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# **NFC Application Ecosystems: Introduction, Peer-to-Peer, NFC Tags/Posters and Product Label Applications**

- **Smart Card Alliance Mobile & NFC Council Webinar**
- **September 27, 2012**



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## Introductions

- Brent Bowen, INSIDE Secure
- Chair, Mobile & NFC Council

# Mobile & NFC Council



- *Raise awareness and accelerate the adoption* of all applications using NFC
  - Access control, identity, loyalty, marketing, payments, peer-to-peer, promotion/coupons/offers, transit, ...
- *Accelerate the practical application of NFC*, providing a bridge between technology development/specifications and the applications that can deliver business benefits to industry stakeholders.

# Mobile/NFC Ecosystem Project

## Objectives

- To educate broadly on NFC – especially beyond payment
- Describe ecosystem as it relates to the different applications (marketing, payments, identity, access, transit, peer-to-peer, posters, gaming, product labels) and different end markets (e.g., consumer, medical, enterprise) – especially beyond payment

## Application Ecosystems

- Peer-to-Peer
- Tags and Posters
- Product Labels
- Marketing
- Gaming
- Access
- Identity
- Social Networking
- Payments
- Ticketing
- Transit

# Today's Webinar Topics & Speakers



- **Introductions:** Brent Bowen, INSIDE Secure & Chair, Smart Card Alliance Mobile & NFC Council



- **Introduction to NFC Ecosystems:** Doug Morgan, C-SAM



- **Peer-to-Peer Applications:** Bart van Hoek, Collis/UL



- **NFC Tags and Posters:** Rob Zivney, ID Technology Partners



- **Product Labels:** Brent Bowen, INSIDE Secure

- **Q&A:** Randy Vanderhoof, Smart Card Alliance





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# **An Introduction to Mobile / NFC Ecosystems**

- **Doug Morgan, C-SAM**
- **Smart Card Alliance Mobile & NFC Council**

# Intro to NFC & Ecosystems

- **What is NFC (Near Field Communications) ?**
  - Short range wireless (1-4 cm typical, 10 cm theoretical)
  - Low speed (106 to 424 kbits/sec)
  - User friendly and simple (no discovery, no pairing, just “tap”)
  - Passive capability (for many applications one of the devices can be unpowered)
  
- **How can it be used?**
  - Three primary operating modes: Card Emulation, Reader/Writer, Peer-to-Peer
  - Card Emulation allows a mobile phone to simulate a physical contactless card
  - Reader/Writer allows reading or writing information to or from a passive tag/poster
  - Peer-to-Peer allows bidirectional communication between devices
  
- **What types of applications can it support?**
  - Payments at a POS, use of the phone as a transit ticket, physical access
  - Accessing information or triggering an event with a tap (e.g., smart posters, product information, store check-in, triggering marketing offers)
  - Exchanging business cards or other information
  - Connecting devices with a tap (e.g., create a bluetooth pairing, link to a wifi)

# Intro to NFC & Ecosystems

## ➤ What is an “Ecosystem” ?

- The collection of business entities which need to collaborate to provide an overall solution or application.
- Example – an NFC payment ecosystem consists of the entities required to provide all necessary elements – from a mobile handset, to a network operator, to a point of sale terminal, to a TSM to provision the card to the phone, to a processing network to acquire and settle the transactions – that would ultimately allow a consumer to make a payment using their NFC enabled phone.

## ➤ The application defines the Ecosystem

- Each top level mobile NFC solution or application area will require a potentially different set of players to fully implement it.
- However, there are some common Ecosystem players that will be required across virtually all mobile NFC application areas.



