

**FINAL DRAFT**  
**ERPB INTERIM REPORT**  
**MOBILE AND CARD-BASED CONTACTLESS**  
**PROXIMITY PAYMENTS**

<b>Abstract</b>	This document presents the interim report on mobile and card-based contactless proximity payments and focuses on the vision for these types of payments and the main barriers and gaps identified through a dedicated survey to release this vision.
<b>Document Reference</b>	ERPB CTLP 38-15
<b>Issue</b>	Version 1.0
<b>Date of Issue</b>	4 June 2015
<b>Reason for Issue</b>	Interim report to ERPB meeting 29 June 2015
<b>Produced by</b>	ERPB CTLP Working Group

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## Executive Summary

This interim report provides the status of the work of the ERPB Working Group on mobile and card based contactless proximity payments. The group started its activities in January 2015 following the mandate given by the ERPB meeting in December 2014 (see Annex 1).

In order to gain a better insight into these types of payments, the Working Group decided to conduct a landscaping exercise through a survey amongst Working Group participants. The survey focused on the existing or planned mobile and card based contactless proximity payment solutions; on the related technical and security specifications and guidelines, on the related existing and planned regulations and recommendations and last but not least on the issues and barriers that may prevent the development and the adoption of pan-European solutions for these types of payments.

The survey results highlighted that the market is fragmented in terms of maturity of the contactless solutions adoption and the related technical standards implementations. Likewise, the mobile proximity payments environment shows strong complexities, mainly related to the usage of different technologies and the large number of business stakeholders involved in the mobile ecosystem.

Based on the results of the survey and subsequent inputs received, the Working Group specified an overall vision for these payments in the European Union. It further derived from the survey the barriers and gaps which need to be addressed towards the realisation of that vision. The quantitative feedback, based on the 49 inputs received may be found in Annex 4, with an indication if they are in the competitive or cooperative space. The Working Group subsequently prioritised a number of main barriers and gaps. For each prioritised barrier, this interim report provides an issue description based on the inputs received as well as related key observations made through a first - high level - analysis by the Working Group. These barriers need to be further analysed in detail by the Working Group for their accuracy and appropriateness while the key observations should be further completed. This work will provide the Working Group a basis to develop over the coming months the concrete recommendations, guidelines and actions to be taken in order for the essential conditions in the cooperative space to materialise towards the realisation of the vision, which will be documented in the final report in November 2015.

With this interim report the ERPB Working Group aims to collect high level feedback from the ERPB meeting in June 2015 on their work carried out so far.

## 0 Document information

### 0.1 Structure of the document

This section describes the structure of this interim report. Section 0 provides the definitions, and abbreviations used in this document. The scope of the work is provided in section 1. Section 2 contains a description of the methodology and survey used to gather the information represented in this report. The vision for mobile and card-based contactless proximity payments is specified in Section 3. Section 4 portrays the current situation with respect to the actual implementations or planned implementations of these types of payments through the description of country clusters. Section 5 is devoted to the description of the barriers and gaps prioritised by the ERPB Working Group which were identified through the survey. It further contains key observations related to these barriers which should be used as input for the next phase in the specification of recommendations and guidelines which will be provided in further chapters in the final report.

Annex 1 presents the ERPB Mandate while Annex 2 shows the composition of the ERPB Working Group. The survey used for the preparation of this report is provided in Annex 3. Annex 4 represents the quantitative outcome on the barriers and gaps identified through the survey. Annex 5 lists the legal and regulatory requirements identified which impact these payments while Annex 6 provides the technical and security references for these payments.

### 0.2 References

This section lists the references mentioned in this document. Square brackets throughout this document are used to refer to a document of this list.

Ref.	Title
[1]	EMVCO specifications <a href="http://www.EMVCo.com">http://www.EMVCo.com</a>
[2]	Global Platform TEE System Architecture <a href="http://www.globalplatform.org/">http://www.globalplatform.org/</a>
[3]	ISO/IEC 14443: Identification cards -- Contactless integrated circuit cards -- Proximity cards – Parts 1-4. <a href="http://www.iso.org">http://www.iso.org</a>
[4]	ISO/IEC 18092: Information technology -- Telecommunications and information exchange between systems -- Near Field Communication -- Interface and Protocol (NFCIP-1). <a href="http://www.iso.org">http://www.iso.org</a>
[5]	ISO 20022: Financial Services - Universal financial industry message scheme – Parts 1-8. <a href="http://www.iso.org">http://www.iso.org</a>
[6]	Payment Services Directive Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market.

**Table 1: References**

### 0.3 Definitions

The following terminology is applied in this document. The abbreviations used may be found in section 0.4.

Term	Definition
<b>2D barcodes</b>	A two dimensional barcode is a machine-readable optical label that contains digital information. They are also referred to as matrix barcodes. Examples include QR codes and tag barcodes.
<b>Acquirer</b>	A PSP or one of their agents that enters into a contractual relation with a merchant and an issuer via the card payment scheme, for the purpose of accepting and processing card transactions.
<b>Authentication</b>	The provision of assurance of the claimed identity of an entity or of data origin.
<b>Bluetooth low energy (BLE)</b>	A <a href="#">wireless personal area network</a> technology designed and marketed by the <a href="#">Bluetooth Special Interest Group</a> aimed at novel applications including beacons. Compared to <a href="#">classic Bluetooth</a> , BLE is intended to provide considerably reduced power consumption and cost while maintaining a <a href="#">similar communication range</a> .
<b>Card Payment Scheme</b>	A card payment scheme is a technical and commercial arrangement (often referred to as the “rules”) between parties in the card value chain, resulting in a set of functions, procedures, arrangements, rules and devices that enable a consumer (cardholder) to perform a payment transaction, and/or cash withdrawal or any other card service. The members of the card scheme can issue or acquire transactions performed within the scheme.
<b>Consumer</b>	A natural person who, in payment service contracts covered by the [6], is acting for purposes other than his trade, business or profession (as defined in [6]).
<b>Consumer Verification Method</b>	A method for checking that a consumer is the one claimed.
<b>Contactless Technology</b>	A radio frequency technology operating at very short ranges so that the user has to perform a voluntary gesture in order that a communication is initiated between two devices by approaching them. It is a (chip) card or mobile payment acceptance technology at a POI device which is based on ISO/IEC 14443 (see [3]).
<b>Contactless Card Payment</b>	A card based proximity payment where the payer and the payee communicate directly using contactless technologies.
<b>Customer</b>	A consumer or a merchant.
<b>Credential(s)</b>	Payment account related data that may include a code (e.g., mobile code), provided by the issuer to their customer for identification/authentication purposes.
<b>Digital wallet</b>	A service accessed through a consumer device which allows the wallet holder to securely access, manage and use a variety of services/applications including payments, identification and non-payment applications. A digital wallet is sometimes also referred to as an e-wallet.
<b>EMVCo</b>	An LLC formed in 1999 by Europay International, MasterCard International and Visa International to enhance the EMV Integrated Circuit Card Specifications for Payments Systems. It manages, maintains, and enhances the EMV specifications jointly owned by the payment

