

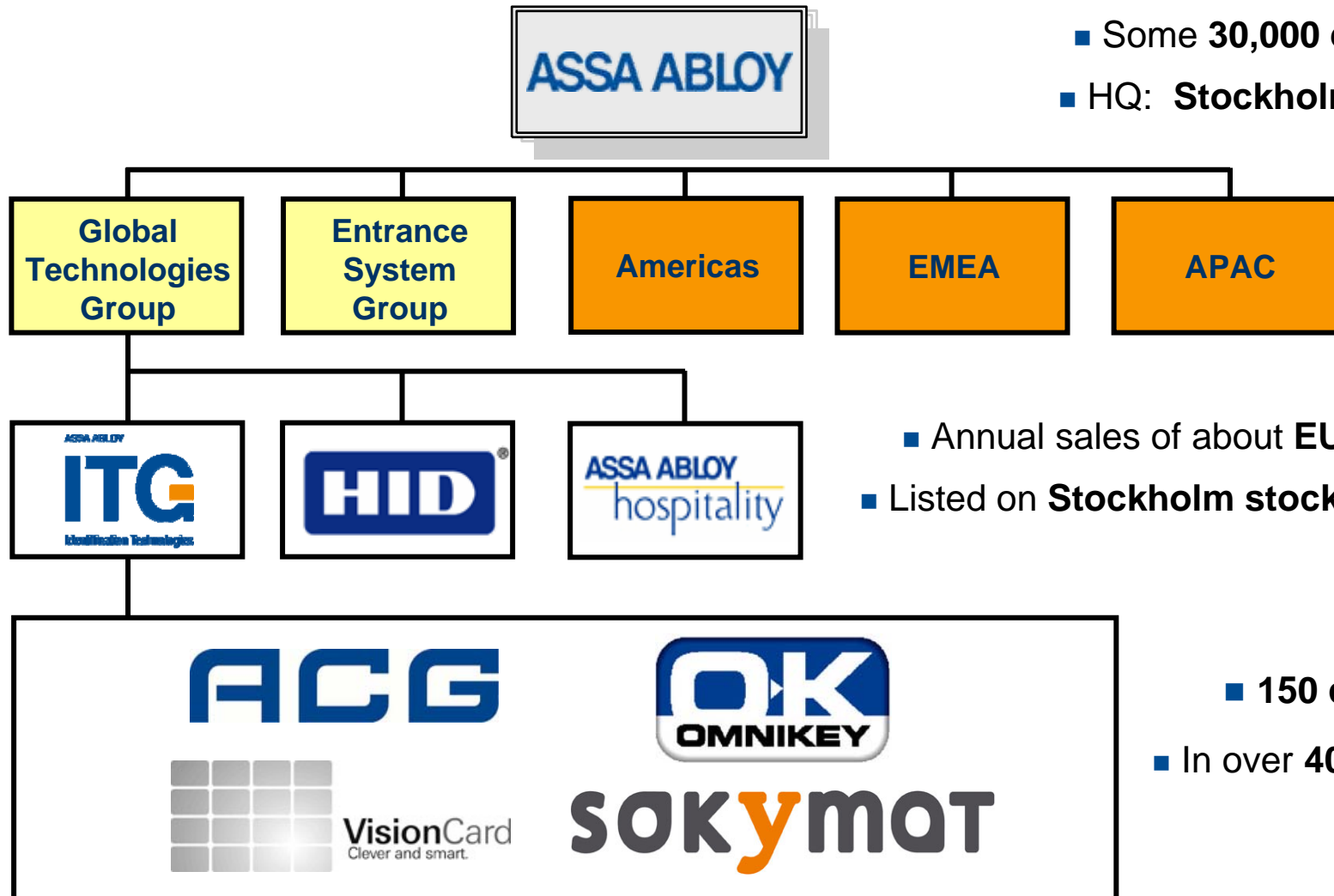


NFC in the PC environment

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March 2007

ITG within ASSA ABLOY



- A multi-national group
- Some 30,000 employees
- HQ: Stockholm, Sweden

- Annual sales of about EUR 3 billion
- Listed on Stockholm stock exchange

- 150 companies
- In over 40 countries

Content

- What are the application drivers for NFC on the PC?
- How could a hardware integration look like?
- What is available / missing on the software integration?
- What is still required in the perspective of the PC end-user?

Application drivers

- Bluetooth pairing
 - Easy and convenient setup for
 - PC to PDA, PC to Cell-phone etc.



Application drivers

- E-Payment
 - Using payment infrastructure of mobile operator
 - Pay for Internet content (e.g. business certificates, music downloads,.....)



