

# Mobile ~ Just the Ticket

This whitepaper is an extract from:

## **Mobile Ticketing Transport, Sport, Entertainment & Events 2008-2013**



. . . information you can do business with

# Mobile - Just The Ticket

## I. Introduction

Juniper Research defines a mobile ticketing user as **“someone who stores a ticket on their mobile phone for later redemption”** at the point of travel, the music venue, the cinema etc.

The purchase of the ticket does not need to have been initiated on the mobile phone and, more than likely, the main point of purchase for mobile tickets is currently either online at an eCommerce website, via a telephone call centre or alternatively at a physical ticket outlet or kiosk. This definition therefore includes mobile boarding passes for air travel, even if the ticket has been purchased through a non-mobile channel. This is not to say that there will be occasions when the full end-to-end transaction – the purchase, storage and redemption – will all occur on the mobile device. This full end-to-end transaction is the ultimate mobile ticketing solution. In terms of definition of “mobile device”, we make the distinction that the primary function must be mobile telephony. This excludes other mobile devices that have a different primary function such as entertainment, e.g. digital music player or portable games console, or travel, e.g. a GPS enabled mapping device.

Organisations that control the issuance and redemption of tickets are seeing the advantages that mobile phones have over other ticketing options, namely paper-based and electronic tickets stored on a smart card. These organisations, including agencies such as Ticketmaster and Tickets.com for entertainment and live events, sporting organisations such as Major League Baseball (MLB) in the USA, and travel organisations such as IATA (International Air Travel Association) are promoting and developing mobile ticketing applications, trials and services. In addition there is a range of vendors that are, in turn, working closely with these organisations to make mobile ticketing happen.

This white paper focuses on the technology used in mobile ticketing, and provides a summary of the global market opportunity.

## 2. Mobile Ticketing Technology

Juniper Research classifies the two major mobile ticketing technologies as:

- Code (predominantly barcode)
- Contactless (RFID and NFC)

## Code (predominantly Barcode)

A code for mobile ticketing is defined as any readable, either by machine or by sight, representation of information in a visual format that is displayed on the screen of the mobile phone. However, the most popular code technology for mobile ticketing is barcodes. The first barcodes appeared in the 1940s but were not put to commercial use until the 1980s when they started appearing on retail products as a way of providing information about the product. The original barcodes, still used today, store data in the widths and spacings of printed parallel lines. Today, they can come in many variations including patterns of dots and concentric circles. The barcode is read by a scanner that can be based on laser or optical technology. Optical scanners, using digital cameras or charge coupled devices (CCDs), capture the barcode and then process the data from the captured images. This technology often surpasses laser scanners on performance and reliability and is an important technology for mobile barcodes.

There are one-dimensional (1D) and two-dimensional (2D) barcodes in use today. Traditional 1D barcodes use the bar's width to encode just a product or account number. The 1D barcode is widely used as the Universal Product Code (UPC) on millions of consumer items. 2D barcodes, such as PDF417, MaxiCode and DataMatrix, are scanned horizontally and vertically and hold considerably more data. Examples of 1D and 2D barcodes are detailed below in Figures 1 through to 5 below:

**Figure 1: One-Dimensional Barcode**

From Computer Desktop Encyclopedia  
© 1998 The Computer Language Co. Inc.



**Figure 2: Two-Dimensional Barcode (PDF417)**

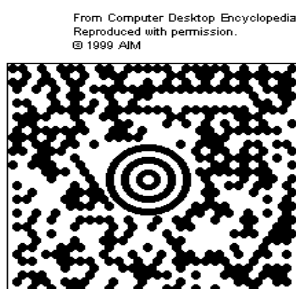
From Computer Desktop Encyclopedia  
Reproduced with permission.  
© 1999 Symbol Technologies, Inc.



**Figure 3: Two-Dimensional Barcode**

From Computer Desktop Encyclopedia  
Reproduced with permission.  
© 1999 AJM



**Figure 4: Two-Dimensional Barcode (MaxiCode) (DataMatrix)**

Most mobile phone-based barcode schemes use 2D barcodes as they can store more data in the code and have better error handling as they can still be read even though a portion of the barcode is damaged or unreadable.

