Near Field Communication Technology and the Road Ahead

NFC Forum
Christophe Duverne
Chairman

Gerhard Romen
Marketing Committee Chairman

GSM Association
Thierry Barba, Mobile NFC Initiative

14 February 2007

Today's Agenda

- An Overview of the NFC Forum
  - Christophe Duverne, NFC Forum Chairman (NXP Semiconductors)
- The NFC Forum Technology Roadmap for 2007
  - Gerhard Romen, NFC Forum Marketing Committee Chairman (Nokia)
- GSMA and the NFC Mobile Initiative
  - Thierry Barba, (Orange/FT Group)

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NFC Technology

Near Field Communication (NFC) is a standards-based, short-range wireless connectivity technology that enables simple and safe two-way interactions among electronic devices.

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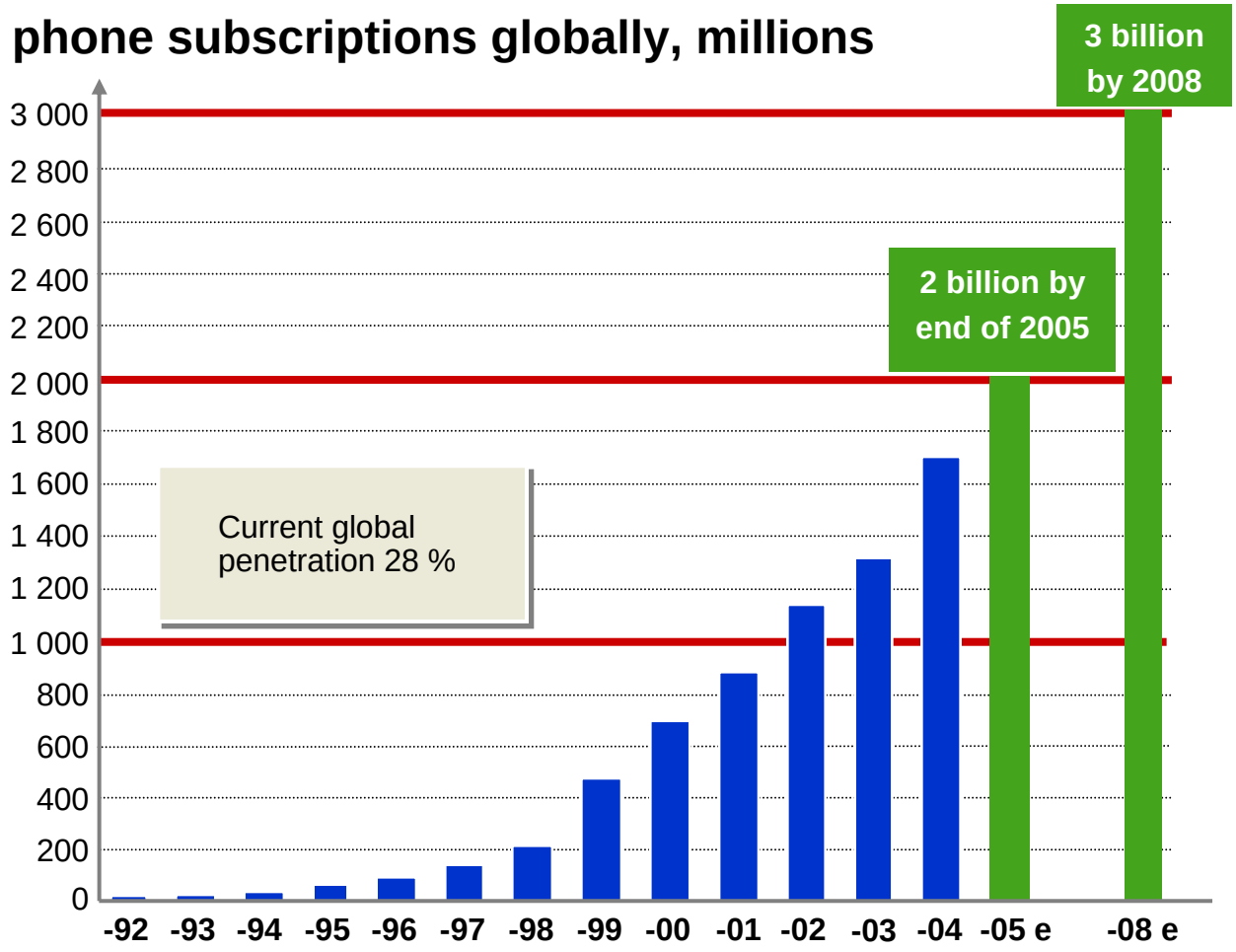
Mobile Phones Are Consumer Essentials

Mobile phone subscriptions globally, millions



Source: Nokia

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The Key NFC Applications

Connect Electronic Devices

Access Digital Content

Make Contactless Transactions

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“Touch” to Become the New “Click”

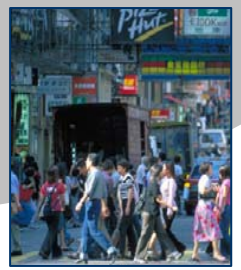
Get information by touching smart posters!