Application drivers

- Transport - Ticketing
 - Booking on the Internet PC for higher value tickets (flights, trains) gives better orientation
 - Download to Cell-Phone AND frequent travel card (OTA only Cell-phones can be loaded)
 - Convenient display of last transactions on PC



Application drivers

- Secure log-on
 - Use your cell-phone as credential to log-on on your PC
 - Benefit is high user acceptance as mobile phone is typically not forgotten



Application usages

- **Touch & Go:**
 - 1-3 seconds for interconnection between NFC devices
 - Collect information like SmartPoster Application
- **Transact:**
 - 3-60 seconds for interconnection between NFC devices
 - Buy a ticket, reserve a hotel room
- **Stay:**
 - NFC devices interconnect for longer time to allow transactions to happen when triggered by an application
 - Logon onto computer, do digital signature when e-mail sent

Applications & Usages

| | Bluetooth pairing | E-Payment | Transport - Ticketing | Secure log-on |
|------------|-------------------|-----------|-----------------------|---------------|
| Touch & Go | X | | X | |
| Transact | | X | X | |
| Stay | | | | X |

Hardware Integration

- External devices
 - USB connected
 - Plug and play
 - PC/SC enabled
 - Working seamless for Reader/Write Mode

Hardware Integration

■ Form-factors

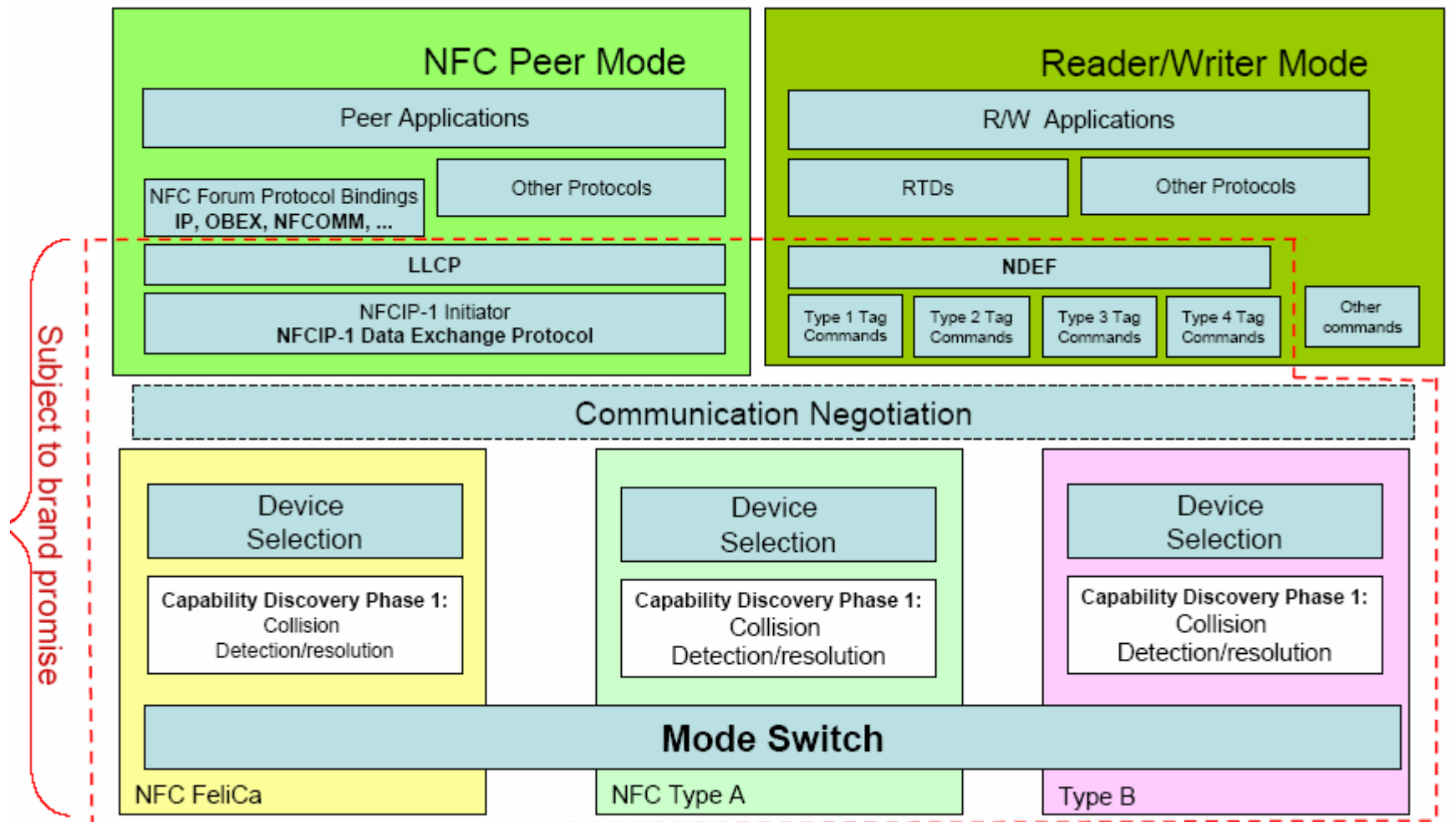
- CardMan 5331: For card or mobile-phone
 - Touch & go, Transact and Stay
 - Combination with full size contact smart card slot
- CardMan 6331:
 - NFC-SIM Dongle: Touch & Go and Transact
 - Combination with SIM-sized smart card slot