# Basic Mobile / NFC Ecosystem Players

Category	Examples	Role
<b>NFC handset manufacturer</b>	<ul style="list-style-type: none"> <li>HTC, Huawei, LG, Nokia, Pantech, RIM, Sagem, Samsung</li> </ul>	<ul style="list-style-type: none"> <li>Designs and manufactures mobile phones</li> <li>Defines which mobile phones are NFC-enabled</li> </ul>
<b>Operating system provider</b>	<ul style="list-style-type: none"> <li>Apple, Google, Microsoft, RIM</li> </ul>	<ul style="list-style-type: none"> <li>Maintains phone OS and provides APIs to developers creating applications</li> <li>May provide wallet or other value-add applications</li> </ul>
<b>Mobile network operator</b>	<ul style="list-style-type: none"> <li>AT&amp;T, Verizon, Sprint, T-Mobile</li> </ul>	<ul style="list-style-type: none"> <li>Provides mobile network services to consumer and provisions wireless settings</li> <li>Determines handset features/functions and service options</li> </ul>
<b>Application service provider</b>	<ul style="list-style-type: none"> <li>Banks, retailers, enterprises, government, transit agencies, security manufacturers, marketing applications</li> </ul>	<ul style="list-style-type: none"> <li>Offers application or use cases that will be implemented on consumer's mobile phone and use the NFC functionality (e.g., payment, access, coupons, transit)</li> </ul>
<b>Wallet developer/provider</b>	<ul style="list-style-type: none"> <li>C-SAM, Google, VIVOftech</li> </ul>	<ul style="list-style-type: none"> <li>Develops wallet and/or application and UI to manage NFC applications</li> <li>Wallet or App can be preinstalled or downloaded via app store or Internet</li> </ul>
<b>Consumer</b>	<ul style="list-style-type: none"> <li>n/a</li> </ul>	<ul style="list-style-type: none"> <li>Uses the various NFC applications installed on their mobile device</li> </ul>

# Security and Secure Elements

## ➤ What about security?

- The level of security required varies with the application – from no security to read a tag and access a URL or obtain product information, to a high level of security to provision a credit card to a phone and then make a purchase thru an NFC “tap”.

## ➤ What is a “Secure Element” ?

- A tamper proof smart card chip to provide secure storage of high value credentials for higher security applications such as payment and transit.

## ➤ Forms of Secure Elements

- Secure Elements can be incorporated on the SIM, embedded in the handset, or added externally as a microSD or through an add-on sleeve. External solutions also allow for the addition of NFC capability to non-NFC phones.

## ➤ Effect on ecosystem

- Whether a Secure Element is required for an application and the form in which it is implemented affect the ecosystem and the business model for that application. The presence of an SE requires an entity or entities (TSMs) to manage the keys and provisioning of the SE, and also necessitates a business model that accounts for this ownership and control.

# Add'l Players in a SE-based Application

Category	Examples	Role
<b>Secure element manufacturer</b>	<ul style="list-style-type: none"> <li>• <u>SIM &amp; Embedded</u>: Gemalto, G&amp;D, Infineon Technologies: INSIDE Secure, NXP Semiconductors, Oberthur, STMicroelectronics</li> <li>• <u>microSD and Add-Ons</u>: DeviceFidelity, Tyfone, Watchdata, Wireless Dynamics</li> </ul>	<ul style="list-style-type: none"> <li>• Manufactures secure element in UICC, embedded SE, microSD or other form factors or add-ons that incorporate an SE</li> </ul>
<b>Trusted service manager</b>	<ul style="list-style-type: none"> <li>• Bell ID, Cassis, First Data, Gemalto, G&amp;D, Oberthur Technologies, SK C&amp;C</li> </ul>	<ul style="list-style-type: none"> <li>• Provides over-the-air (OTA) provisioning and lifecycle management services to the NFC application issuer and the owner of the SE</li> <li>• Multiple TSMs may be involved – e.g., secure element issuer TSM and service provider TSM</li> </ul>