Your NFC device is your ticket!

TOUCH

Your NFC device is your travel card!

Buy goods from vending machines with your phone!



Get information about your current job or task!

Your NFC device is your credit card!

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What Analysts are Saying

- Strategy Analytics forecasts mobile phone-based contactless payments will facilitate over $36 billion of worldwide consumer spending by 2011

- ABI Research predicts by 2011, nearly 500 million cellular handsets will incorporate NFC capabilities

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Our Vision

The vision of the NFC Forum is to enable users to access content and services in an intuitive way, leading to...

- a world of secure universal commerce and connectivity…
- in which consumers can access and pay for physical and digital services…
- anywhere, at any time, using any device

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More than 100 Members Today

Our Board Members Includes These World Leaders:

MasterCard International

NEC

RENESAS

Panasonic

NOKIA

SAMSUNG ELECTRONICS

Microsoft

NXP

SONY

hp invent

VISA

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Our Mission

The mission of the NFC Forum is to advance the use of Near Field Communication technology by:

- Developing specifications
- Ensuring interoperability among devices and services
- Educating the market about NFC technology

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The Forum's Goals and Activities

- Develop standards-based specifications that define NFC device architecture and protocols for interoperability
- Encourage use of NFC Forum specifications
- Work to ensure that products claiming NFC capabilities comply with NFC Forum specifications
- Educate consumers and enterprises globally about NFC

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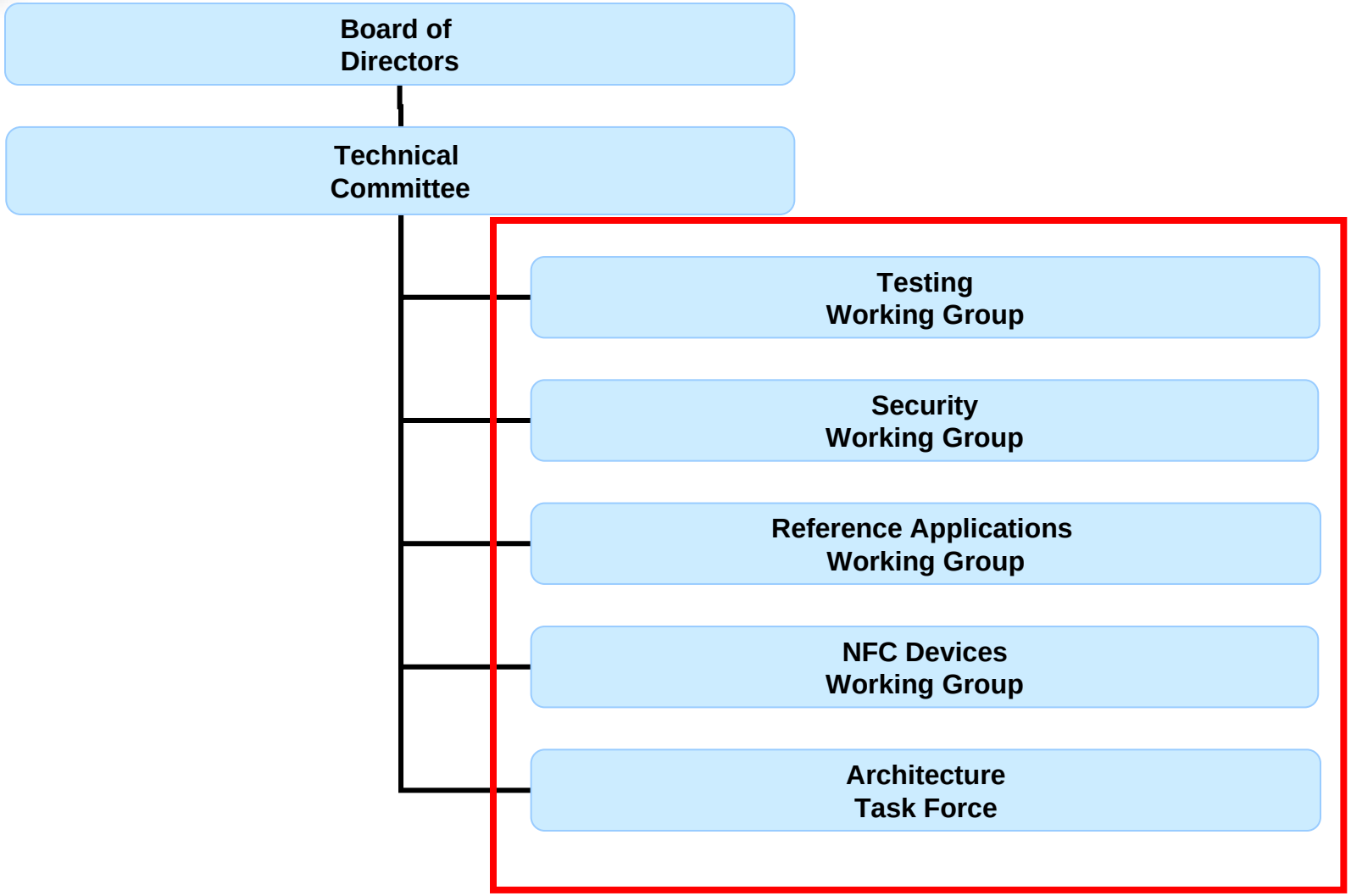
The Forum's Technical Committee Drives Our Work