Hardware Integration

- OEM Build-In
 - Keyboard integration
 - USB
 - Touch & go, Transact and Stay
 - Display integration
 - Connection?
 - Touch & go only
 - Notebook integration
 - Touchpad combination: Only for Touch & go
 - No additional real estate necessary
 - Touch & go, Transact and Stay depending on location

Architecture



Software Integration

- NFC in Reader mode
- PC/SC 1.0
 - USB CCID driver support build-in
 - Only T=0 and T=1, no standard T=CL or Mifare support
- PC/SC 2.0
 - Added T=CL
 - No implemented functionality by Microsoft
 - Vendors support PC/SC 2.0 by IOCTL

Software integration

- NFC in peer-to-peer Mode
 - Today NFC devices have a serial to serial communication implemented (VCOMM)
 - LLCP (Logical Link Control Protocol) in definition
 - OSI layer 2 / 3 / 4
 - Comparable to L2CAP (Bluetooth) and IrLMP (IrDA)
 - Higher level protocols and application layers in discussion
 - Looking into existing protocols like Infra-Red architecture (IrDA), Ethernet or Bluetooth

Software integration

- LLCP shall transport
 - OBEX (Object Exchange)
 - SNEP (Simple NDEF Exchange Protocol)
 - IPv4, IPv6
 - NFCOMM based on RFCOMM (serial port emulation)

- OS Integration most likely like IrDA
 - Would mean OBEX support for functions like file transfer, VCard exchange,...

End-user requirements

- Seamless functionality for devices carrying the NFC logo
 - What does compliance mean?
 - What does interoperability mean?

- Definition of the minimum level of interoperability for a NFC Forum compliant device

NFC Compliant devices

- 1. An NFC Forum compliant device needs polling and listening capabilities
- 2. An NFC Forum compliant device shall be able to communicate in
 - Peer Mode according ISO 18092 NFC IP-1 and LLCP
 - Reader/Writer mode with all NFC Forum tag types (1..4) up to and incl. NDEF layer

NFC Compliant devices

- 3. The support of Card Emulation is optional for NFC Forum compliant devices
 - Currently there is no need to define NFC Forum compliant devices with mandated Card Emulation
 - To enable Card Emulation use cases, testing applications / test suites based on RF layers shall be developed by the NFC Forum.
 - The test applications for Card Emulation need to cover the RF layer and the initialisation of Card Emulation and test frames (e.g. APDU in ISO14443) in the supported modes (ISO 14443 A, ISO 14443 B and /or FeliCa).

NFC Compliant devices

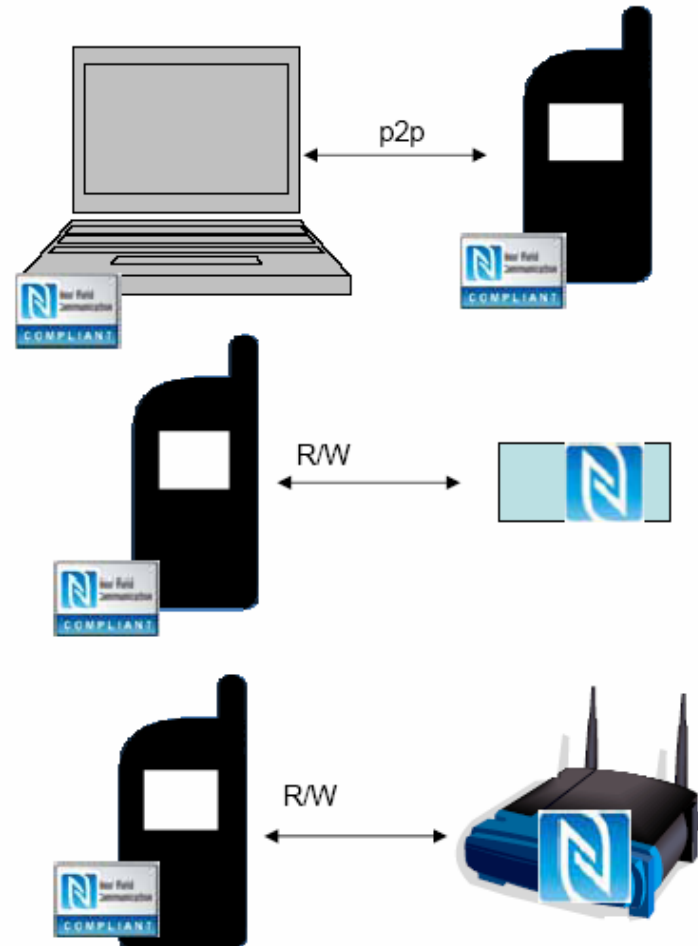
- 4. In case Card Emulation is implemented, it is optional for NFC Forum compliant devices to support emulation of NFC Forum tag types
 - To enable tag types based use cases for NFC Forum compliant devices in card / Tag Emulation mode test applications and test suites need to be developed
 - It is recommended to implement the tag type 4 for NFC Forum devices supporting NFC Forum Tag Emulation
- 5. In all communication modes graceful failure is required
 - TC/TWGs shall come up with definitions for graceful failure