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# Peer-to-Peer Applications

- Bart van Hoek, Collis
- Smart Card Alliance Mobile & NFC Council

## NFC forum defined 3 types of NFC

- Reader/Writer Mode
- Card Emulation Mode
- P2P Mode



# What Is Peer-to-Peer?

## Broadcast *and* Peer-to-Peer



1 Speaking  
99 Listening



50 Speaking  
50 Listening



## Examples – Data Transfer



*I am using SNEP  
and NDEF Push  
Protocol*

ANDROID BEAM

## Examples – Pairing




First NFC, then  
Bluetooth

# Examples – Gaming



## Examples – Payment



*Most payments schemes are based on card-emulation, but not me.*

Tap phones, hold,  
and wait for the buzz

# Industry Players



OS Developers



NFC

Application Developers

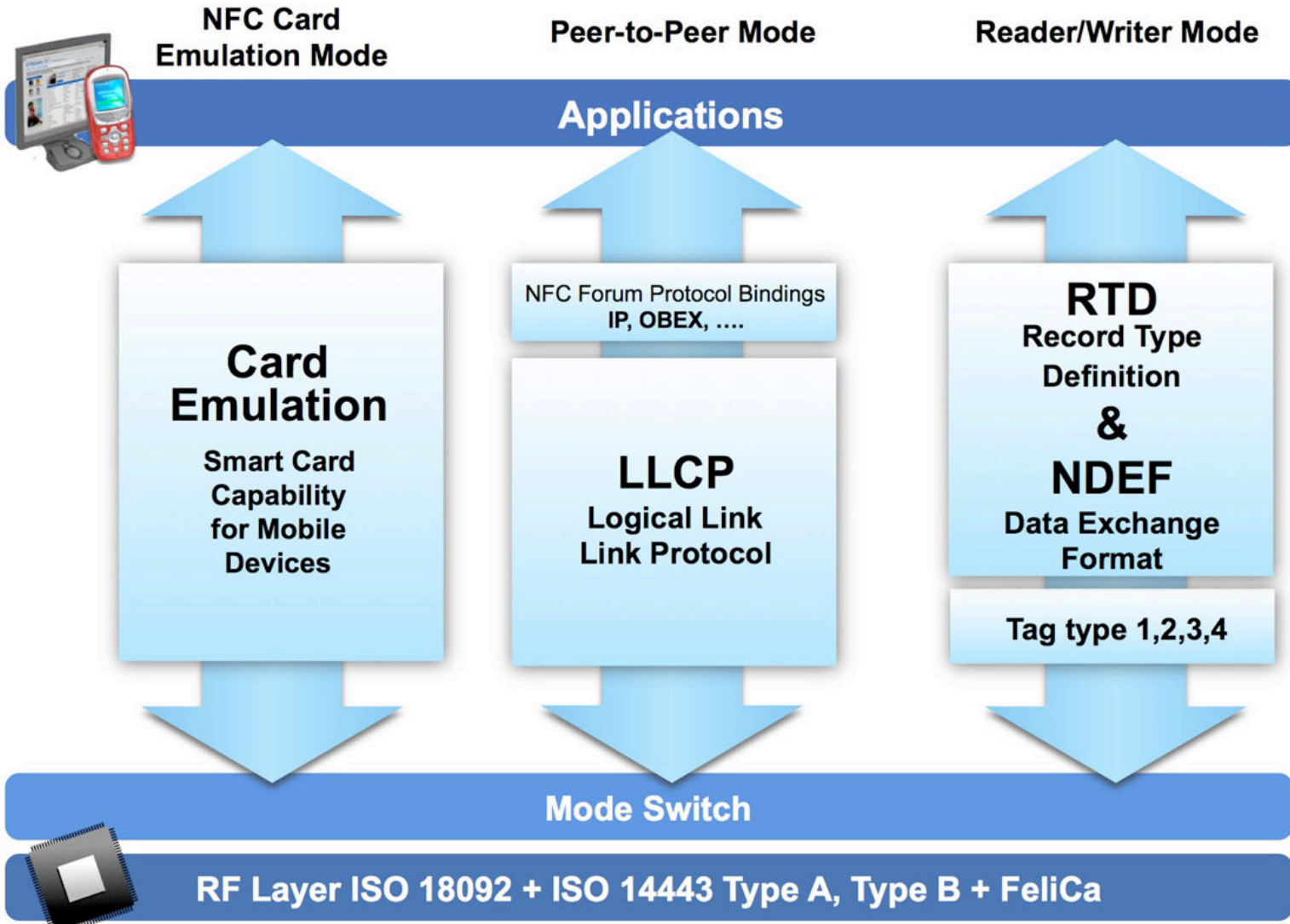


Chipset Manufacturers



Peripheral Manufacturers

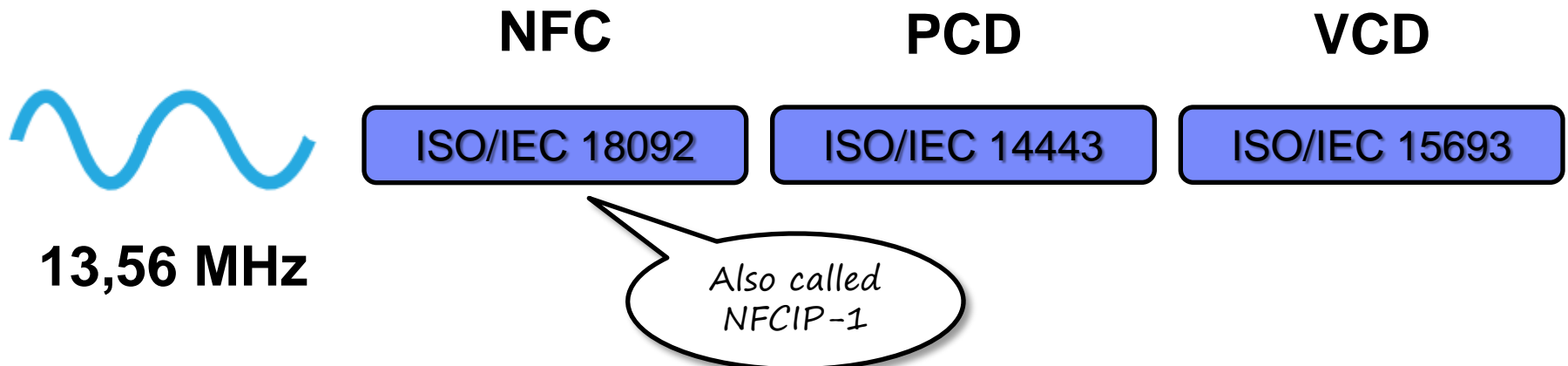
# Specs and Modes



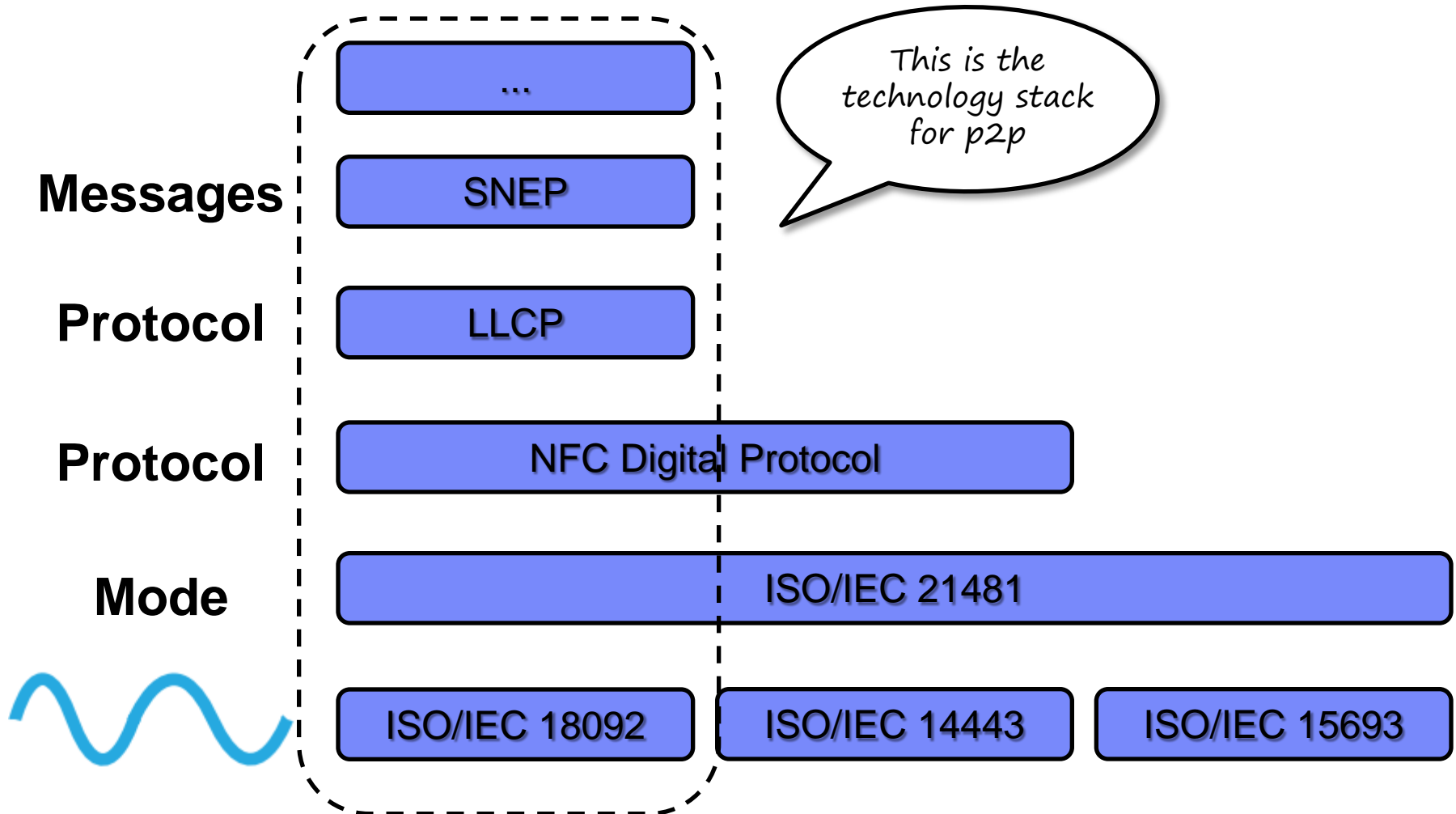


# Radio Frequency

- RF signal interface
- Initialisation
- Anti-collision
- Protocols



# Peer-to-Peer



## To Summarize

- P2P has a huge potential
- Unexplored opportunities
- Handset manufacturers will implement P2P
- We will see a lot in the near future
  - App developers
  - Peripheral Manufacturers



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# NFC Tags and Posters

- Rob Zivney, Identification Technology Partners
- Mobile & NFC Council

# Smart Tags & Posters

## Research Stuff

- URL Links to Websites
- Product Data
- Dynamic Updates
  - Writable
  - Better than QR codes