	systems. It currently consists of American Express, Discover, JCB, MasterCard, Union Pay and VISA (see [1]).
<b>Host Card Emulation (HCE)</b>	A technology that enables mobile devices to emulate a contactless card. HCE does not require the usage of a secure element for storage of sensitive data such as credentials, cryptographic keys, ...
<b>Issuer</b>	A PSP or one of their agents that supplies the card payment account and the card services (including card data) to the cardholder, and is a member of a card payment scheme.  The Issuer enters into a contractual relationship with a consumer (cardholder) and guarantees payment to the acquirer for transactions that are in conformity with the rules of the relevant card payment scheme.
<b>Merchant</b>	The beneficiary within a mobile payment scheme for payment of goods or services purchased by the consumer/payer. The merchant is a customer of its PSP.
<b>Mobile code</b>	A user verification method used for mobile card payments. It is a code entered via the keyboard of the mobile device to verify the cardholder's identity as a cardholder verification method.
<b>Mobile Contactless Payment (MCP)</b>	A mobile proximity payment where the payer and the payee communicate directly using contactless technologies.
<b>MCP application</b>	An application residing in a secure environment performing the payment functions related to a Mobile Contactless Payment (MCP), as specified by the MCP application issuer in accordance with the payment scheme.
<b>Mobile device</b>	Personal device with mobile communication capabilities such as a telecom network connection, Wi-Fi, Bluetooth ... which offers connections to internet. Examples of mobile devices include mobile phones, smart phones, tablets ...
<b>Mobile Network Operator (MNO)</b>	A mobile phone operator that provides a range of mobile services, potentially including facilitation of NFC services. The MNO ensures connectivity Over the Air (OTA) between the consumer and its PSP using their own or leased network.
<b>Mobile payment service</b>	Payment service made available by software/hardware through a mobile device.
<b>(Mobile) proximity payment</b>	A (mobile) payment where the consumer and the merchant (and/or their equipment) are in the same location and where the communication between the consumer device (card or mobile device) and the Point of Interaction device takes place through a proximity technology (e.g., contactless including NFC, 2D barcodes, BLE, etc.). (Mobile) proximity payments include but are not limited to (mobile) contactless payments. Contact card payments are excluded.
<b>Mobile service</b>	Service such as identification, payment, ticketing, loyalty, etc., made available through a mobile device.
<b>Mobile wallet</b>	A digital wallet accessed through a mobile device. This service may reside on a mobile device owned by the consumer (i.e. the holder of the wallet) or may be remotely hosted on a secured server (or a combination thereof) or on a merchant website. Typically, the so-called mobile wallet issuer provides the wallet functionalities but the usage of the mobile wallet is under the control of the consumer.

<b>NFC (Near Field Communication)</b>	A contactless protocol specified by ISO/IEC 18092 [4].
<b>Payment account</b>	Means an account held in the name of one or more payment service users which is used for the execution of payment transactions (see [6]).
<b>Payment Service Provider</b>	The bodies referred to in Article 1 of the [6] and legal and natural persons benefiting from the waiver under Article 26 of the [6].
<b>Payment transaction</b>	An act, initiated by the consumer of placing, transferring or withdrawing funds (as defined in [6]).
<b>POI device</b>	“Point of Interaction” device; the initial point where data is read from a consumer device or where consumer data is entered in the merchant’s environment. As an electronic transaction-acceptance product, a POI consists of hardware and software and is hosted in acceptance equipment to enable a consumer to perform a payment transaction. The merchant controlled POI may be attended or unattended. Examples of POI devices are Point of Sale (POS), vending machine, Automated Teller Machine (ATM).
<b>Secure Element (SE)</b>	A certified tamper-resistant platform (device or component) capable of securely hosting applications and their confidential and cryptographic data (e.g., key management) in accordance with the rules and security requirements set forth by a set of well-identified trusted authorities. Examples include universal integrated circuit cards (UICC), embedded secure elements, chip cards and secure digital cards.
<b>Secured Server</b>	A web server with secure remote access that enables the secure storage and processing of payment related data.
<b>Trusted Execution Environment (TEE)</b>	An execution environment (as defined by Global Platform, see [2]) that runs alongside, but isolated from a main operating system. A TEE has security capabilities and meets certain security-related requirements: it protects TEE assets from general software attacks, defines rigid safeguards as to data and functions that a program can access, and resists a set of defined threats.
<b>User Interface (UI)</b>	An application enabling the user interactions.

**Table 2: Terminology**

## 0.4 Abbreviations

Abbreviation	Term
<b>2D barcode</b>	Two dimensional barcode
<b>BLE</b>	Bluetooth Low Energy
<b>C2B</b>	Consumer-to-Business
<b>C2C</b>	Consumer-to-Consumer
<b>ETSI</b>	European Telecommunications Standards Institute
<b>GP</b>	GlobalPlatform
<b>GSMA</b>	The GSM Association
<b>HCE</b>	Host Card Emulation
<b>HSM</b>	Hardware Security Module
<b>MCP</b>	Mobile Contactless Payment
<b>MNO</b>	Mobile Network Operator
<b>NFC</b>	Near-Field Communications

<b>OS</b>	Operating System
<b>OTA</b>	Over the Air
<b>POI</b>	Point of Interaction
<b>PSD</b>	Payment Services Directive
<b>PSP</b>	Payment Service Provider
<b>QR code</b>	Quick Response code
<b>SE</b>	Secure Element
<b>TEE</b>	Trusted Execution Environment
<b>UI</b>	User Interface

**Table 3: Abbreviations**

## 1 Scope

The scope for this report on mobile and card based contactless proximity payments was specified in the mandate given in December 2014 by the ERPB (see Annex 1) to the dedicated Working Group (see Annex 2 for its composition).

The main goal is to address issues related to the muted take up of mobile and card based contactless proximity payments. Several innovative payment solutions rely on contactless technologies to perform payments or on proximity technologies to initiate payments. They usually provide a more convenient user experience at the point of interaction (POI) and a substantially faster check-out. Even though these types of payments are still at an early stage of development, there is already a trend towards setting standards that differ across schemes, devices and countries. The purpose of the work is to analyse existing solutions and standards (both national and international) and assess to what extent there are differences in standards and technical implementation preventing interoperability at pan-European level.

The Working Group has to deliver a final report to the ERPB in November 2015. This report will contain the vision for mobile and card based contactless proximity payments in the European Union, the analysis of the market conditions and a set of recommendations. These recommendations will identify concrete actions to be taken in the cooperative space in order to realise the essential conditions to materialise the vision.

The current interim report only addresses the vision and describes the main barriers and issues identified through a dedicated survey which was conducted in the Working Group.

## 2 Methodology

Throughout the first semester of 2015 the participants to the ERPB Working Group on mobile and card based contactless proximity payments gathered and analysed information related to these payments. A dedicated survey (see Annex 3) amongst the participants of the Working Group was organised to collect this information.

The aim of this survey was to provide input on the following topics:

- A. Existing or planned mobile and card based contactless proximity payment solutions;
- B. Existing or planned white papers and technical and security specifications / standards related to mobile and card based contactless proximity payments;

- C. Existing or planned regulations and recommendations / guidelines on mobile and card based contactless proximity payments, including security and privacy aspects;
- D. Issues or barriers that may prevent the development of pan-European solutions.

In total 57 responses to the survey have been received, representing 25 countries both from the demand and the supply side. The input received on existing and planned mobile and card based contactless proximity implementations is reflected in section 4.

