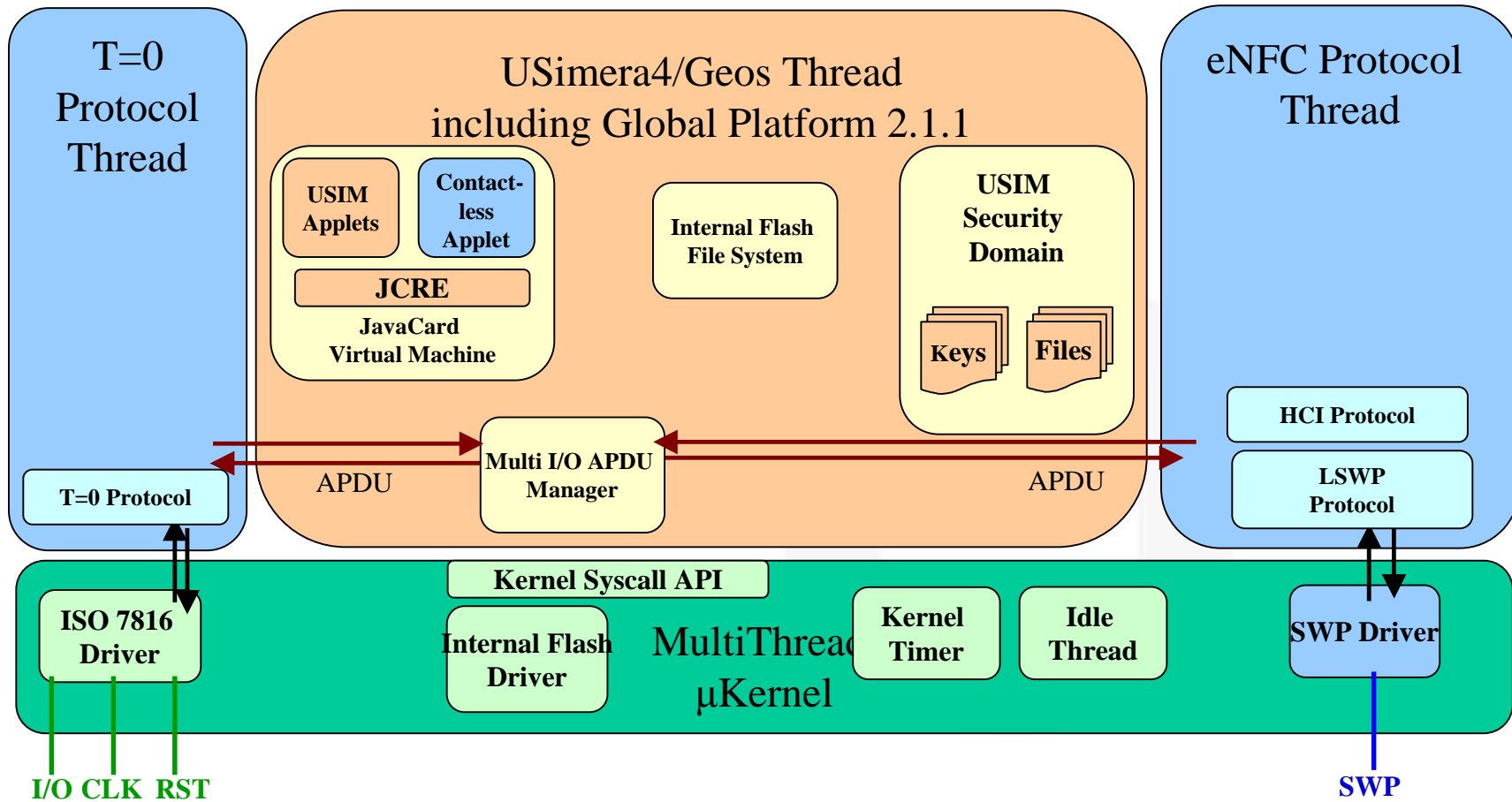
System Overview

Hardware Architecture



System Overview

Software Architecture



System Overview

Software Architecture

- ✦ The Rainbow microkernel
- ✦ The eNFC thread
- ✦ The USimera4 Thread

System Overview

Software Architecture: The Rainbow microkernel

★ Rainbow's features used in Proximera

- Multitasking, Multithreading
- Cooperative mode
- System Calls
- Inter Process Communication (IPC)
- Signals
- Interrupt Management
- Driver Management
- Internal timer
- Idle thread