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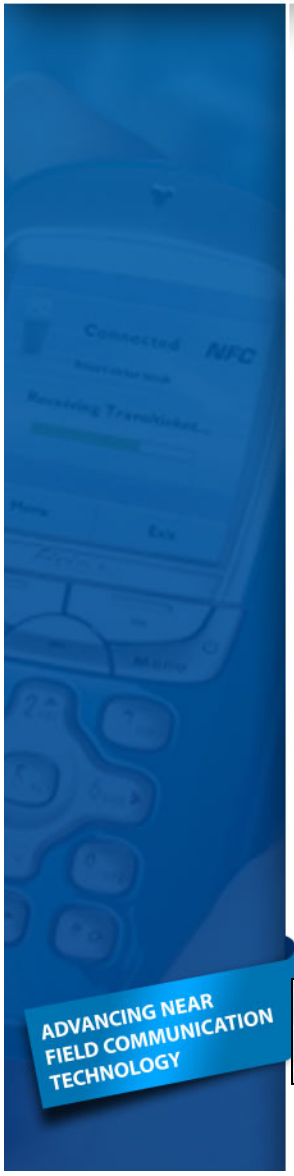
The NFC Forum Technology Roadmap

Gerhard Romen
Marketing Committee Chairman

14 February 2007

NFC Forum Technology Architecture



RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa

Specified NFC Forum Mandatory Tag Support

- The NFC Forum specified an initial set of mandatory tag formats based on ISO 14443 Type A and 14443 Type B standards, and Sony's FeliCa
  - ISO 14443 is a four-part international standard for contactless smart cards operating at 13.56 MHz in close proximity with a reader antenna
  - Compatible tags are available initially from Innovision, NXP Semiconductors, Sony and other vendors

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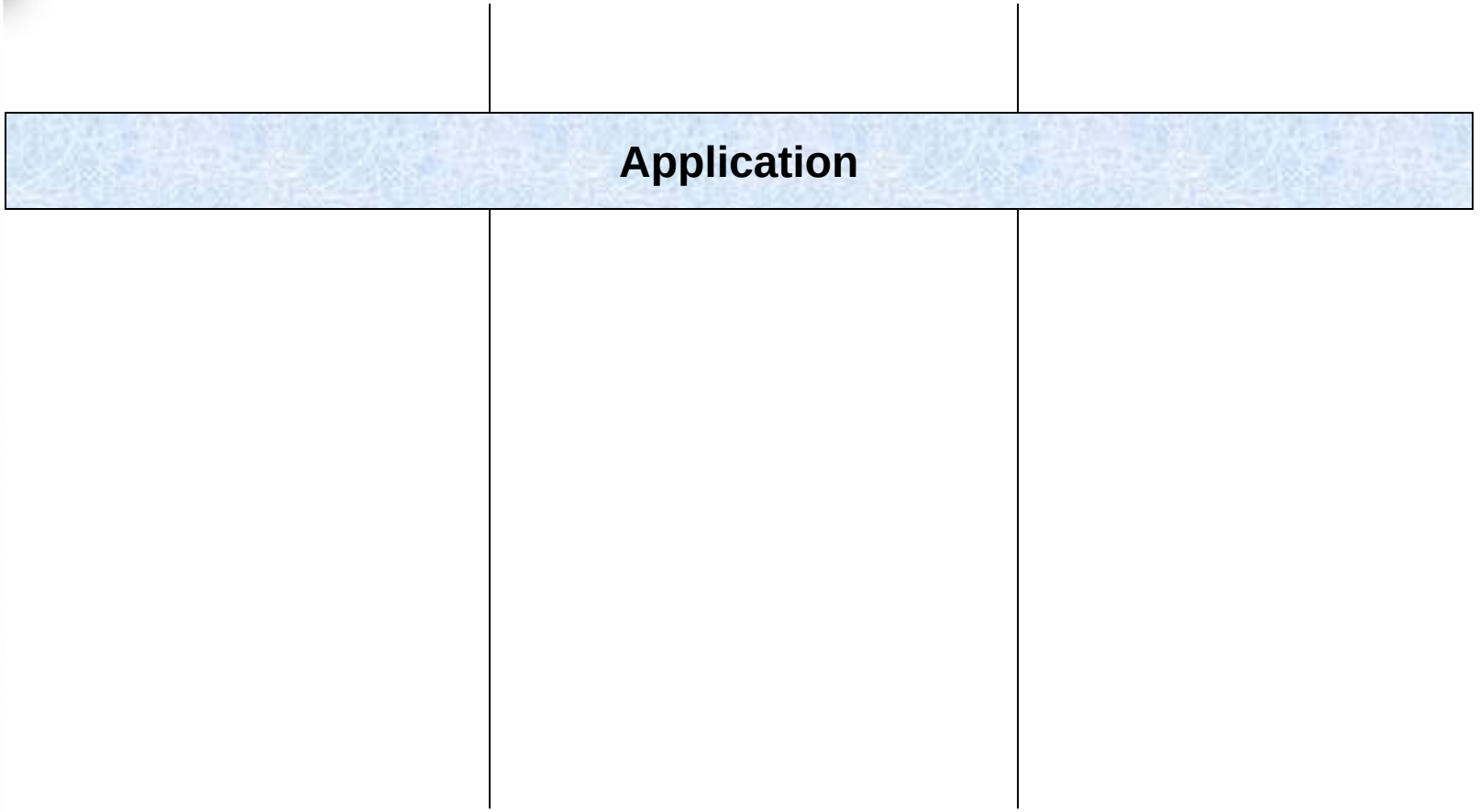
NFC Forum Technology Architecture