Based on the inputs received, the Working Group specified an overall vision for mobile and card based contactless proximity payments in the European Union which is presented in section 3. It further derived from the survey the barriers and gaps which need to be addressed towards the realisation of that vision. The quantitative feedback, based on the 49 inputs received on the barriers and gaps identified through this survey, is contained in Annex 4, with an indication if they are in the competitive or cooperative space. The Working Group subsequently prioritised a number of main barriers and gaps and specified for each barrier related key observations (see section 5). These barriers and key observations will be further analysed over the coming months to develop for the final report concrete recommendations, guidelines and actions to be taken in order for the essential conditions in the cooperative space to materialise towards the realisation of the vision.

### **3 Vision**

The Working Group defined the vision for mobile proximity and card based contactless payments in the European Union as follows:

*“To ensure over time, across Europe, a secure, convenient, consistent, efficient and trusted payment experience for the customer (consumer and merchant) for retail transactions at the Point of Interaction (POI), based on commonly accepted and standardised contactless and other proximity payment technologies.”*

This vision is based on the following guiding principles:

- Technical interoperability of contactless and other proximity transactions across Europe (based on common technical, functional and security standards and certification / evaluation framework) both for consumer devices (cards, mobile devices, wearables, ...) and POIs;
- Wide availability and usability of appropriate POI equipment and consumer devices;
- Appropriate security and privacy to build up and maintain trust.

This should lead to an enhanced payment experience - faster check out, user-friendliness, better integration of value added services with payment - and to cost-effectiveness for Society.

### **4 Contactless and other proximity implementations in Europe**

To be provided in the final report

## 5 Prioritised barriers

The survey reflected that nowadays the market has considerably matured with respect to card contactless payments, largely based on the EMVCo specifications, while it appears to be still early days for mobile proximity payments, including mobile contactless payments. Concerning the latter, NFC seems to be the widest adopted technology nowadays for mobile proximity payments (in analogy to contactless card payments) although also other technology solutions have been introduced to initiate mobile proximity payments such as 2D barcodes, beacons, ... It should be noted that for the latter, the underlying payment instrument may not be a card payment.

The survey highlighted the presence of barriers and gaps for the different types of payments in scope. In view of their market maturity, less barriers and gaps have been identified for contactless card payments compared to mobile proximity payments. It is generally expected that the creation of the necessary conditions for removing these barriers might be easier for card based contactless payments rather than for mobile based proximity payments.

It is important to note that at present, this report contains the description of barriers and gaps as they have been gathered from the survey respondents and subsequent inputs received. They need to be further analysed by the Working Group in the coming months with respect to their accuracy and appropriateness in order to produce a shared assessment.

Below follows a list of the barriers which were prioritised as being valid both for contactless card and mobile proximity payments.

### 5.1 Barriers for proximity payments

#### 5.1.1 Lack of a common (open) set of specifications and implementation guidelines for proximity payments transactions

##### *Issue description*

The lack of a complete common set of (open) specifications and implementation guidelines for proximity payment transactions, - both card and mobile device based - creates differences across Europe in proximity payment products and in customer (both consumer and merchant) experience which hinder technical interoperability and prevent cost-effectiveness for Society.

More in particular, the survey identified the following issues for mobile and card based EMV contactless payments which should be addressed through standardisation work:

- Multiplicity of acceptance implementation options creating issues at the POI (e.g. PIN on line not supported, TAP + mobile code+ TAP not supported, etc...);
- Difference in implementation between online and offline transactions in different geographies in Europe may lead to an inconsistent consumer experience (and missed business opportunities for merchants and PSPs);

In addition, the following specific issues for standardisation related to mobile proximity payments were reported through the survey:

- Lack of interoperability of existing acceptance infrastructure (accepting NFC and 2D barcodes on the same POI).
- Time at check-out with POI should be at least as fast as with a card payment;

- Lack of standardisation in the payment initiation message for new proximity technologies such as 2D barcodes<sup>1</sup> or BLE;
- Lack of standards for the enrolling in digital wallets;
- The absence of standard procedures to personalise card data into secure elements;
- The presence of multiple consumer verification methods (no PIN, PIN at POI, mobile code, fingerprint,...) leading to non-interoperable solutions and consumer confusion;
- Co-existence of multiple mobile contactless payment applications on #multiple secure elements, cloud, host card emulation, etc. need to be addressed in a consistent manner to ensure optimal consumer experience.

### ***Key observations***

Within the card and mobile based proximity payments environment, the standardisation work for EMV contactless payments is already well-advanced and implemented, especially with regards to the interaction between the POI and the consumer device (either card or mobile device). Some improvements may be identified to further enhance the customer experience and solve some interoperability issues as noted through the survey. On the opposite, for other proximity payment techniques (such as 2D barcodes, BLE, etc.) there are no (open) common specifications yet and existing proximity technologies and standards are not yet widely known in the payment industry.

The most prevalent technology on the market nowadays for contactless payments is based on NFC and employs the EMVCo specifications (see [1]). EMVCo is already working on the next generation of their specifications which aim to unify the requirements for all payment contexts, covering both contact and contactless card transactions through a single specification for the POI kernel (currently multiple kernel specifications exist – to date 7 have been registered by EMVCo). The final version of these specifications, referred to as “EMV Next Generation” are planned to be released by end 2016.

The implementation of EMV Next Generation specifications could be part of a solution to create a level playing field through standardisation in the cards-to-POI and in the POI application domains. This process might be further complemented with the development of common minimum security requirements for the contactless payment application and of specifications for the POI-to-acquirer domain, the latter being addressed by other organisations such as Nexo. The migration to a single protocol in the POI-to-acquirer domain would allow moving away from domestic, proprietary protocols which hinder cross-border interoperability and would result in an improved cost-effectiveness. Simplifying the access to the card acquiring market via the standardisation of contactless card environment related specifications enhances competition.

There are EMV and GlobalPlatform specifications for personalising card data into secure elements that could be referenced in a set of standard personalisation procedures.

The lack of commonality between EMV implementations within Europe (e.g. some countries support online PIN, others do not) could be addressed through the development of implementation guidelines.

Complimentary to the development of implementation guidelines specifications and requirements, appropriate existing testing, evaluation and certification processes should be revisited and potentially further developed to meet these new requirements which should be resulting in a “unified” certification framework.

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<sup>1</sup> Note that the EPC published guidelines on the usage of QR codes for the initiation of a SEPA credit transfer (EPC 069-12) but not for the specific usage in a mobile environment.

## 5.1.2 Lack of customer demand and contactless payment experience

### ***Issue description***

A lack of familiarity makes it difficult for customers (both consumers and merchants) to employ contactless payments. Trust and confidence in these payments should be built by the industry leveraging the advantages of these solutions. The multiple solutions that exist in contactless payment products create some variations in the user experience. For example, different consumer devices can be used to initiate a contactless transaction (card, mobile, sticker, key fob, watch, etc.) and POIs may have different set-ups (see also section 3.5). Moreover, multiple consumer verification methods are available (PIN on POI, mobile code on mobile device, biometrics on mobile device or absence of any consumer verification methods, etc.). These variances contribute to the creation of a lack of clarity with regards to contactless payments and a lack of trust both from consumers and merchants. This affects the take-up of contactless payment products.

### ***Key observations***

Customers (both consumers and merchants) lack habituation with contactless payment products. More in particular, there is a lack of familiarity and trust with other form factors and technologies than contactless cards. The customer experience could be improved by defining standardised sets of rules and user interface requirements<sup>2</sup> for the different payment use cases and merchant environments which ultimately may result in a more consistent user experience across SEPA (see also section 5.1.5).

