

University of Belgrade  
Faculty of organizational sciences  
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# Developing NFC based Mobile Wallet services

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# Introduction

# Introduction

- In the modern world, a mobile phone has become an essential device.
- The usage of mobile phones is widespread and mobile devices are frequently used for payments instead of payment cards.
- Visa Europe Mobile Money research showed that it is expected that one in four Britons estimate spending more than £50 a week on mobile by 2020 and their level of consumption increased by an average of 10 pounds a week to 27 pounds per week.
- According to Statistical Office of the Republic of Serbia 90.3% of households in Serbia have a mobile phone available.

# Introduction

- Digital wallet is service based on NFC technology and used for contactless payments.
- Embedded Near Field Communication wireless technology is one way of enabling payment.
- Statistics from The Statistic portal Statista have estimated that 1.9 billion phones worldwide will have been NFC-enabled by 2018.

# Introduction

- Goals and settings to introduce new service:
  - promotion Wave2Pay service as a new payment method in Serbia
  - to satisfy increasing customers' needs
  - presentation of the technologically advanced innovations for banks in Serbia
  - represent the Bank as a leader in the implementation of new products
  - competitive advantage in the market for the Bank
  
- Realisation:
  - Banca Intesa
  - Department of e-business, Faculty of organizational sciences, University of Belgrade

# Introduction

- Banca Intesa ad Beograd has, in collaboration with Intesa Sanpaolo Card, developed new solution, Wave2Pay Digital Wallet.
- Banca Intesa ad Beograd is part of an international banking group Intesa Sanpaolo, which has a history of more than 400 years.
- Banca Intesa in Serbia has been operating for more than 10 years.
- The Banca Intesa ad Beograd is particularly proud of:
  - 1.67 million clients
  - 3,000 employees
  - 170 branches
  - represented in nearly 100 cities in Serbia

# Introduction

- Department of e-business:
  - We are recognized as a center of excellence in IT R&D
  - We teach and research the following topics:
    - E-business
    - Mobile business
    - Internet technologies
    - Enterprise networking
    - Cloud infrastructure and services
    - Big data infrastructure and services
    - Internet of things
    - ...



# Theoretical background

# Near Field Communication

- NFC (Near Field Communication) is a short-range technology which uses magnetic field induction to enable communication between two devices which are in close proximity.
- NFC communication is designed in a way that one device at one point can send or receive data.

# Near Field Communication

- Depending on the operating way that exists between active and passive devices, three functioning modes are developed:
  - **peer-to-peer** - This model supports the direct exchange of information between the two active NFC chips. Devices operate on the principle that one initiates a transaction while others respond to requests. Multivendor environments
  - **read/write** – This mode allows the initiator to read from or write to another NFC tag.
  - **Card emulation mode** - This mode is mainly used to support mobile payments (m-payment), but is often used to simulate different cards (loyalty cards, medical cards, personal information cards, membership cards, season tickets etc.).

# Overview of contactless technologies

- There are many technologies that are similar to NFC by their features, such as RFID, IrDA (Infrared Data Association Protocol) and Bluetooth.

	NFC	RFID	IrDA	Bluetooth
Time to make a connection	<0.1 ms	<0.1 ms	~0.5 s	~6 s
Range	to 10 cm	to 3 m	to 5 m	to 30 m
Usability	Human-oriented, easy, intuitive, fast	Object oriented	Data oriented	Data oriented
Utility	Payment, Data access, Data exchange	Object tracking	Control and data exchange	Data exchange
User experience	Easy connection (tap, wave)	Download information	Easy to use	System requirements

- A large number of NFC based payment systems has been implemented since 2003, but many of these were soon put out. The reason for this is the small number of mobile phones based on this technology.
- Present situation on the mobile phone market is such that the number has significantly grown over the last several years.

# Case study: Wave2Pay

# Design

- The goal of develop this service is to enable Bank's client new contactless payment model using virtual card on client's mobile device.
- Every client who applied for Digital wallet and virtual card will be able to pay on POS terminals without the use of plastic cards.