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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa		

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	

Card Emulation

(Smart Card Capability for Mobile Devices)

RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
	RTD **(Record Type Definition)** **&** **NDEF** **(Data Exchange Format)**	**Card Emulation** **(Smart Card Capability for Mobile Devices)**
RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa		

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Specifications Delivered in Q3-Q4 2006

- Specifications providing common formats for data sharing between NFC-enabled devices and between devices and tags
  - **NFC Data Exchange Format (NDEF)**
    - Specifies a compact, common data format for NFC Forum devices and NFC Forum tags
  - **NFC Record Type Definition (RTD)**
    - Specifies standard record types used in messages between NFC Forum devices and between NFC Forum devices and tags
    - Allows the use of internet-standard media types

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Specifications Delivered in Q3-Q4 2006

- Specifications defining specific Record Type Definitions
  - **Smart Poster RTD**
    - For posters incorporating tags containing text, audio or other data
  - **Text RTD**
    - For records containing plain text
  - **Uniform Resource Identifier (URI) RTD**
    - For records that refer to an Internet resource

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
	RTD (Record Type Definition) & NDEF (Data Exchange Format)	Card Emulation (Smart Card Capability for Mobile Devices)
	Tag type 1,2,3,4	
RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa		

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Tag Specifications by Q2

	Type 1	Type 2	Type 3	Type 4
RF Interface	ISO 14443 A-2	ISO 14443 A-2	FeliCa (ISO 18092, passive communication mode at 212 kbits/sec)	ISO 14443-2
Initialization	ISO 14443 A-3	ISO 14443 A-3	FeliCa (ISO 18092, passive communication mode at 212 kbits/sec)	ISO 14443-3
Speed	106 kbits/sec	106 kbits/sec	212 kbits/sec	106-424 kbits/sec
Protocol	Specific Command set	Specific Command Set	FeliCa protocol	ISO 14443-4 ISO 7816-4 commands
Memory Size	Up to 1 KB	Up to 2 KB	Up to 1 MB	Up to 64KB
Cost (memory dependent)	Low	Low	Moderate	Moderate
Use cases	Tags with small memory for single application		Flexible tags with larger memory offering multi-application capabilities	

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
NFC Forum Protocol Bindings **IP, OBEX, ….**	**RTD** **(Record Type Definition)** **&** **NDEF** **(Data Exchange Format)**	**Card Emulation** **(Smart Card Capability for Mobile Devices)**
NFCIP-1 **Data Exchange Protocol**	**Tag type 1,2,3,4**	
RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa		

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
NFC Forum Protocol Bindings **IP, OBEX, ….**	**RTD** **(Record Type Definition)** **&** **NDEF** **(Data Exchange Format)**	**Card Emulation** **(Smart Card Capability for Mobile Devices)**
LLCP **(Logical Link Control Protocol)**		
NFCIP-1 **Data Exchange Protocol**	**Tag type 1,2,3,4**	

RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa

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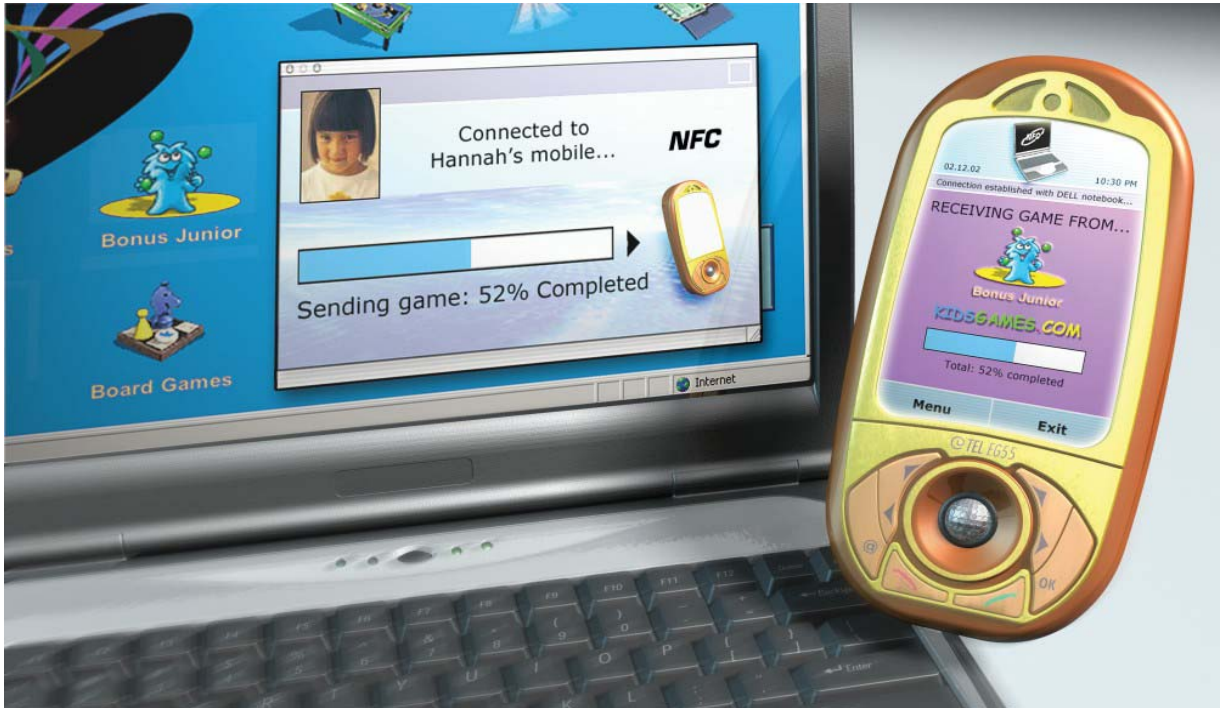
LLC Protocol for Device Interaction



Peer-to-Peer Specifications

- Defines the protocol to manage the logical link between NFC Forum devices (based on ISO 18092 / NFCIP-1)

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NFC Forum Technology Architecture

Peer-to-Peer Mode	Read/Write Mode	NFC Card Emulation Mode
	Application	
NFC Forum Protocol Bindings **IP, OBEX, ….**	**RTD** **(Record Type Definition)** **&** **NDEF** **(Data Exchange Format)**	**Card Emulation** **(Smart Card Capability for Mobile Devices)**
LLCP **(Logical Link Control Protocol)**		
NFCIP-1 **Data Exchange Protocol**	**Tag type 1,2,3,4**	
Mode Switch		
RF Layer ISO 18092 + ISO 14443 Type A, Type B + FeliCa		

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Mode Switch Specification Will Help Fulfill Multifunction Promise of NFC