## Movies

- Launch Video Trailers

## Privileges Wristbands

- Events, Theme Parks
- Spa & Fitness

## Get Coupons etc

- Scan Tags
- Trade Show Promotions
- Storefront Promotions

## Location Based Services

- Collect Data

## Then Buy Stuff

- Via Mobile Wallet



# Got NFC? A Tag-Centric Perspective

## Tags, Stickers, & Inlays



## SDKs



## Readers



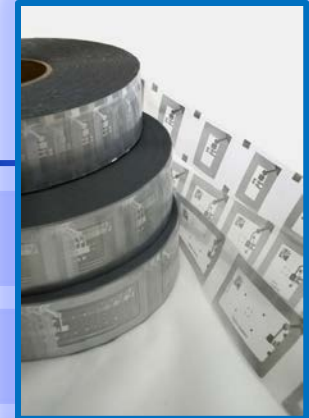
A Card & A Reader



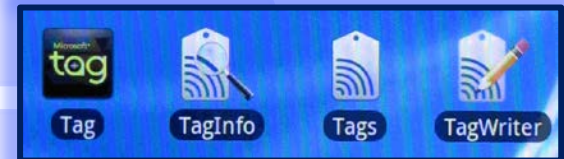
## Apps



# The Tag Value Chain



Smart Chips	<ul style="list-style-type: none"> <li>•Encryption Options</li> </ul>
Antennae	<ul style="list-style-type: none"> <li>•RFID Expertise &amp; Consulting</li> <li>•Standard and Custom Designs</li> <li>•Tag on Metal (tom® solutions)</li> </ul>
Inlay Designs: Chip + Antenna	<ul style="list-style-type: none"> <li>•Frequency Tuning Services</li> </ul>
Embed Inlays in “Paper or Plastic”	<ul style="list-style-type: none"> <li>•Tags, Cards, Fobs, Stickers</li> <li>•Shipped on a Roll, Fanfold, Singulated</li> </ul>
Bulk Production	<ul style="list-style-type: none"> <li>•High and Low Volume</li> </ul>
Bulk Printing Services	<ul style="list-style-type: none"> <li>•Logos, etc.</li> </ul>
Bulk Encoding via NFC Readers	<ul style="list-style-type: none"> <li>•Chip Initialization &amp; Formatting</li> <li>•Chip Formatting</li> <li>•Label &amp; Inlay Inkjet Printing (UID, serial number, text)</li> </ul>
SDK’s & Applications	<ul style="list-style-type: none"> <li>•Cloud Based Tag Management Solutions</li> <li>•Content Management for Tags</li> <li>•Phone Apps</li> </ul>
2 way B2C Communication Deployments	<ul style="list-style-type: none"> <li>•Pilots for Marketing Campaigns</li> </ul>



# The Tag Value Chain

Smart Chips	<ul style="list-style-type: none"> <li>•Encryption Options</li> </ul>	<ul style="list-style-type: none"> <li>•INSIDE Secure</li> <li>•Infineon</li> <li>•Sony</li> </ul>	<ul style="list-style-type: none"> <li>•NXP Semiconductors</li> <li>•Broadcom</li> <li>•STMicroelectronics</li> </ul>
Antennae	<ul style="list-style-type: none"> <li>•RFID Expertise &amp; Consulting</li> <li>•Standard and Custom Designs</li> <li>•Tag on Metal (tom® solutions)</li> </ul>	<ul style="list-style-type: none"> <li>•Identive</li> <li>•UPM/Smartrac</li> </ul>	
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2 way B2C Communication Deployments	<ul style="list-style-type: none"> <li>•Pilots for Marketing Campaigns</li> </ul>	<ul style="list-style-type: none"> <li>•Identive</li> <li>•Proxama</li> <li>•BlueBite</li> </ul>	<ul style="list-style-type: none"> <li>•Tagsquared</li> </ul>

## Benefits of NFC Tags

- 2 Way Communications
- Low Friction Setup
  - No Discovery - No pairing
  - Can Bootstrap Bluetooth & WiFi
- Automatic! No Need to Launch App
  - Instant Gratification...It Just Works!
- Touch Sharing
  - Content, Web Page, Video, Apps
- Supports Encryption (MIFARE DESFire)
  - App Can Implement Encryption

## Standards

- Passive (Unpowered) Tags & Stickers
- No Link Level Encryption
- Includes ISO/IEC 14443, ISO/IEC 18092
  - FeliCa (Japan: Sony)
- Short Range RFID Technology (1-4cm)
  - 13.56MHz
- Low Speeds (106-414 kbps)
- Data Structures < 1KB (type 4 tag, 2KB)
- Standards Defined by NFC Forum
  - NDEF is Standardized Data Format
- Various NDEF record types for specific use cases:
  - Smart posters
    - URLs, SMSs, or phone numbers on tag
    - Read now, process later
    - Trigger apps
    - Launch a browser - View a website
    - Send SMS to a service to receive a ring tone
  - URI's
  - Digital Signatures
  - Text
  - vCard



## Rule of 3's

### NFC Devices

- NFC Enabled Mobile Phones
- NFC Readers
- NFC Tags



A Simple Migration Alternative  
Use a Sticker

### NFC Phone Operating Modes

- Reader/Writer (most common)
  - NFC Mobile (active) to NFC Tag (passive)
- Peer to Peer (least common)
  - NFC Mobile to NFC Mobile (both active)
    - Data Exchange
- Card Emulation (most commercial apps)
  - Contactless Smart Card Capability in Phone
  - Mobile Phone to NFC Reader