# Host Card Emulation

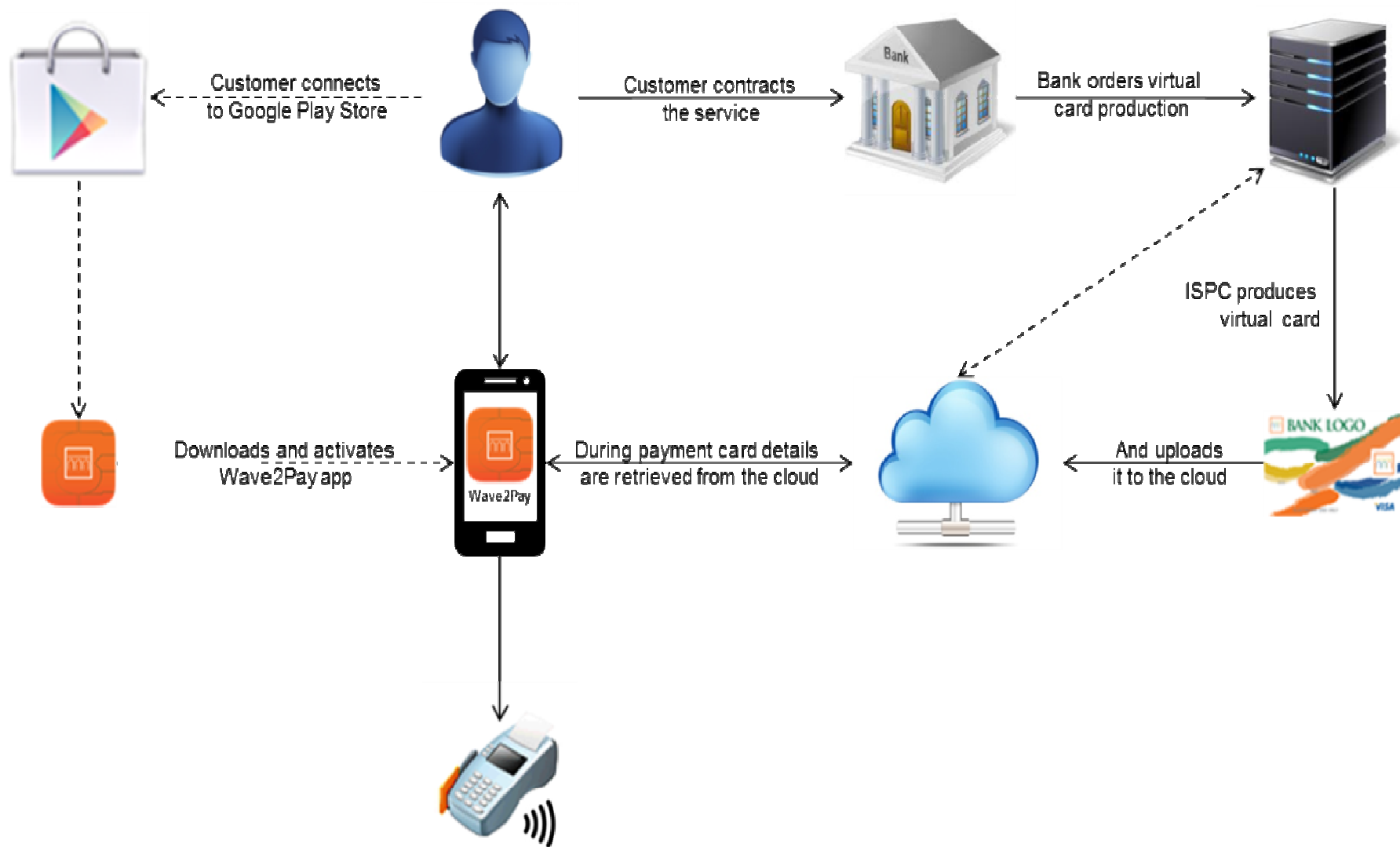
- Payments are based on HCE (Host Card Emulation) technology by virtualizing the payment card into a cloud thus enabling payment via smartphones.
- HCE service will be realized within mobile wallet application for specific payment cards with the use of tokenization.
- The virtual card will be stored in the cloud and customer will retrieve payment credentials on his/her smartphone by accessing his Digital wallet which he/she downloaded from Google Play Store.

# Security Overview

- Users can lock their mobile phones and no one can use it without authorization.
- Wallet application is a passcode protected and needs to be opened every time the customer makes purchase. When customer starts Wave2Pay application, which is necessary before making payment, he/she must enter the passcode consisting of four digits.
- The next security element is the existence of the security chip that keeps encoded confidential data of users. This chip can be accessed only by authorized programs.



# General workflow process



# Implementation

- For the Digital Wallet service, a client (individual) requires a virtual card from bank's offer intended for contactless payment. When digital wallet service is activated in the branch, it is required to generate a unique Activation code and provide it to the client. At the same time client gets Activation key.
- Banca Intesa AD will generate the Activation key and deliver it to the customer printed on the sealed PIN envelope. Activation key is unique per customer and is considered as static data. It is the same for all actions related to Wave2Pay application.
- Processor (ISPC) will generate Activation code and deliver it by SMS. It is considered to be dynamic data, i.e. it will have different value every time.