System Overview

Software Architecture: The eNFC Thread

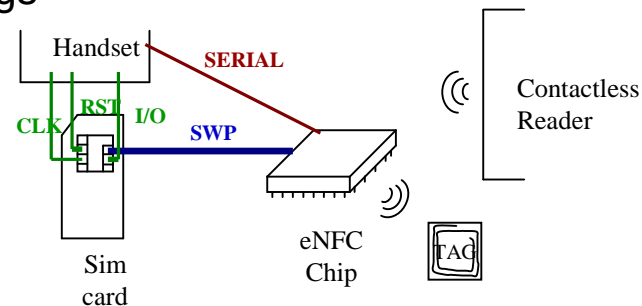
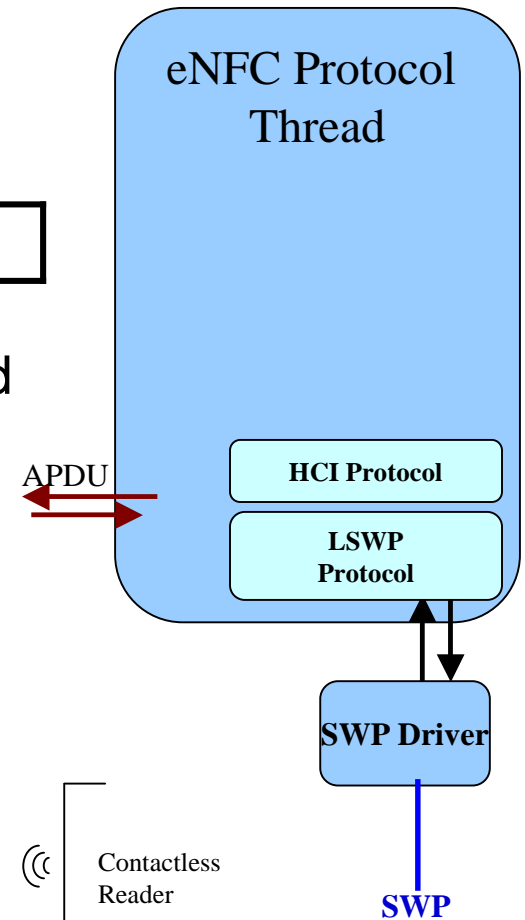
★ Frame Format on SWP line



★ All **APDUs** are forwarded to the USimera4 thread on logical channel 3

★ HCI Protocol (Network Layer) —

- Based on pipe system across a network that is composed of: the eNFC chip, the Sim card, the handset, the contactless readers and the tags
- The eNFC chip acts as a router



System Overview

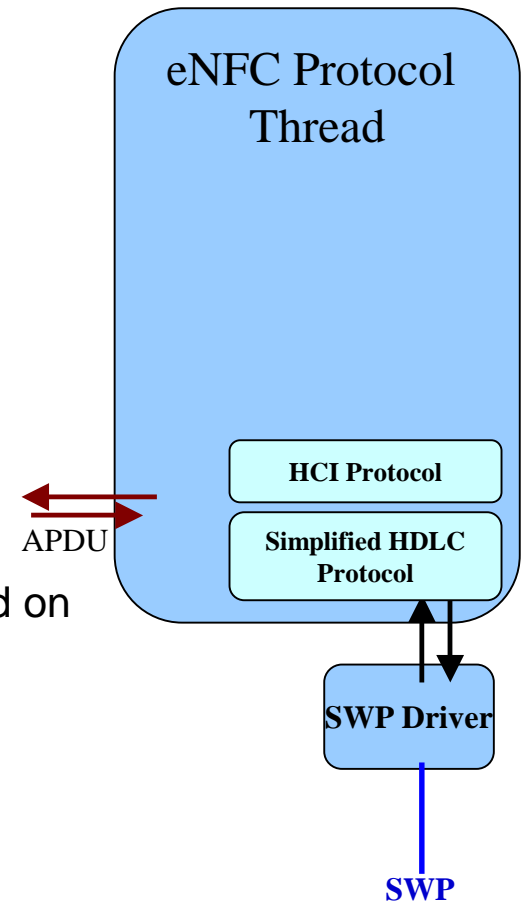
Software Architecture: The eNFC Thread

★ LSWP Protocol (Link Layer) —

- Packet Acknowledgment
- Retransmission
- Packet Sequencing

★ SWP Protocol (Physical Layer) —

- Full Duplex
- Maximum Speed of 1.5Mb/s
- The data, the clock and the control messages are carried on the same wire.
- Hardware support