In Japan, most mobile phone barcode applications use the QR Code, a 2D matrix code developed in 1994. The “QR” is derived from “Quick Response” as it can be decoded at high speed. The QR code is shown below in Figure 5:

**Figure 5: Two-Dimensional Barcode (QR Code)**

There are also other non-barcode, codes used for mobile ticketing. The most noteworthy are Active Media Technology’s RAPOS™ PIN code and the “bCODE” from bCODE. The bCODE is a character-based code that is delivered via SMS to a mobile device and then redeemed on a bespoke reader or multimedia kiosk. The code was developed by the Australian-based vendor, bCODE, and is mainly aimed at low-volume ticketing scenarios where a richer multimedia experience is required. Active Media Technology’s RAPOS™ system was used in the very successful film voucher system run by Orange, the two-for-one cinema ticket offer called “Orange Wednesdays”.

## Contactless RFID - Near Field Communication (NFC)

Contactless IC (Integrated Circuit) chip technology has been around for many years, mainly in plastic smartcard format. It is used in a variety of ways: from payment to mass transport ticketing, to physical access control, to vending. Since 2005/6, the dominant, and most successful, physical mobile payment schemes have been contactless chip based - the “wave & pay” schemes using technology that includes NFC (Near Field Communication). With these schemes a contactless chip, similar to the chips that are embedded in smartcards, is embedded into the mobile phone and interacts with a payment application that is either pre-loaded onto the phone or downloaded OTA (Over the Air).

### Technology

In June 2006, the NFC Forum announced the NFC technology architecture and the first five Forum-approved specifications. NFC is a short-range wireless connectivity technology (also known as ISO 18092) that provides intuitive, simple, and safe communication between electronic devices. Communication occurs when two NFC-compatible devices are brought within four centimetres of one another. The

underlying layers of NFC technology follow universally implemented ISO, ECMA (European association for standardising information and communication systems), and ETSI standards. NFC operates at 13.56 MHz and transfers data at up to 424 Kbits/second. One device is an NFC reader/writer and the other is a passive NFC tag which is embedded in an object such as a smart poster. The standard for contactless smart card communications is ISO 14443, dated 2001. It defines a contactless, or proximity, card that uses RFID (Radio Frequency Identification) to communicate with a reader, through the use of a magnetic loop antenna operating at 13.56 MHz. ISO 14443 consists of four parts and describes two types of cards: type A and type B. ISO 14443 uses the term PCD (proximity coupling device) (or reader) and PICC (proximity integrated circuit card). The NFC Forum also announced four initial tag formats based on ISO 14443 Type A and 14443 Type B standards, and on the NFC standard ISO 18092. NFC Forum-compliant devices must support these formats. In July 2007, the NFC Forum announced the specification of the initial tag formats to cater for the broadest possible range of applications and device capabilities<sup>1</sup>:

- Type 1 is based on ISO 14443 A and is currently available exclusively from Innovision Research & Technology (Topaz™). It has a 96-byte memory capacity, which makes it a very cost-efficient tag for a wide range of NFC applications
- Type 2 is also based on ISO 14443 A and is currently exclusively available from Philips (MIFARE UltraLight). It has half the memory capacity of Type 1 tags
- Type 3 is based on FeliCa and is currently exclusively available from Sony. It has a larger memory (currently 2kbyte) and operates at a higher data rate (212kbit/s), which means it is suitable for more complex applications
- Type 4 is fully compatible with ISO 14443A/B and is available from a number of manufacturers, including Philips (typical product example is MIFARE DESFire). It offers large memory-addressing capability with read speeds of between 106kbit/s and 424kbit/s – making it suitable for multiple applications.

