Sendy Platform Architecture

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1. Purpose of the document

This document describes the requirements for the retail financial product Sendy, which allows the payments and money transfers using the mobile devices without the usage of bank cards.

List of used terms is assembled in Appendix 1.

List of used abbreviations is assembled in Appendix 2.

2. General information

2.1. Use of Platform

The Sendy platform designed for providing of payments and transfers using the mobile devices without usage of bank cards. Transactions are provided using the cash funds and electronic funds. To provide the transactions there is the issuing of Electronic Payment Means Sendy (hereinafter - Sendy EPM), herein the registration of new bank account or the linking of existing bank account, belongs to Customer. The payment transactions are providing with the usage of QR-code.

The main business purpose for developing of Sendy platform is the implementation of "T+1 principle", means that the transactional funds shall be delivered to the business account of beneficiary or merchant of goods and services not later than next business day after the issuing of payment order for this transaction.

2.2. Legal foundation for IT solution and legal requirements

The Sendy platform was designed on the Sendy Payment System Rules, affirmed by Resolution of Extraordinary Meeting of participants of Digital Payment, LLC, #84 dated 19 September 2017 and published on Payment System site https://sendy.land. Sendy Payment System was licensed by Central Bank of Russia, License Certificate #0035 issued 30.09.2014 of Central Bank of Russia.

Sendy platform functions complies the requirements of Russian Federal Law #115-FZ "On Counteracting the Legalization (Laundering) of Criminally Obtained Incomes and the Financing of Terrorism" dated 7 August 2001 and the requirements of Russian Federal Law #161-FZ "On national payment system" dated 27 June 2011.

2.3. Users of Sendy platform

The following users are using the Sendy platform:

● Customers – private persons and legal entities, private entrepreneurs, which uses the payment services within the Sendy payment system. Customer registration shall be provided by Sendy Participant, following the identification requirements of Federal Law #115-FZ. The private customers can use the Sendy payment system without the identification provided, in this instance the customer transactions shall be restricted following the Federal Law #115-FZ (item 3.5).
● Trade and service companies (hereinafter – Merchants) - companies or private entrepreneurs, provided the sales of goods or services, and had to set up the commercial relations with Participant for purchases of goods and services with payment by using the Sendy EPM and settlement for these transactions.
● Sendy payment system Participants - providers of payments and transfers (defined in Federal Law #161), including the EPM processors, Government bodies of the Federal Treasury, international

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finance organizations, foreign central (national) banks, foreign commercial banks, which joined the Sendy payment system and have provided the banking services for Customers and Merchants.

Now the dominant cashless payment service is the bank cards in Russian merchant networks. Sendy platform have the following features for Customers in comparison with the bank cards:

● The possibility to use the cashless payments and transfers without the identification of Customer (within the limits of legal restrictions);

● In case of smartphone loss, the Mobile application is secured by necessary Customer's settings of smartphone security, like PIN or fingerprints checks;

● Higher security of payments, because the payment means details are not transferred to Merchant POS for payment initiation;

● Customer can be involved into Merchant's loyalty programs.

The main feature of Sendy platform for Merchant – the lower time of purchase funds settlement with Merchant account from the customers, in comparison with the settlement for bank card's purchases. This lead to better financial results for Merchant.

The Participants owes the commission share income for the payment services for Customers and Merchants within Sendy payment system.

2.4. Main functions of Sendy Platform

Sendy Platform provides the following main functions:
● Authorization and verification of users (Customers, Participant's employees, Company executives, or Merchant cashiers);
● Issuing of Sendy EPM, while EPM is linked to existing Customer account or to new account, just open in Participant-bank by Customer choice;
● Control of Customer EPM;
● Accepting of Customer's payment orders and Transfer requests;
● Check of Customer's payment requests for compliance of Payment System Rules, considering the Customer's identification level;
● Notification of users about the processed transactions;
● Providing of payment clearance and issuing of Payment Transactions Lists and Payment Orders Lists;
● Delivery of Payment Orders Lists to Settlement Centre;
● Information exchange with automated Bank Core System of Participant (hereinafter BCS);
● Providing of Participants and Merchants with the detailed and consolidated reports for Sendy activity.