NFC Compliant devices

- 6. An NFC Forum compliant device must achieve a minimum operating range
 - Range to be defined
 - Description of range needs to be defined
 - Possibly more than one range for different types of devices
- 7. An NFC Forum compliant device must be able to poll for all technologies – Type A, Type B and FeliCa.

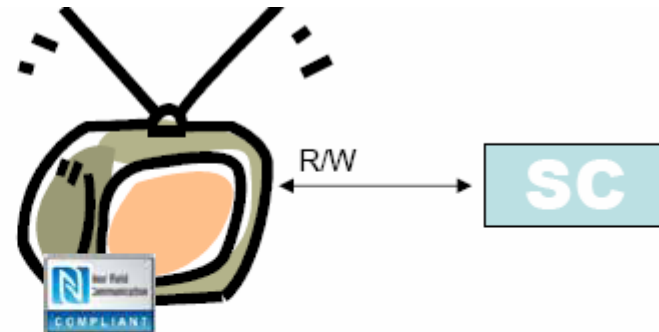
Interoperability: Defined use cases

1. An NFC Forum device (Initiator) can communicate to another NFC Forum device (target) in p2p mode and vice versa.
2. An NFC Forum device in R/W mode can communicate to an external NFC Forum tag (type 1...4)
3. An NFC Forum device emulating a type 1 ...4 tag

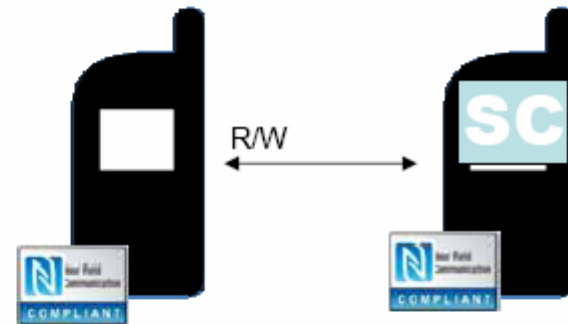


Interoperability: Legacy use cases

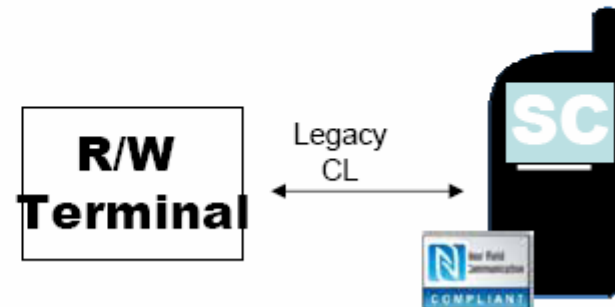
4. An NFC Forum device in R/W mode can communicate to an external smart card supporting applications out of the scope of the Forum



5. An NFC Forum device in R/W mode can communicate to another NFC Forum device emulating a smart card supporting applications out of the scope of the NFC Forum



6. An NFC Forum device emulating a smart card to be read out by an external terminal



End-user requirements

- Usage of readers for non NFC applications
 - Can a device be both PayPass and NFC certified?
 - Yes, but a different ISO 14443 dialect means a mode switch
 - Automated switch into NFC or Paypass mode?

- NFC enabled PC-connected readers have an important role in the future adoption of NFC
- Good integration concept for Reader / Write Mode already exists
- For peer-to-peer definitions need to be finalized and seamless integration and OS support needed to fit to end-user behaviors
- Combination of Contact smart card, NFC and PayPass in one device will safeguard infrastructure investment



Thank you for your interest !

For questions or comments:

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