Furthermore, the consumer awareness should be increased through communication activities (with respect to liability, security, proximity habits, speed, etc.) by merchants and/or payment service providers, but possibly also through multi-stakeholder commercials. A coordinated communication effort by all stakeholders might effectively contribute to increasing the familiarity with contactless payment products. This would promote the market take-up of these solutions.

## 5.1.3 Lack of ubiquity of POIs

### ***Issue description***

The payments market is a two-sided market. This means that for a payment product to become successful, it has to be frequently used by consumers on one side, but also widely accepted by merchants on the other side. A large part of the POI terminals in Europe today is not equipped for contactless transactions yet. The average merchant take-up of contactless POIs is slow because it is usually linked to the POI lifecycle (i.e. renewal of POIs) and the associated costs. The European market presents itself fragmented in that respect; in some countries the retailers already have a large percentage of POIs which support contactless technology while in other countries only a limited number of merchants with contactless POIs are available. As a consequence, consumers which have been provisioned with a contactless payment instrument are not always offered sufficient opportunities to use contactless technology. This hinders consumer and merchant habituation and ultimately leads to an even slower take-up of contactless payment solutions.

### ***Key observations***

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<sup>2</sup> In analogy to the document developed by the UK Cards Association with MasterCard and Visa on a *Contactless User Interface for Europe and the UK*, based on *EMV Contactless Specifications for Payment Systems – Book A: Architecture and General Requirements* (see [1]).

A lack of availability of contactless POIs makes the uptake of contactless payments by consumers difficult. Note that this is not only matter of take-up by the retail sector but in some countries a lack of support from the acquirers for promoting, selling and deploying contactless POIs is to be noted.

Deployment of EMV compatible contactless POI terminals has been successful where coordination at country level took place (e.g. UK, Poland, Czech Republic). A second success factor is the involvement of particular retail sectors, such as large grocery departments, where the consumer has a recurrent payment experience or the involvement of other consumer services such as public transport.

In order to enhance the availability of contactless POI terminals, some of the (international and domestic) card schemes have mandated in Europe the migration of the POI terminal base to support contactless technology.

Where legally possible, a further incentive could be created through the deployment of contactless technologies by public authorities and administrations in the respective countries in Europe. They may play an exemplary role in this by for instance accepting contactless payments related to public services such as tax and (local) administrative fees collections.

#### 5.1.4 Security and privacy

##### ***Issue description***

Various stakeholders have a general concern about the security and the privacy issues related to contactless payments. Additional risks are perceived from the introduction and the usage of contactless technology (e.g.; short range technology used in the communication between the consumer device and the POI creating an opportunity for electronic eavesdropping) and should be adequately addressed. Also new risks associated with the usage of mobile devices (see also section 5.2.2), instead of physical cards, by the consumers pose new security challenges.

With regards to mobile proximity payments, payment credentials may be stored in new environments (such as hardware / software modules on the mobile device or back-end servers (clouds) accessed via the mobile device), each come with different security and privacy threats which need to be appropriately countered by security measures.

In case of security breaches, the appearance of subsequent fraudulent transactions may result in a lack of trust in contactless payments which in turn can hinder market take-up.

##### ***Key observations***

With respect to contactless payments in general, it is very important to have an appropriate communication towards the customers to address privacy and data protection concerns, to inform about the security of the payment instrument and to explain how (exceptional) fraudulent transactions would be handled. This communication is important to create customer (both consumer and merchant) trust which is an important pillar for an increased market take-up of contactless payment products. Merchants also expressed the need for the identification of the form factor of the consumer device at the POI.

Privacy appears to be a bigger concern with mobile proximity payments than contactless card payments. The mobile environment is seen as more vulnerable than the card.

In particular, related to the security of mobile contactless payments, the SecuRe Pay Forum drafted a preliminary set of security recommendations in 2013. This work was handed over to the EBA as one of

the potential inputs for the future development of guidelines and regulatory technical standards which will possibly be mandated within the PSD2<sup>3</sup>.

Last but not least, in the mobile proximity payment ecosystem, which is far more complex than the contactless card ecosystem and which involves many more stakeholders, a same minimum level of security for each stakeholder in the payment chain should be ensured. At the same time, a relevant distribution of liabilities should be applied accordingly amongst these stakeholders.

### 5.1.5 Consumer interaction with POI

#### ***Issue description***

Besides the lack of familiarity of consumers regarding contactless payment products in general which was mentioned in section 5.1.2, there still seems to be a lot of uncertainty when consumers face a POI and wish to perform a contactless payment: is the POI contactless enabled, where should I wave my consumer device (the POIs which are contactless enabled may have the contactless interaction point placed in different positions), has the payment been executed, do I get a receipt?

There are also accessibility issues concerning contactless POIs for people who are visually impaired or have a physical or mental disability or who are chronically ill. For example, the sound of the beep at the moment of contactless interaction is not loud enough, the palpability of certain keys is not good enough or the contrasting colors on the display make it difficult to read. These issues prevent certain groups of consumers to use contactless payment products.

#### ***Key observations***

The development of common minimum requirements for contactless POIs, including a common symbol for the contactless spot, requirements on audio feedback and on the displays and keyboards to ensure that everyone in the society is able to use contactless payment products, may contribute to a more uniform payment experience. EMVCo has already undertaken some work in that respect with specifications for the POI user interface which are contained in the EMV Contactless Specifications for Payment Systems – Book A: Architecture and General Requirements (see [1]). However, the POI vendors have a number of choices within the specified requirements.

EMVCo has also developed two contactless marks: a contactless indicator (e.g. the consumer device) and a contactless symbol (e.g. for the POI) with licensing agreements and reproduction requirements which may be found in the “Best Practices” section on their website (see [1]).

## 5.2 Additional barriers for mobile proximity payments

This section provides a description of additional prioritised barriers which apply specifically to mobile proximity payments.

### 5.2.1 Fragmented and immature mobile technology landscape

#### ***Issue description***

The market for mobile proximity payments is very fragmented with a lot of innovative but immature solutions. The fragmentation derives either from the presence of multiple mobile solutions with a limited geographical coverage or from the usage of different technologies, standards and business rules across the existing mobile solutions.

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<sup>3</sup> This might need to be updated after the publication of the PSD2 text.

Mobile devices provide the payment industry with multiple technologies to initiate and/or perform payments. They have the capability to capture, store and transmit data in diverse and numerous ways.

The versatility of the mobile devices leave stakeholders in the ecosystem (including merchants, PSPs, Mobile Network Operators (MNO), other service providers, ...) with major challenges with respect to the development of strategies / road maps with a viable business case and market reach.

Furthermore, being that the market for payment services is a multi-sided market, mobile proximity payments solutions should be simultaneously introduced and employed on the consumer and merchant sides. However, there is a lot of uncertainty how the market will develop and what will be the future prevalent technology solution.

Some initiatives in this area are leveraging the card contactless acquiring infrastructure, others are creating closed loop solutions with selected merchants, which are often subsidised for technology integration. In many countries domestic solutions with local protocols are being employed. This results in a large variety of solutions across Europe with no pan-European acceptance. Those solutions involve different technologies and infrastructures resulting in interoperability issues which are a main barrier for market integration. The market fragmentation is leading consumers and merchants to confusion and limited adoption of the existing solutions.