2.5. Exchange with external systems

To process the payment transactions according the Payment System Rules, Sendy Platform shall exchange the payment data with BCS of Participants and Settlement Centres.

Also, Sendy platform is integrated with WeChat payment system.

The exchange interface with external systems described in items 3.3. and 3.6. of this document.

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3. Sendy Platform Architecture

There are described here the main concept of Sendy platform and principles of Sendy processing with the scenarios of main processes in Sendy payment system.

3.1. Main concept of Sendy platform
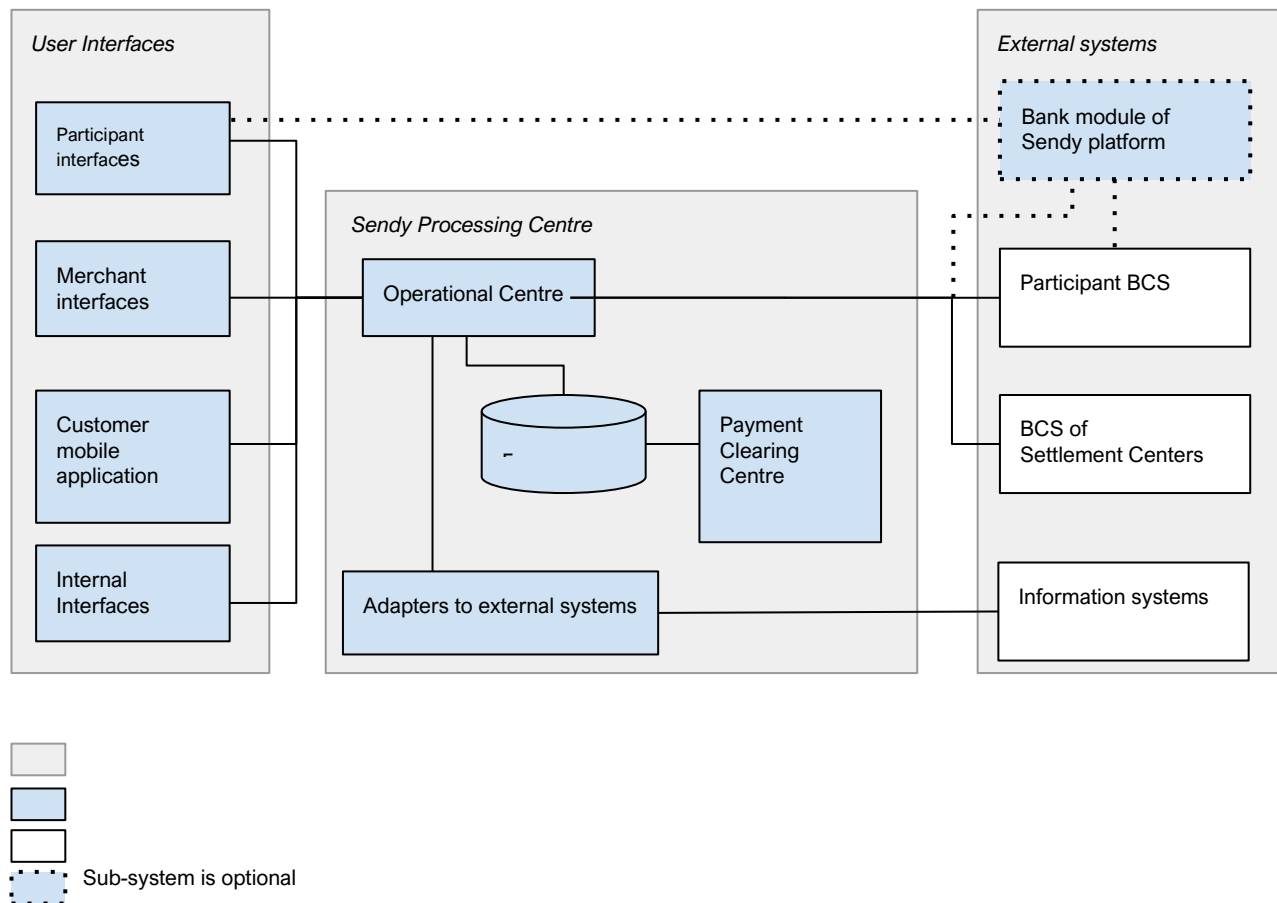
Fig 3.1 Sendy Logical scheme

The internal interfaces are developed for setting and control of Sendy platform and it contains the tools for management, monitoring, reconciliation procedures, issuing of all reports.

The user interfaces are providing the issuing of the payment orders for transactions, the requests for information, the issuing of digital data packet in necessary format, electronic signature of this packet, delivery to Operation Centre of Sendy payment system, processing of received replies.

Operational Centre provides the checks of obtained packets for data integrity and security, defines the Customer's identification level and the compliance of transaction with the imposed restrictions and limits. The restrictions and limits for transactions described in item 3.5.

In the case of accepting and processing of package, the notification message shall be delivered to user. In the case of successful checks and processing of payment order, the necessary notification message shall be delivered to user also.

The Operation Centre shall provide the calculation of commission amount for each Participant (depends of his role – Issuer or Acquirer) and commission settlement for each transaction.

Also, the Operation Centre shall form and deliver the date, requested by users via user and internal interfaces.

The Bank service module and Web-interface for Bank executives were developed, together with adaptation for integration with some Bank Core Systems, like UNISAB and DIASOFT BCS. The exchange between Sendy platform and Participant's BCS can be provided by this Bank module, used by Participant executive manually, or by implemented Bank API package, which depends on the choice of Participant because of his BCS and integration method (item 4.2.).

The Bank module delivers the request to open the EPM account into the Participant's BCS to issue the new EPM, and after the Bank module issues the EPM identification number (PAN) and delivers it to BCS. In the case of linking of EPM to existing bank account of Customer, the Bank module provides the delivery of the account number, defined in Web-page by bank executive, and the EPM identification number (PAN) into the Participant's BCS.