Connect Electronic Devices

Access Digital Content

Make Contactless Transactions

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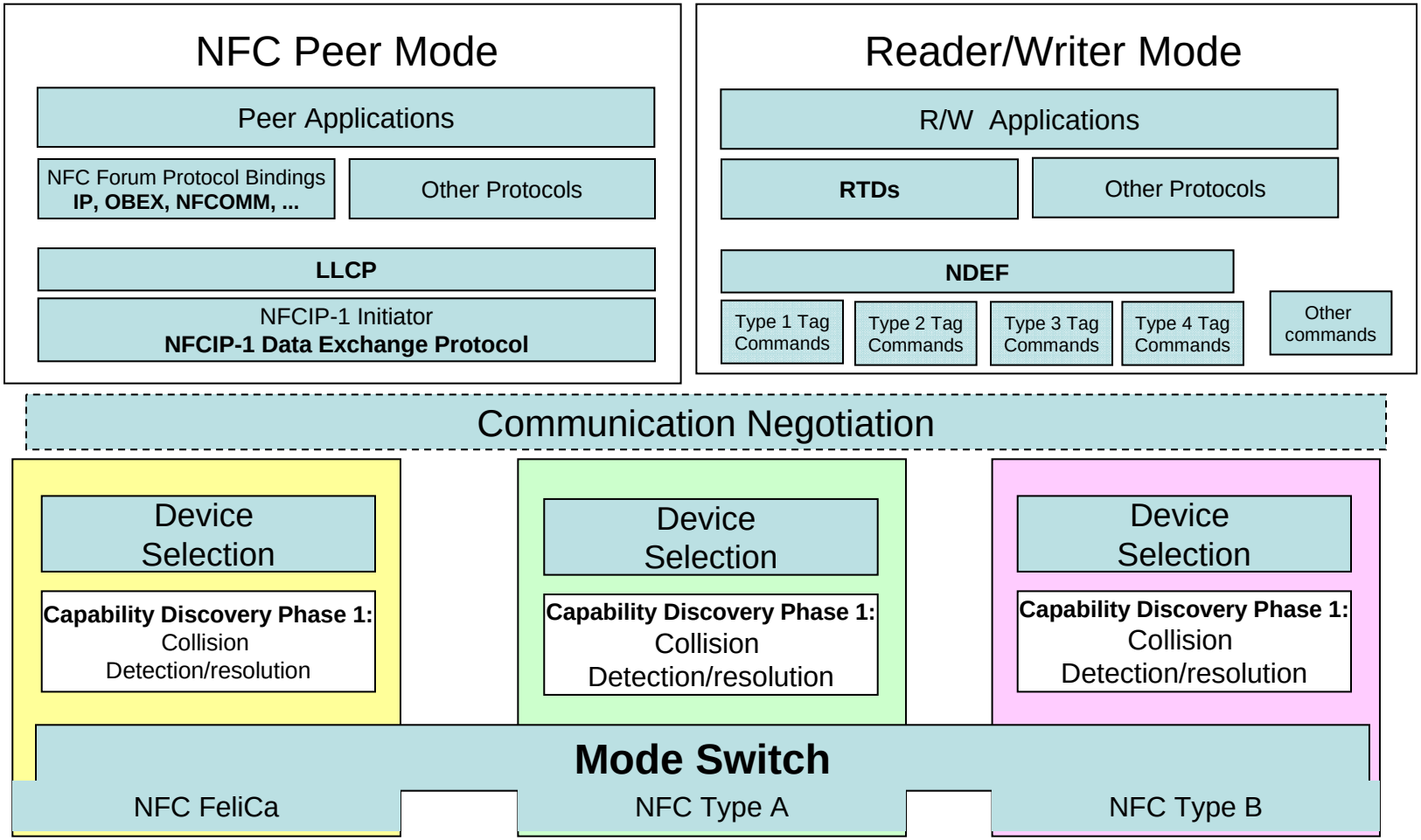
Technology Architecture

Initiator



Privacy Guidelines

- Guidelines for NFC ecosystem participants will give vendors and providers tools to ensure privacy for consumers
- Guidelines document should be released in mid-2007

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NFC Security

- Initial work complete in first half of 2007
  - Threats analysis
  - Countermeasures analysis
- Still analyzing best mechanisms for enhancing the inherent security of NFC technology (proximity)
- Also expect to work with other industry organizations like GSMA

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Testing and Interoperability Activities

- Testing specifications under development and expected to be available by end of 2007
- Also developing mechanisms to establish compliance of products and services with NFC Forum specifications, based on testing

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Some Key Deliverables for 2007

- Tag specifications, NFC Tag types 1-4
- Logical Link Control Protocol (Peer-to-Peer Specifications)
- Mode Switch Specification
- Privacy guidelines for implementers
- Security solutions
- Testing tools and mechanisms to establish product and service interoperability

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The GSM Association
Mobile NFC Initiative

Thierry Barba
GSM Association
(Orange / France Telecom)

Feb. 14, 2007

The GSMA Mobile NFC Project

- Started in September 2006
- Involving 19 of the largest Mobile Network Operators (MNOs), addressing over 45% of global subscriber base

Objectives

- Define a *common global approach* to enable mobile NFC on mobile phones
- Ensure that a *consistent approach* is taken amongst the industry to make mobile NFC services *compliant with customer needs*
- Make mobile NFC *a successful business case* with value for *all players*

Mobile NFC Project Deliverables

A series of White Papers that will be shared with the industry players, addressing:

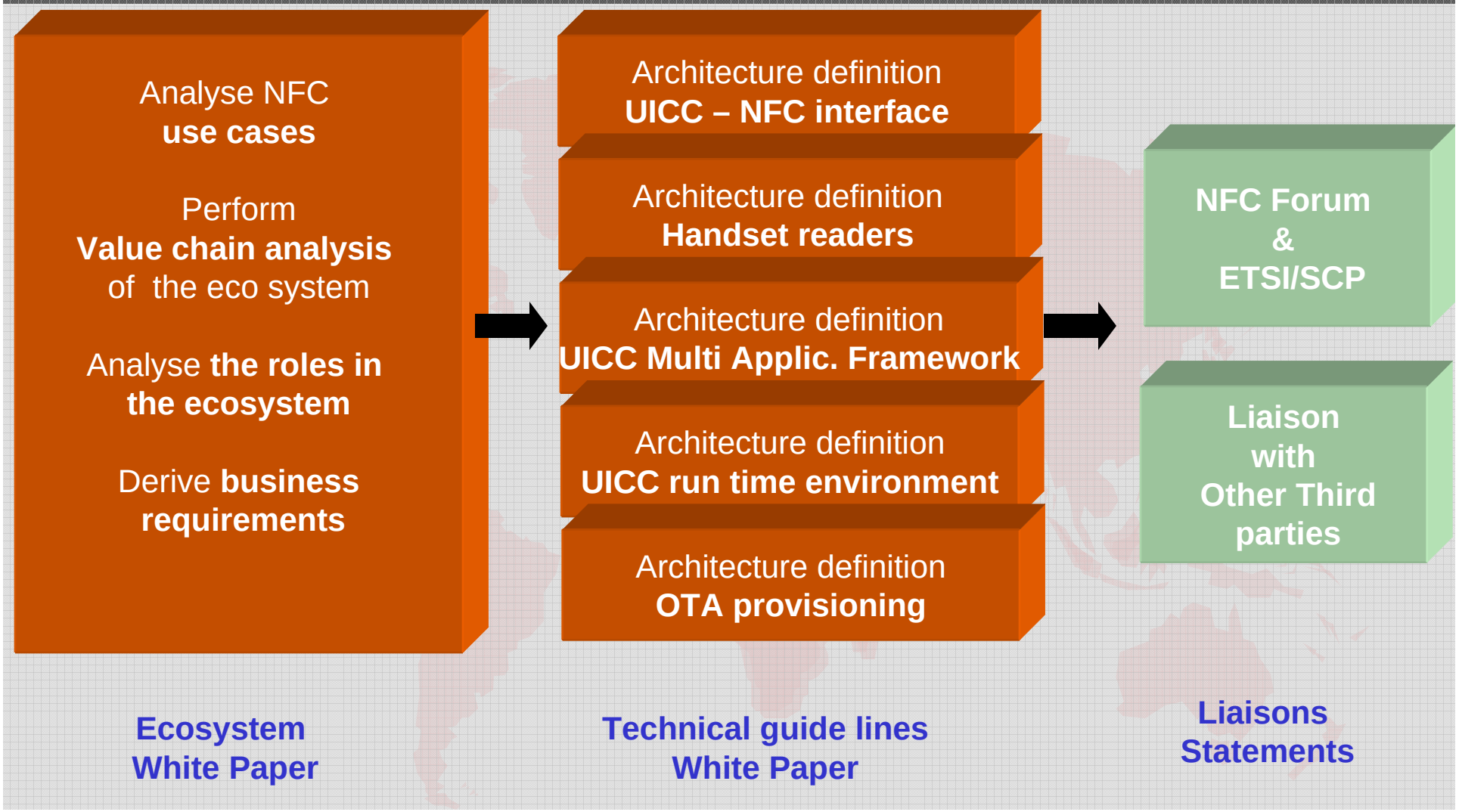
(A) The mobile NFC Ecosystem

(B) Technical Guidelines

A series of technical inputs to standardisation bodies (e.g. ETSI, NFC Forum) to support the standardisation effort