System Overview

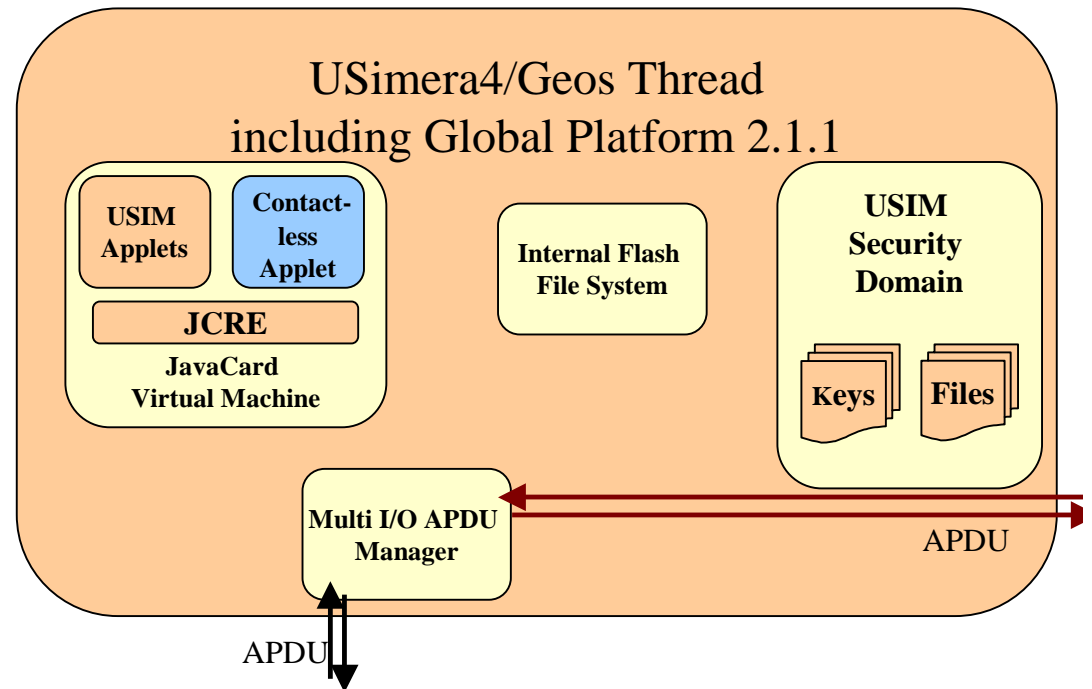
Software Architecture: The Usimera 4 Thread

★ Usimera 4 Features

- Global Platform 2.1.1
- Javacard 2.2.1
- SIM/USIM Compliance
- Memory management
- BIP, CATP

★ Multi IO APDU Manager

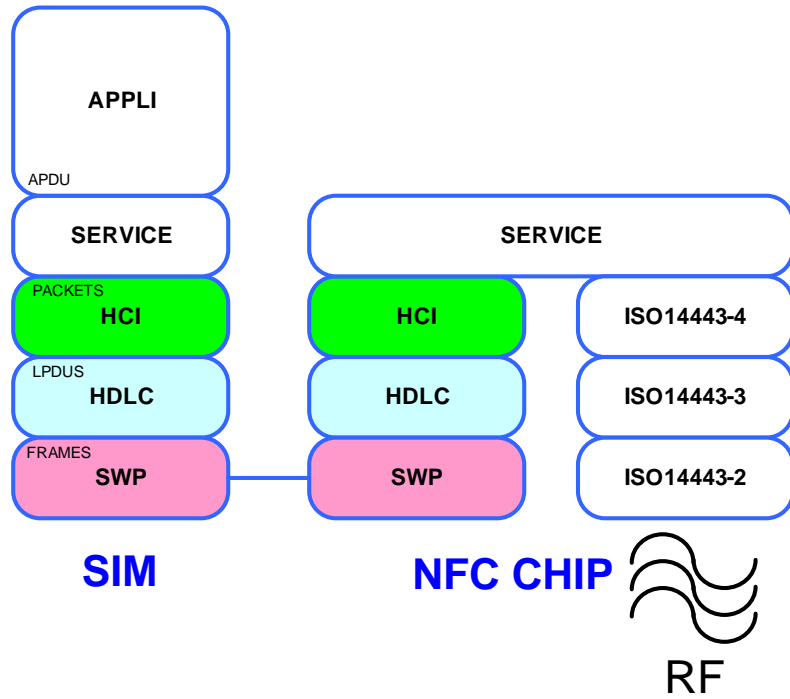
- Handles APDU coming from
 - eNFC Thread
 - ISO 7816 Driver
- Priority management