### ***Key observations***

New payment products are often promoted to a national audience rather than European level. In this situation similar solutions are developed and launched in different countries but unfortunately they are not always interoperable with each other. This creates market fragmentation in Europe. Market fragmentation in turn makes it difficult for suppliers of payment products to reach scale economies, which in the payments market is a key factor for a business model to be successful.

The focus should be to develop basic standards for each of the mobile proximity technologies which can be addressed at this very moment in view of where the market is today. Taking into account that contactless payments are already much better adopted than other mobile proximity payments, it could be appropriate to further develop pan-European implementation standards for mobile proximity payments which are based on the EMVCo contactless specifications (see also 5.1.1).

It is also to be noted that the speed for adoption of card contactless payments has proven to be much quicker in countries (e.g.; UK, Czech Republic, Poland, ...) where a centralised coordination took place across payment market stakeholders with the support of the card schemes. A similar approach could be advisable for mobile proximity payments.

## 5.2.2 Complexity and security of mobile devices

### ***Issue description***

A mobile device may be considered as a quite complex piece of equipment with many different components, including the baseband, operating system, firmware, software, NFC controller, multiple external interfaces, possibly a Trusted Execution Environment (TEE) and one or multiple Secure Elements (SEs). Moreover, the production of these components involves different manufacturers before integration in the mobile device. This means that functional and security standards should be ensured throughout the whole production cycle. Also the presence of different software on the mobile device, developed by diverse vendors or service providers, poses a significant challenge to the integrity of the mobile device ecosystem.

It is also important to note that for providers of mobile contactless payment applications there is a strong dependency on the handset manufacturers and mobile OS providers, which is a highly competitive space with little cooperation on standardisation. Therefore they face a huge complexity with different solutions for each handset and/or mobile OS. This means that they need to develop their applications for a large number of different mobile platforms (combinations of different hardware and software) in view of the current platform incompatibilities. This obviously comes with a cost impact and may in some cases also lead to consumer confusion. The fact that there are multiple solutions on the market which are different - read not compatible - makes it challenging for the supply side. Moreover, once the devices are in usage by the consumer, there are a number of additional challenges which remain to be addressed; security and privacy are the most relevant ones.

Indeed, consumer trust in mobile proximity payments is strongly linked to security and privacy. Two aspects of security have to be considered, the first is the customer perceived security in the solution or in the system, the second is the level of security the solution has which is strongly linked to its cost and usability. Enhanced security often comes with additional costs while the user experience may be negatively affected.

The mobile device is exposed to threats in view of the many interfaces it has, including change of behaviour or incompatibility due to software upgrades, rooting (jail-breaking) of mobile phones, etc. The increased presence of malware on mobile devices has to be noted and should also be kept under careful consideration.

Finally, with regard to diversity and complexity, the consumers interact potentially with a multitude of user interfaces related to different payment solutions, adding a further layer of complexity.

### ***Key observations***

The security threats and risk models related to the usage of mobile devices for payments are different to the threats encountered for payments with contactless cards. Also the security features offered to counter the threats are different for contactless card payments compared to mobile proximity payments.

Security standards for mobile devices in support of mobile payments are not yet widespread nor adopted since the market is living its early days.

Some organisations have already developed specifications and standards for securing the mobile contactless payment environment. Furthermore, they have also created some testing and certification activities in accordance to those standards and specifications.

Nevertheless the payment industry is still missing an overall framework for the usage of mobile devices which addresses functionality, security and privacy. Such a framework could ensure a widespread adoption and usage of mobile devices for (proximity) payments. There is a need for the development of minimal security objectives / requirements for mobile devices (possibly through a layered standardisation approach) in support of mobile payments (which can be met by different technologies / implementations). A corresponding testing, evaluation and certification framework is needed for the stability and security of mobile devices as a platform for mobile payments throughout their lifecycle. In addition, appropriate consumer awareness is needed with respect to safeguarding the security of their mobile device.

## **5.2.3 Lack of ubiquity of appropriate mobile devices**

### ***Issue description***

As mentioned before, the NFC based contactless technology is considered nowadays as the most promising one in terms of short and medium term development. The background for this is that consistent investments are currently on-going to update the hardware on the supply side (PSPs are issuing contactless enabled cards) and merchants are installing contactless POIs based on NFC technology.

Whilst this trend is noticeable, with different intensity in each European country, the introduction of mobile contactless payments still seems to suffer from a lack of availability of appropriate mobile devices supporting the NFC functionality. Moreover, within the group of NFC enabled devices still a minority of them is working with a mobile operating system supporting Host Card Emulation (HCE). At date only Blackberry OS7 or newer and Android Kit Kat 4.4 or newer support HCE. Microsoft announced the support of HCE in the mobile version of its Windows OS 10 later on in 2015.

### ***Key observations***

NFC based contactless technology is the most promising in terms of development in the short and medium term. Contactless NFC based solutions are gaining traction across several geographies in Europe, nevertheless this growth is mainly due to physical card based solutions.

The manufactures are gradually installing NFC hardware on the majority of the newly developed and on sale models for mobile devices.

## 5.2.4 Mobile competitive landscape

The mobile ecosystem has proven over the last decade to be a very competitive landscape whereby multiple services are accessed via the mobile device. This has come with a strong competition among the different service providers on service levels and pricing. Mobile service providers are widening their offer to other services which are accessed via the mobile device, including payments. The mobile devices allow the co-existence of different payment solutions on a single device, even from multiple PSPs either using similar or different technologies.

A characteristic this landscape presents is that it transforms the commercial relationships between the consumers and PSPs and it changes the provisioning channel of the payment solutions.

### ***Key observations***

Currently it is unclear what will be the prevailing mobile proximity payment technology in the future, which results into difficult decisions with respect to investments to be made. It is precisely the competition between the different technologies that leads to a fragmented market.

However, there is a strong demand for more openness of the new solutions which are entering the market today to support competitiveness; examples are an open (but secure) and free access to the mobile device capabilities (including the NFC antenna, any component being it the SE or HCE).

With the objective of streamlining the consumer experience and facilitating payments, the industry supply side recently introduced wallet services. These services represent a breakthrough in the payment market; consumers have the opportunity of aggregating the payment service interfaces via the wallet together with other information (e.g., loyalty reward scheme accounts, etc.). The wallet supplier may be able to act as intermediary between the PSPs and the consumer; this could change the commercial position of the PSPs towards the consumer.

It has to be noted that numerous mobile offerings are gaining consumer attention, interest and preference. Nevertheless, consumer awareness on mobile device usage for payment services initiation is still low. The will from the payment supply side to conquer the consumer preference might lead into a movement towards the use of closed loop solutions, which could hinder widespread use of mobile proximity payments, potentially leading again to market fragmentation.

### 5.2.5 Regulatory framework

#### ***Issue description***

Regulatory authorities can play an important role in taking away barriers in the payments market. However, excessive regulatory interference in the emerging and developing market of mobile proximity payments could lead to unintended consequences such as stifling innovation in an immature market or preventing the introduction of consumer focused services. Therefore it is important that new regulation provides room for innovations and supports new market developments

#### ***Key observations***

At the moment of publication of this interim report, the most recent European regulation directed to card payments is the Interchange fee regulation. Although it might be too early to judge the effect of this regulation, possibly card based contactless payments may be impacted in view of the requirements on application selection<sup>4</sup>.