# Impact of SE Infrastructure on Tag?

- **Phones Use Reader/Writer Mode to Passive Smart Tags & Posters**
- **Smart Tag Apps Typically Don't Need a Secure Area in Mobile Phones**
  - Just Reading (or Writing) Non-Secure Data on a Tag
- **Secure Element Mostly Used for Card Emulation Mode**
  - Not Relevant for Smart Posters & Tags
- **Tag Apps & Use Cases Can Lead Market Growth**



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# NFC Product Labels (Proximity Marketing)

- Brent Bowen, INSIDE Secure
- Mobile & NFC Council



# NFC Product Labels in Use

- **Proximity Marketing is the wireless distribution of advertising content in a particular space or location**
- **Transmissions can be received by individuals who wish to receive them and have the necessary equipment to do so**
- **A subset of proximity marketing includes the use of NFC enabled product labels**



# Actionable or Informational

- **The proximity marketing alternatives can either provide additional information to a consumer and/or prompt an action by the consumer**

## Examples include:

- **Informational**
  - **An NFC chip providing information on a new vintage of wine just released**
  - **A comparison of this brand of peanut butter versus other brands**
- **Actionable**
  - **Based on tap at the store, an offer to save 25% in the next 30 minutes could be displayed**

# Product Labels in Action

- **Before the Internet, drink makers put prizes under the caps of their beverages**
- **With the web, manufacturers moved to codes redeemable online**
- **NFC could provide real-time rewards for consumers with a single tap**



# NFC Product Label Players

Category	Examples	Role
<b>Proximity Marketing</b>	<ul style="list-style-type: none"> <li>• Blue Bite</li> <li>• Proxama</li> <li>• Proximity Sky</li> </ul>	<ul style="list-style-type: none"> <li>• Provide proximity marketing solutions for companies who wish to deliver content to mobile phones such as vouchers, marketing and loyalty messages and the delivery of iPhone and Android apps</li> </ul>
<b>Tag Production</b>	<ul style="list-style-type: none"> <li>• Identive</li> <li>• BuyNFCTags.com</li> <li>• The NFC Dog</li> <li>• Smartrac</li> <li>• HID Global</li> </ul>	<ul style="list-style-type: none"> <li>• Create and deliver NFC tags, readers, software and related items or services</li> <li>• Provide printing and branding services</li> </ul>

# Value Chain

## Inlay Creation

- Combines the chip and an antenna into an inlay
- These inlays come in various shapes and sizes depending on the requirements

## Embed Inlay in printed or plastic form

- Embed the inlay into a tag, sticker or fob
- Special messages, URLs and other information can be encoded into the tag prior to shipping

## Readers

- Consumers can read the tags using not just mobile devices
- When building applications that will read NFC tags, SDKs are available for quicker integration and deployment

## Marketing Services

- Marketing campaigns make use of tags in product labels or posters and other publicly available material
- Consumers read tags from product labels, posters or other marketing concepts
- A mobile application isn't necessarily required
- Tag may redirect consumer to website as well for product information or call to action



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## Questions & Answers



# Mobile & NFC Council Webinar Series

- **NFC Application Ecosystems: Marketing, Gaming , Access and Identity Applications – October 11, 2012, 1pm ET/10am PT**
  - NFC Marketing Applications: Chandra Srivastava, Visa Inc.
  - Gaming Applications: Deborah Baxley, Capgemini
  - Access Applications: Tom Zalewski, CorFire
  - Identity Applications: Steve Rogers, Intellisoft
  
- **NFC Application Ecosystems: Social Media, Payments, Ticketing and Transit Applications – October 25, 2012, 1pm ET/10am PT**
  - Social Media Applications: Brent Bowen, INSIDE Secure
  - Payments Applications: Josh Kessler, MasterCard Worldwide
  - Ticketing Applications: Tom Zalewski, CorFire
  - Transit Applications: David deKozan, Cubic



## Smart Card Alliance



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- Doug Morgan, [doug.morgan@c-sam.com](mailto:doug.morgan@c-sam.com)
- Bart van Hoek, [hoek@collis.nl](mailto:hoek@collis.nl)
- Rob Zivney, [rzivney@idtp.com](mailto:rzivney@idtp.com)

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