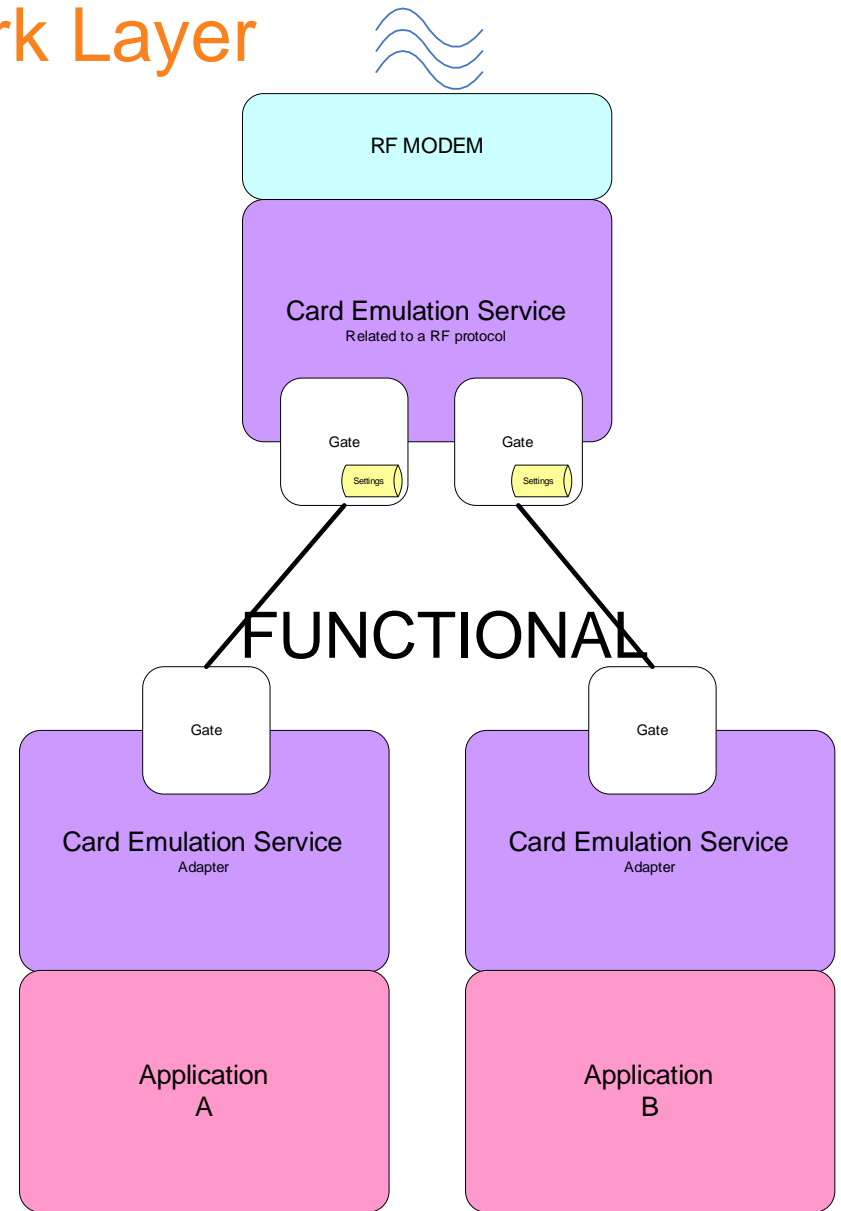
Communication Protocols with NFC chip

HCI Protocol – ISO Network Layer

Architecture



PROTOCOL
STACK



HCI Protocol – ISO Network Layer

Overview

✦ HCI Services

- Card Emulation service
 - Subscribe
 - Exchange
 - Activation
 - Deactivation
- Reader Mode Service
 - Anticol
 - Exchange
 - Open
 - Close

The End

Thank you