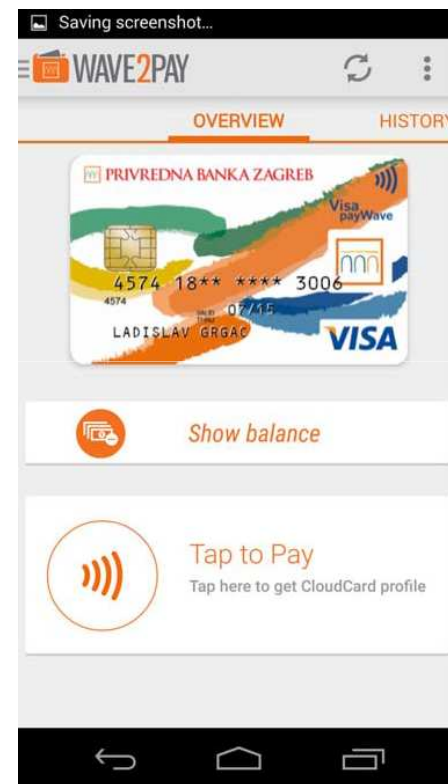
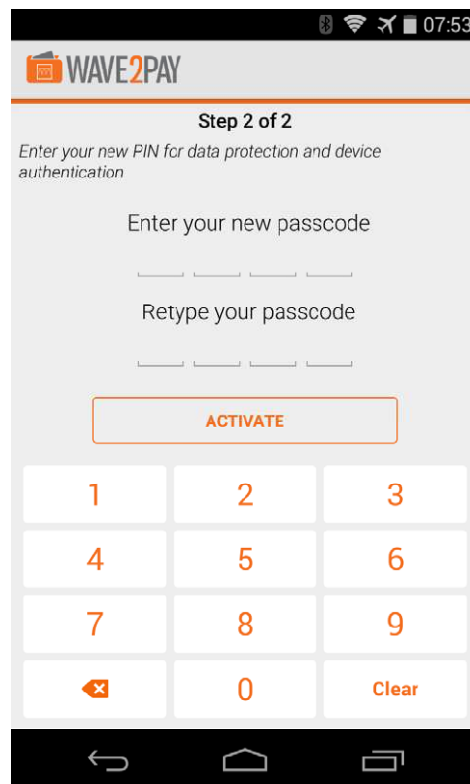
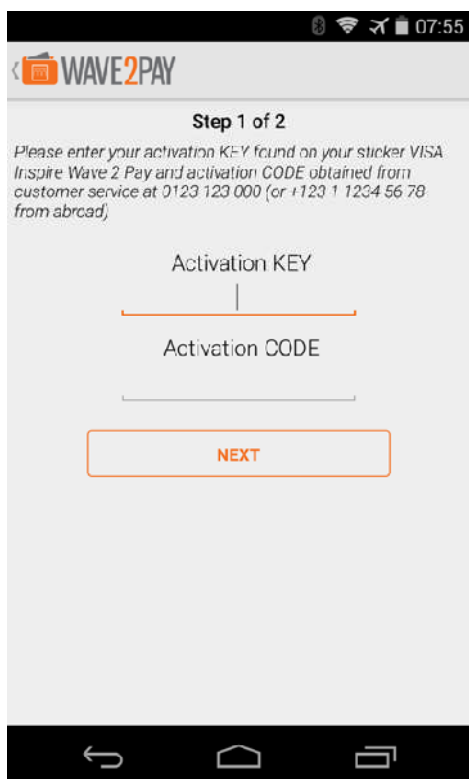
# Implementation

- After service activation client downloads Digital wallet (Wave2Pay) application from the Google Play Store. The client has to enter his Activation code and mobile phone number to activate the application.
- Server will check whether wallet account has been created for the client and it will check client's phone number. If outcome is positive, the one-time Activation code will be generated by Wallet server and a SMS will be sent to the client's mobile device.
- When the client receives an SMS with the Activation code on his/her mobile phone device, Digital wallet application is automatically activated.

# Implementation

- Upon application activation the customer will be prompted by the application to define a passcode to access the mobile application and to authorize transaction.
- Wallet server fetches card data for that particular client from back office application and enrolls them in a wallet account.
- Payment card is planned for mobile proximity payments virtualized into cloud using tokens and available for contactless payments.

# Digital wallet service displays at Banca Intesa AD



# Digital wallet service displays at Banca Intesa AD

- In the Digital wallet application, customer embossed name and card expiry date are shown. The client can update such data manually in the mobile application, but those updates don't affect card's performance.
- Each client can have Digital wallet application installed only on one mobile device. Activation of the application on the new device will automatically disable application on the old device.
- In case when the client loses his/her mobile phones, he/she will have to report it to the Bank and all devices will be removed from the client's account. A new Activation code will be created.
- Digital wallet application on lost/stolen mobile device will become unusable and further activation with the old Activation code will not be possible.

# Conclusions

# Conclusions

- The main goal of implementing this project is to put into production Wave2Pay service for making contactless payments using mobile devices.
- Banca Intesa is a pioneer of digital banking in domestic market and the introduction of Wave2Pay service in the course of 2016 is the beginning of an entirely new payment method that will certainly contribute to increasing the level of digitalization of the banking system in Serbia.
- Evaluation is in progress on a sample of 25 users. First results are positive.
- The service is planned to be launched in September.



# Conclusions

- Target group: around 170.000 clients who use internet and mobile banking services.
- It is expected that around 40% of these users have Android phone with NFC.
- This project is one step towards the main goal: digital wallet with fully integrated services.

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