There is a general concern among some market participants that (further) regulatory activity might disrupt consolidated business models, hamper the entrance of new players into the market and increase the costs associated with regulatory compliance.

### 5.2.6 Complexity of mobile ecosystem

#### ***Issue description***

An increased number of stakeholders are involved in the ecosystem for mobile proximity payments compared to card payments in view of the complexity of the underlying infrastructure. At this time in Europe the infrastructure used for mobile payment services is build up by many different parties and components. This introduces new challenges from a business perspective. Next to the technical complexity of issuing and operating payment applications through mobile devices, there is a huge business complexity in view of the different and often new players involved in the value chain. Establishing a business model across them, sharing customer ownership and revenues are recognised to pose major challenges to the mobile payment ecosystem.

#### ***Key observations***

The introduction of contactless card based solutions is easier and more straightforward compared to mobile contactless payment solutions because it involves the same stakeholders as in the legacy contact card ecosystem. The presence of additional business stakeholders in the mobile ecosystem (depending on the adopted technology and architecture) aiming to gain revenues and customer ownership results in an increased complexity of the overall business models. This condition impacts the market take up of the mobile contactless payment solutions but clearly resides in the competitive space.

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<sup>4</sup> Currently a dedicated impact analysis is being conducted in the Card Stakeholder Group (CSG).

## **Annex 1: Mandate of the ERPB Working Group on mobile and card based contactless proximity payments**

Based on Article 8<sup>5</sup> of the mandate of the Euro Retail Payments Board a working group is set up with the participation of relevant stakeholders to address issues related to the muted take up of mobile and card based contactless proximity payments.

**Scope:** Several innovative payment solutions rely on contactless technologies to initiate payments or transfer payment related data in proximity payment situations. They usually provide a more convenient user experience at the point of sale and a substantially faster check-out. Even though these types of payments are still at an early stage of development, there is already a trend towards setting standards that differ across schemes, devices and countries. The purpose of the working group would be to analyse existing solutions and standards (both national and international) and assess to what extent there are differences in standards and technical implementation preventing interoperability at pan-European level.

**Deliverables:** The working group is expected to:

- i. elaborate on a vision (define the ‘what’ we should achieve) for mobile and card based contactless proximity payments in euro;
- ii. define the essential conditions for the realisation of the vision;
- iii. distinguish between essential conditions that need to be addressed in the competitive and in the cooperative space; and
- iv. identify concrete actions to be taken in order for the essential conditions in the cooperative space to materialise.

The form of communicating the findings and the recommendation of the working group is a report to the ERPB.

**Time horizon:** The working group is expected to start work in Q4 2014 and report its findings in Q4 2015. The group would then be dissolved.

**Participants and chairmanship:** Membership in the working group is open to all volunteering members of the ERPB. The group will ideally include at least representatives of payment service providers, consumers, retailers, and corporates. One representative of the ERPB Secretariat and a limited number of representatives of euro area NCBs will be invited to join the working group as active participants. The working group could also involve relevant third parties (e.g. mobile network operators, payment processors) as active participants. A representative of the EU Commission will be invited as observer. The working group is to be co-chaired by the EPC (supply side) and Eurocommerce / ERRT (demand side). The final composition of the working group will be submitted to the ERPB for endorsement.

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<sup>5</sup> “For the execution of its mandate, the ERPB may establish a working group (...) for a limited period of time for dealing with specific work priorities. Several groups may operate in parallel, depending on the work priorities. A group is disbanded as soon as its mandate is fulfilled. (...) Depending on the work priority at hand, the group(s) may be asked by the ERPB to draft or make recommendations on business practices, business requirements for standards, standards or implementation specifications or to address specific issues” [http://www.ecb.europa.eu/paym/retpaym/shared/pdf/ERPB\\_mandate.pdf](http://www.ecb.europa.eu/paym/retpaym/shared/pdf/ERPB_mandate.pdf) ECB-RESTRICTED

**Rules of procedure:** The mandate of the ERPB defines a broad set of rules for the procedures of its working groups. The working group takes positions on a  $\frac{3}{4}$  majority basis. Upon request, dissenting members (if any) may have their opinions annexed to the final document(s) prepared by the working group. The members of the group decide on how to organise their work. Costs related to the operation of the working group are met by the members of the group.

## Annex 2: Composition of the ERPB Working Group on mobile and card based contactless proximity payments

Name	Surname	Nominating Institution
<b>Co-Chairs</b>		
Frederic	Mazurier	Eurocommerce
Dag-Inge	Flatraaker	EPC
<b>Members</b>		
Robert	Renskers	ESBG
José Carlos	Bringas Casado	EPC
Paul	Alfing	Ecommerce Europe
Pascal <i>Alternate:</i> Arnaud	Spittler  Crouzet	EuroCommerce
Charlie <i>Alternate:</i> Ben	Craven  Smith	EPIF
Patrice	Hertzog	EACB
Faiza	Mahmood	EMA
Michael <i>Alternate</i> Patrick	Hoffmann  Poncelet	EBF
Farid	Aliyev	BEUC
Massimo	Battistella	EACT
Carlos <i>Alternate:</i> Michael	Soares  Taggart	Public Administrations
Alice	Sinigaglia	AGE Platform
<b>NCBs</b>		
Judith <i>Alternate:</i> Melanie	Looman  Hekwolter of Hekhuis	DNB
Johannes <i>Alternate:</i> Julien	Klocke  Novotny	Bundesbank
Sergio <i>Alternate:</i> Esther	Gorjón  Barruetabeña	BdE
Christiane <i>Alternate:</i> Alexander	Dorfmeister  Mayrhofer	OeNB
Li-Chun	Yuan	BcL
<b>ECB</b>		
Francesco <i>Alternate:</i> Iddo	Di Salvo  De Jong	ECB
<b>Observer</b>		
Barry	Harrington	European Commission

<i>Alternate:</i> Pierre-Yves	Esclapez	
<b>Guests</b>		
Richard <i>Alternate:</i> David	Koch  Stephenson	ECPA
David <i>Alternate:</i> Chris	Dechamps  Kangas	MasterCard
Marc <i>Alternate:</i> Agnes	Temmerman  Revel	Visa
Priya	Vempati	American Express
<b>External liaison</b>		
Christian <i>Alternate:</i> Dave	Delporte  Wilson	EMVCo
Margot <i>Alternate:</i> Xavier	Dor  Piednoir	ETSI
Yves <i>Alternate:</i> Gil	Moulart  Bernabeu	GlobalPlatform
Claire <i>Alternate:</i> Harald	Maslen  Boerekamp	GSMA
Arnaud <i>Alternate:</i> William	Crouzet  Vanobberghen	Nexo
<b>Secretariat</b>		
Marijke	De Soete	EPC

## **Annex 3: Template of the survey on mobile and card based contactless proximity payments**

### **1. INTRODUCTION**

This survey is being developed in preparation of a landscaping overview on Mobile and Card Based Contactless Proximity Payments.

The aim of this survey is to provide input on the following topics:

- A. Existing or planned mobile and card based contactless proximity payment solutions;
- B. Existing or planned white papers and technical and security specifications / standards related to mobile and card based contactless proximity payments;
- C. Existing or planned regulations and recommendations / guidelines on mobile and card based contactless proximity payments, including security and privacy aspects;
- D. Issues or barriers that may prevent the development of pan-European solutions.