NFC devices are unique in that they can change their mode of operation to be in reader/writer mode, peer-to-peer mode, or card emulation mode. The different operating modes are based on the ISO/IEC 18092 NFC IP-I and ISO/IEC 14443 contactless smart card standard:

- In reader/writer mode, the NFC device is capable of reading NFC Forum mandated tag types, such as in the scenario of reading an NFC Smartposter tag. The reader/writer mode is on the RF interface compliant to the ISO 14443 and FeliCa schemes.
- In Peer-to-Peer mode, two NFC devices can exchange data. For example, you can share Bluetooth or Wi-Fi link set up parameters, and exchange data such as virtual business cards or digital photos. Peer-to-Peer mode is standardized on the ISO/IEC 18092 standard.
- In Card Emulation mode, the NFC device itself acts as an NFC tag, appearing to an external reader much the same as a traditional contactless smart card. This enables contactless payments and mobile ticketing, for example.

NFC is also compatible with the broadly established contactless smart card markets based on ISO14443, MIFARE technology and Sony's FeliCa technology.

The integration of contactless IC technology onto the mobile phone is the natural progression for this technology. The mobile phone has a number of distinct advantages over the smart card: the phone has evolved into a very powerful mini computer that can provide value-added services, such as marketing and advertising, to the payment or ticketing operator.

---

<sup>1</sup> Source: Innovision White Paper “Near Field Communication in the real world – part II”

## NFC Uses

The most widely installed contactless smartcard technology in the world, with over 500 million smart card chips and 5 million readers sold, is MIFARE. About 75% of all contactless smart card schemes worldwide use NXP's MIFARE technology for electronic ticketing in public transport, including London, Seattle, Sao Paulo and 130+ cities in China. One example of a MIFARE implementation is the Oyster card used by Transport for London.

**Figure 6: Oyster Card Using MIFARE Technology**



Source: [www.tfl.gov.uk](http://www.tfl.gov.uk)

FeliCa is a contactless RFID IC chip smartcard system developed by Sony, nominated as a Type 3 tag format by the NFC Forum. First deployed in the Octopus mass transport system in Hong Kong, the technology is used in a variety of cards also in countries such as Singapore and Japan. FeliCa based services are available to around 50m Japanese mobile subscribers today, largely with NTT DoCoMo, but also with KDDI and Softbank.

The following chart gives a view of the wide range of potential applications for NFC.

**Figure 7: Uses of NFC**



Source: NXP Semiconductors

# Market Opportunity

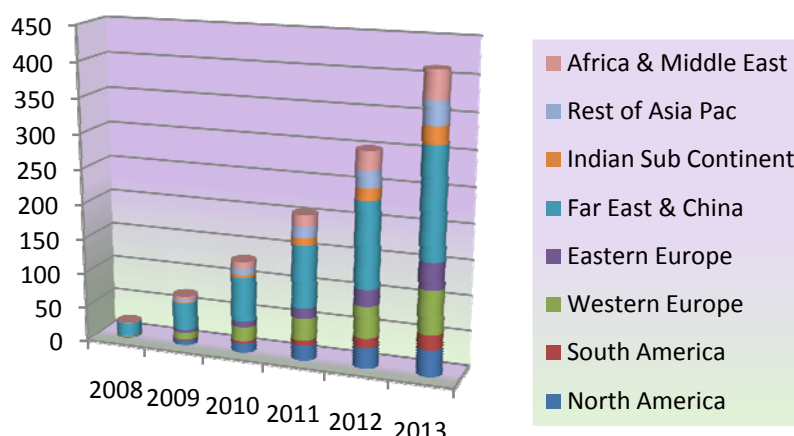
Juniper Research classifies mobile ticketing into three distinct segments:

- **Transport:** air, rail, bus/coach, sea/ferry travel.
- **Sporting Events:** all of the major spectator-attended professional sporting events around the world. This includes sport at club, national and international levels. The major club sports include Association Football (Soccer), American Football, Baseball, Rugby, Cricket, Basketball and Ice-Hockey. This is by no means a complete list of all of the major club-based sports around the world but represents some of the major ones that are watched by fans in their millions. There are also non-club sports that attract large attendances including horse-racing and motor sports, as well as large international events such as the Olympic Games and World Cup.
- **Entertainment & Events:** This segment includes most of the live entertainment events such as live music, theatre, ballet, comedy, cinema, museums and galleries, trade shows.