GSMA is not developing the NFC standard

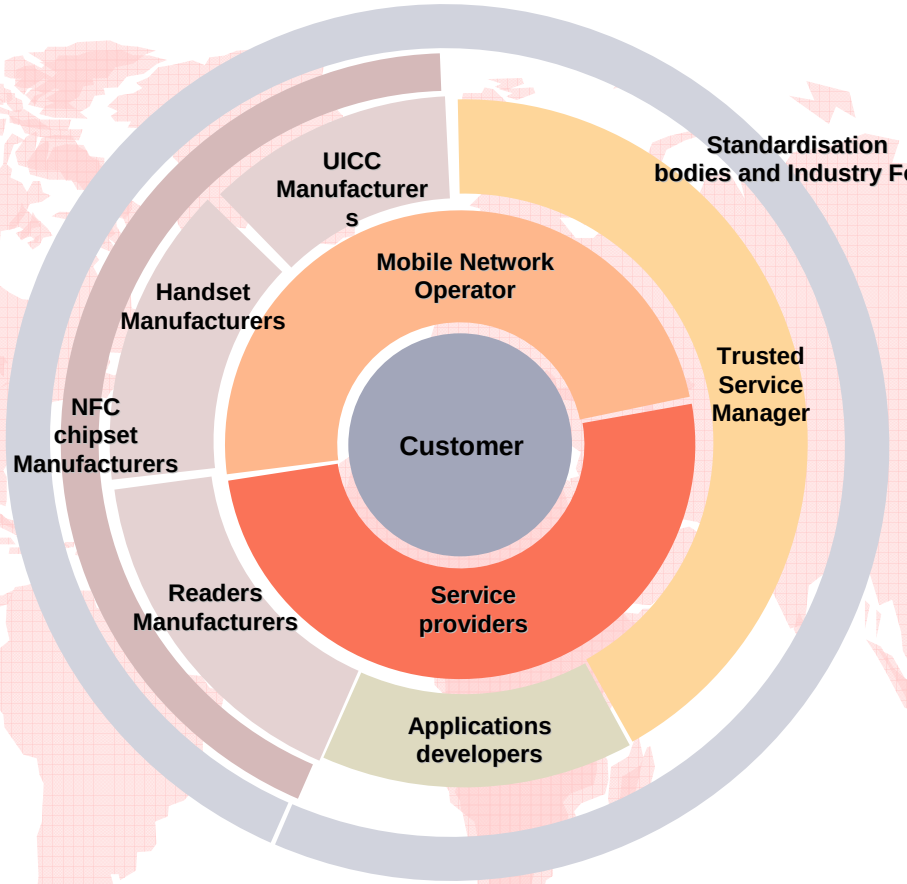
Mobile NFC Project Approach



Mobile NFC Project

- Key findings
  - Eco system
  - Secure Element
  - Interoperability via standards

Mobile NFC Ecosystem



- A steady ecosystem will provide value for all

Key Findings: ecosystem

- MNOs: a *key role* to play in the eco system to *enable the market* and achieve critical mass
  - Proven experience in high scale customer care & assistance
  - Ability in managing diverse services on mobile phones
  - Bring overall coherence to end users experience with their mobile phone
- Trusted Service Manager: a *new role*
  - To distribute and manage NFC services to the MNO customer base
  - To act across Services Providers (banks, credit card…) and MNOs
  - This role can be performed by independent third parties or by MNOs

Key Findings: Secure Element

- The *UICC is the most appropriate NFC secure element* for the mobile phone for the following reasons:
  - Portable and transferable (across devices and networks)
  - Universal (global penetration)
  - Dynamic remote management (a proven and widely deployed platform)
  - Logical security and physical security
  - Long life cycle, typically longer than for devices
  - Standardised
  - Host secure application (each service provider has an exclusive control over his own application)

Key Findings: interoperability via standards

- Standards are key to:
  - Reach critical mass and achieve economy of scale
  - Offer a sustainable customer experience to allow multi applications to be housed in the mobile phone
  - Leverage the mobile phone as the new form factor for contactless services

- Hot topics:
  - Backward compatibility and Interoperability between legacy (ISO/IEC 14443) and diverse contactless systems (readers, tags)
  - UICC-NFC chipset communication standardisation is required for time to market

MNOs Value Proposition (1/2)

- Ease of use *for all* End-Users
  - Integrated NFC services in mobile-services suite
  - Enriched user experience to all users of current contacless services
  - Transferability of services across devices (SIM portability)
- Trust and confidence for End-Users and Service Providers
  - Services stored on the UICC (tamper resistant)
  - UICC based on Global Platform security feature
  - Secure remote management by Service Providers

MNOs Value Proposition (2/2)

- Customer Care
  - End-User support through the MNO channel
  - High level of on instant on-demand service management (activation/revocation/ restoration of lost/stolen UICC/device)
- Cost saving and additional revenue for Service Providers
  - Increase access to customer base
  - Economy of scale on service distribution
  - Benefit from OTA provisioning based on existing MNO's capabilities (activation/revocation/ restoration of lost/stolen devices)

GSMA Relationship with NFC Forum

- GSMA provides contributions to NFC Forum efforts, in the form of:
  - Ecosystem & Technical guidelines white papers
  - Liaison Statements
- GSMA develops close alignment with the NFC Forum to attain common goals
  - GSMA invites greater MNO participation in NFC standardization efforts
- Working together will accelerate time to market
  - GSMA welcomes comments on NFC White Paper

Thank you!

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Questions

NFC Is Fast, Private and Easy

	NFC	RFID	IrDa	Bluetooth
Set –up time	<0.1ms	<0.1ms	~O.5s	~6 sec
Range	Up to 10cm	Up to 3m	Up to 5m	Up to 30m
Usability	Human centric Easy, intuitive, fast	Item centric Easy	Data centric Easy	Data centric Medium
Selectivity	High, given, security	Partly given	Line of sight	Who are you?
Use cases	Pay, get access, share, initiate service, easy set up	Item tracking	Control & exchange data	Network for data exchange, headset
Consumer experience	Touch, wave, simply connect	Get information	Easy	Configuration needed