The reader is referred to Annex I for a list of abbreviations used in this document.

Submitters are encouraged to provide as much information and as detailed as possible. If needed, section A can be copied as needed should multiple mobile and card based contactless proximity payment solutions be available and/or planned in one single country.

Submitters are kindly requested to return the completed survey to the Working Group Secretariat by **13 February 2015**.

### **2. SURVEY**

<b>Country:</b>		<b>Name Submitter:</b>	
<b>Organisation:</b>			

## A. Mobile and Card Based Contactless Proximity Payment Solutions

**What Mobile or Card Based Contactless Proximity Payment solutions are currently being offered in your country or are scheduled to be offered in the near future?**

<b>Name of solution:</b>	
<b>Mobile or Card based:</b>	
<b>Short description of solution:</b>	
<b>Launch date and Operational status:</b>	
<b>Geographic coverage:</b>	Within countries:
	Cross-border:
<b>Currency:</b>	
<b>Volumes (last month for which data is available):</b>	Number of customers:
	Total number of transactions:
	Overall total of transaction amounts:
<b>Partners involved (e.g., PSPs, MNOs, TSMs, ...):</b>	
<b>Technical solution used (e.g., MCP application on card, MCP application on SE on mobile device, Remote MCP</b>	

<b>application accessed via mobile device, etc...):</b>	
<b>Infrastructure(s) used (e.g. bank infrastructure, clearing and settlement systems, card infrastructure, ...):</b>	
<b>Source account (e.g. payment account, prepaid card, ...)</b>	
<b>Standards / Guidelines used for system components and communication protocols:</b>	
<b>Evaluation / certification/ type approval used for system components (card, SE, mobile device, POI, etc...) and communication protocols</b>	
<b>Payment instrument(s) used:</b>	
<b>Consumer / Merchant identification and authentication methods:</b>	
<b>Additional remarks:</b>	

**B. Overview White Papers, Specifications and Standards for Mobile and Card Based Contactless Proximity Payments**

<b>Annex II provides a list of white papers, technical and security specifications / standards or Mobile and Card Based Contactless Proximity Payments. Please identify any missing document(s) that should be taken into account for this landscaping exercise as appropriate.</b>	
<b>Missing document(s):</b>	

**C. Overview Regulations and Recommendations / Guidelines on Mobile and Card Based Contactless Proximity Payments including security and privacy aspects**

<b>Annex III provides a list of regulations and recommendations / guidelines for Mobile and Card Based Contactless Proximity Payments, including security and privacy aspects. Please identify any missing document(s) that should be taken into account for this landscaping exercise as appropriate.</b>	
<b>Missing document(s):</b>	

D. Issues/Barriers

**What do you consider to be the most important issues and barriers for the development of pan-European mobile based contactless proximity solutions?**

<b>Issue/Barrier 1:</b>	
<b>Possible Solution for Issue/Barrier 1:</b>	
<b>Issue/Barrier 2:</b>	
<b>Possible Solution for Issue/Barrier 2:</b>	
.....	

**What do you consider to be the most important issues and barriers for the development of pan-European card based contactless proximity solutions?**

<b>Issue/Barrier 1:</b>	
<b>Possible Solution for Issue/Barrier 1:</b>	
<b>Issue/Barrier 2:</b>	

<b>Possible Solution for Issue/Barrier 2:</b>	
.....	

## Annex 4: Quantitative outcome on barriers / gaps identified through the survey

- Common barriers and gaps

This section lists the common barriers/gaps/issues identified through the survey which are applicable both to card and mobile based contactless proximity payments.

#	Description of barrier/gap/issue	% coverage in survey <sup>6</sup>	Competitive / Cooperative space
B1	<p>Lack of one common (open) standard for contactless transactions both for card and mobile NFC contactless transactions</p> <ul style="list-style-type: none"> <li>• Card NFC and Mobile device NFC differences in technical specifications with regards to hardware, chip operating system, NFC application, NFC radio transmission and data encryption protocols between card-NFC and mobile device-NFC – lack of standardisation of mobile contactless payments</li> <li>• Usage of closed proprietary technical standards</li> <li>• Multiplicity of standards for NFC contactless payments</li> <li>• Interoperability of contactless acceptance infrastructure</li> <li>• Uniform payment experience</li> <li>• Lack of common protocol on the acquiring side</li> <li>• Local solutions (carrying international brands) which do not work cross-border</li> <li>• Testing and certification</li> </ul>	50	COOP
B2	<p>Lack of ubiquity of contactless POI terminals (no sufficient coverage, slow deployment speed, no customer habituation)</p> <ul style="list-style-type: none"> <li>• Lack of widespread merchant acceptance</li> <li>• A lack of ubiquity in any given market or region may hinder consumer habituation towards contactless technologies and propositions</li> </ul>	48,9	COOP/COMP
B3	<p>Business model sustainability</p> <ul style="list-style-type: none"> <li>• Few parties dominating the market resulting in a lack of competition and in consumer dependence</li> <li>• Freedom of choice for consumer and merchant (standard payment method should not be prescribed by the scheme)</li> </ul>	8,3	COMP
B4	<p>Clashes when several NFC cards/devices are presented at once, leading to conflicts with acceptance problems</p>	6,3	COOP

<sup>6</sup> The percentage reflects the number of respondents that have identified this barrier through the survey

B5	Bad user interface of contactless POI (uniform way of making a payment, display, keys, contactless spot and symbol, clear audio feedback when proximity transaction was accepted/rejected ...) Bad ergonomics Accessibility features	16,6	COOP/COMP
B6	Acceptance problems (e.g. PIN on line not supported, TAP + mobile code+ TAP not supported, etc...) Difference between online and offline transactions, creating cross-border interoperability problems and bad consumer experience (and missed opportunities for merchants and PSPs)	6,3	COOP/COMP
B7	Differences in transaction amount limits per sector (retail, parking, toll ways) + cross border	4,2	COOP
B8	The new card IF Regulation (requiring application selection for co-branded cards), which introduces additional steps into the payment process and impacts the transaction speed	2,1	COOP
B9	Lack of business case <ul style="list-style-type: none"> <li>• Decreasing card industry profitability (e.g; IF regulation negatively impacts business case to innovate and to invest)</li> <li>• Difficulties for the set-up of transaction fees in view of low transaction amounts</li> <li>• POI hardware replacement and costs</li> <li>• Costs for issuers</li> <li>• Costs for merchants</li> <li>• Cost of integration of mobile payments</li> <li>• Cost of UICC centric SE</li> <li>• Lack of business case for an SE based NFC solution</li> <li>• Economic barriers: financial institutions (as well as other players, such as merchants) face the high cost of technological infrastructures /developments and equipment renewals</li> <li>• Life time of new technology products and renewal / migration cycles for payment products</li> </ul>	31,3	COMP
B10	Protection against fraud, security and privacy issues <ul style="list-style-type: none"> <li>• Implement contactless with consumer verification method if above floor limit</li> <li>• Wireless skimming</li> <li>• Data protection concerns by consumers and authorities</li> <li>• All parties involved in the payment scheme must ensure the same level of security</li> </ul>	31,3	COOP
B11	Lack of consumer/customer acceptance / demand <ul style="list-style-type: none"> <li>• Lack of trust by the consumers in this form of payments - new technology (what if I lose my card/mobile device)</li> <li>• Reliability</li> </ul>	51	COOP