Figure 8 provides Juniper Research's forecasts for total mobile ticketing users covering all three market segments combined.

By 2013, over 410 million mobile phone users around the world will be receiving and redeeming tickets on their mobile phones. This is a jump from a figure of just over 22 million mobile phone users at the end of 2008, growth of nearly 400 million mobile phone users. Adoption will be particularly strong in the Far East and China with 16% of mobile phone users taking advantage of using tickets stored on their mobile devices by 2013.

**Figure 8: Total Mobile Phone Users (m) Who Use Mobile Ticketing: Regional Forecast 2008-2013**



Source: Juniper Research

## Order the Full Report

### Mobile Ticketing: Transport, Sport, Entertainment & Events 2008-2013

This whitepaper is taken from Juniper Research's report entitled "Mobile Ticketing: Transport, Sport, Entertainment & Events 2008-2013". In the full report, Juniper provides the most up to date view of the



mobile ticketing market and includes a six year forecasting suite of all the vital data and analysis that vendors, service providers, ticketing agencies and operators in the transport, sporting events and entertainment events sectors need to maximise revenues in this emerging sector.

The report investigates the current state of the mobile ticketing market based on a primary research interviewing programme with CxO level management from a range of industry participants, including leading vendors, transport operators, industry associations, entertainment and sporting organisations, and also secondary research. As well as providing unique insight on the products, plans and strategies of a number of leading companies, the interviews enabled Juniper Research to garner the live feedback on market drivers, constraints, trends and growth prospects.

This report provides six year forecasts, across eight regions of the world (North America, South America, Western Europe, Eastern Europe, Far East & China, Indian Sub Continent, Rest of Asia Pacific and Africa & Middle East). Forecasts show subscriber take-up, ticket prices, transaction volumes and gross transaction values for the transport, sporting events and entertainment events segments.

Key Questions answered by this report:

- How many mobile subscribers will use their mobiles to buy tickets over the next five years?
- Which will be the leading regions in the market in 2013?
- What will be the size of overall mobile ticketing transaction values?
- What are the trends, drivers and constraints affecting the development of the market?
- How are leading ticketing agencies incorporating the mobile into ticket purchase and delivery?
- What will be the trend in ticket prices over the next five years?
- What will be the size and growth of the transport, sporting and entertainment/events mobile ticketing market over the next five years?

For more details on this report visit the website [www.juniperresearch.com](http://www.juniperresearch.com) or phone +44 (0)1256 830002.

## Juniper Research Limited

Juniper Research specialises in providing high quality analytical research reports and consultancy services to the telecoms industry. We have particular expertise in the mobile, wireless, broadband and IP-convergence sectors. Juniper is independent, unbiased, and able to draw from experienced senior managers with proven track records.

### About the Author

---

**Howard Wilcox** is a Senior Analyst with Juniper Research, and author of the Mobile Payments Markets reports series, along with the Mobile Broadband, Fixed WiMAX and Mobile WiMAX reports. He is frequently interviewed by industry journals in both the mobile and finance sectors, and has also been video interviewed by a leading international bank and by the broadcast media including the BBC. Howard spoke EFMA Conference on Mobile Financial Services in November 2008 in Athens.

Howard has over twenty five years' experience in the Telecommunications sector, and has extensive experience of analysing markets, vendors and service providers in the telecoms networks marketplace. He was previously Director of Industry Intelligence at Marconi, where he has spent most of his career in a variety of analytical roles.

Howard has a BA in Business Administration with French from Loughborough University, and a Postgraduate Certificate in Management Development from Coventry University.



## Publication Details

Publication date: October 2008

For more information, please contact:

Michele Ince, General Manager [michele.ince@juniperresearch.com](mailto:michele.ince@juniperresearch.com)

Juniper Research Limited, Wakeford Farm Business Park, Pamber End Tadley, Basingstoke, Hampshire  
RG26 5QN England

Tel: UK: +44 (0)1256 830002/889555 USA: +1 408 716 5483

Fax: +44(0)1256 830093

Further whitepapers can be downloaded at <http://www.juniperresearch.com>