	<ul style="list-style-type: none"> <li>• Complexity of products</li> <li>• Consumer advantages (e.g. combination with VAS) not visible enough</li> <li>• Lack of consumer proximity habits (e.g. scanning 2D barcodes, waving card or mobile device)</li> <li>• Lack of agnosticism in methods to carry out mobile payments</li> <li>• Easiness of solution for consumer (re-use consumer habits / handling) / consumer convenience/uniform consumer experience</li> <li>• Lack of ubiquity in consumer education &amp; communication with respect to security, speed, reliability, consistency on mobile proximity payments</li> <li>• Lack of equally advanced consumer education/awareness</li> </ul>		
B12	Lack of ubiquity of merchant training Lack of equally advanced merchant education/awareness	8,3	COOP
B13	Consumer affordability (card services related costs)	2,1	COMP
B14	Lack of interoperability of existing acceptance infrastructure (accepting NFC and 2D barcodes and...)	2,1	COOP

- Barriers and gaps for contactless card payments

This section lists the additional barriers/gaps/issues identified through the survey which are specific to contactless card payments.

#	Description of barrier/gap/issue	% coverage in survey <sup>7</sup>	Competitive / Cooperative space
CB1	No consumer need for contactless cards	2,1	COOP

- Barriers and gaps for mobile proximity payments

This section lists the additional barriers/gaps/issues identified through the survey which are specific to mobile contactless proximity payments.

#	Description of barrier/gap/issue	% coverage in survey <sup>8</sup>	Competitive / Cooperative space
MB1	Complexity of mobile ecosystem <ul style="list-style-type: none"> <li>• Very large variety of models with different actors and different business impacts</li> </ul>	28,6	COMP

<sup>7</sup> The percentage reflects the number of respondents that have identified this barrier through the survey

<sup>8</sup> The percentage reflects the number of respondents that have identified this barrier through the survey

	<ul style="list-style-type: none"> <li>• Collaboration requires a lot of resources</li> <li>• Predominance of vertical business models: many of the existing solutions are vertical portfolios.</li> <li>• It is difficult to reach an agreement on a common unique solution given that there are many different third parties.</li> <li>• Complexity of ecosystem for issuing payment applications in a smartphone - each player aims to control the customer experience and ensure ROI</li> <li>• Establishment of partnerships between PSPs and MNOs / TSMs;</li> <li>• From a PSP perspective: dependency on the MNOs</li> </ul>		
MB2	<p>Lack of ubiquity (no sufficient coverage) of NFC enabled mobile devices</p> <p>Availability of mobile phones with Android Kit Kat 4.4 and higher</p>	18,8	COOP/COMP
MB3	<p>Lack of incentives for stakeholders in the mobile ecosystem</p> <ul style="list-style-type: none"> <li>• Lack of incentives for acquirers</li> <li>• Lack of interaction with public infrastructures</li> <li>• Lack of involvement of public sector</li> <li>• Consumer advantages (combination with VAS) not visible enough</li> <li>• The absence of incentives for telecom operators to develop NFC solutions</li> </ul>	10,4	COOP/COMP
MB4	<p>Mobile competitive landscape</p> <ul style="list-style-type: none"> <li>• Co-existence of different payment solutions of multiple PSPs on mobile device</li> <li>• Gaining consumer attention is increasingly difficult</li> <li>• New proprietary payment methods (Apple, Google,....) will change the payment landscape leading to a complexity of payment options and increase of acceptance and back-end costs</li> <li>• Owner of wallet solutions may prevent competition amongst payment products in their wallet</li> <li>• Co-existence on mobile device with other mobile services /applications (with different lifecycle)</li> </ul>	10,4	COMP/COOP
MB5	<p>Fragmented and immature mobile technology landscape and immaturity of mobile payments solutions</p> <ul style="list-style-type: none"> <li>• Technology options on the consumer side (issuance) make it challenging for issuers to develop strategies/road maps with a viable business case and market reach.</li> <li>• Uncertainty for developers associated to the future prevalent technology</li> </ul>	37,5	COOP

	<ul style="list-style-type: none"> <li>• Payment infrastructures on which mobile solutions are built are strongly different country by country.</li> <li>• Many closed loop /proprietary solutions with no pan-European acceptance involving different technologies and infrastructures resulting in interoperability issues -barrier for market integration –customer confusion</li> <li>• Differentiation of technologies used and no stable establishment of the most widely accepted technologies (SE or HCE based, NFC, 2D barcodes or SMS)</li> <li>• Technical complexity</li> <li>• Poor implementation guidelines and specifications with a lot of room for different choices make it a labour intensive and high barrier for smaller banks with little expertise and resources to start a project.</li> </ul>		
MB6	<p>Complexity and security of mobile devices</p> <ul style="list-style-type: none"> <li>• Complexity of user interfaces</li> <li>• Change of behavior due to software updates</li> <li>• Solutions in the market are multiple, different and not compatible with all mobile devices. This may create confusion among users.</li> <li>• Firmware of mobile phones – lack of uniform solution for all types of mobile devices</li> <li>• Insufficient security features for smart phones and missing security standards for mobile payments</li> <li>• Stability and security of mobile devices as a platform</li> <li>• The security of secure elements of mobile phones is still an unknown</li> <li>• Rooting (jailbreaking) of mobile phones</li> <li>• Increased malware in mobile devices</li> </ul>	18,8	COOP
MB7	<p>Specific standardisation needs for mobile payments</p> <ul style="list-style-type: none"> <li>• Time at check-out should be at least as fast as with a card payment</li> <li>• Lack of standardisation in the payment initiation message (e.g. 2D barcodes)</li> <li>• Lack of standards for the enrolling in digital wallets.</li> <li>• The absence of standard procedures to personalise card data into secure elements.</li> <li>• Multiple methods (no PIN, PIN at POI, mobile code, fingerprint,...) leading to non-interoperable solutions and consumer confusion</li> <li>• Co-existence of multiple MCP applications on # SEs, cloud, HCE</li> </ul>	10,4	COOP

MB8	Fragmentation: no central repository based on common European standard (IBAN, mobile number, ...)	2,1	COOP
MB9	Lack of pan-European infrastructure for instant payments	4,2	COOP
MB10	Increased risk compared to physical card based transactions <ul style="list-style-type: none"> <li>Increasing consumer convenience for mobile payments also increase risk due to less strong authentication compared to card present EMV transactions</li> </ul>	2,1	COOP
MB11	Availability of mobile payments on accessible phones – Accessibility of mobile payment solutions	10,4	COOP
MB12	Unnecessary or inappropriate regulatory interference in the emerging and developing market the unintended consequences of which may stifle innovation and prevent participants bringing consumer focused services to the market Excessive regulation impacts more heavily smaller/new players	6,3	
MB13	A common regulatory and legal framework in mobile-based, contactless proximity solutions is a necessary prerequisite for the development of a pan-European product offer.	2,1	

## **Annex 5: Legal and regulatory documents impacting mobile and card-based contactless proximity payments in Europe**

To be provided in the final report

## **Annex 6: Technical and security reference documents related to mobile and card-based contactless proximity payments**

To be provided in the final report

End of Document