Following the Current procedures order, defined by the Rules of Payment System, the Payment Clearing Centre shall provide the payment clearing by requests to transactional databases. The resulted Payment Transactions Lists and calculated net positions shall be delivered to Participants.

Also, the Payment Orders Lists shall be issued and delivered to Settlement Centers, settling outside the Sendy payment system.

The calculation of Participants limits shall be provided on the balances of Customer's accounts, following the Payment System Rules.

The Processing Centre of Sendy payment system shall request the additional information from external information systems (like WeChat, ESIA etc.), which is necessary for identification of Customers and information checks. The Adapters are the information exchange modules, which provides the exchange with external information systems.

These Sendy internal processes are described in item 3.6. of this document.

3.2. Sendy Platform structure

There are the following user interfaces in Sendy platform:

- Mobile Application of Customer – native mobile application, which provides the interface between Customer and Sendy payment system, using the mobile device and installed application on it. The Application allows to registry the EPM, to issue the payment orders for payment transactions, to obtain the reporting information for Transactions.

- Personal We-page for Participant (executive of the bank) - the web-application, which provides the information for Participant about the transactions, and provides the control for information about the Merchant agreements, accounts, Merchant details, POS-terminal details, and issued EPM for Customers.

- The interfaces for Merchants.
    - POS-terminal, which provides the accept of Customer's payment orders by terminal application, installed in Merchant POS, and delivers the orders to Sendy platform for approval, and accepts the approval messages for transactions from Sendy. Merchant can integrate the on-line exchange with Sendy into own information system (ex. cash registry system), using the POS API package.
    - Mobile Application Sendy POS, which provides the cashless payments processing and control for it, using the universal mobile device, ex tablet.
    - Personal WEB-page of Company, which allows obtaining of Merchant's transaction lists and reports, managing the Merchant and POS data.

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Processing Centre of Sendy platform includes the following sub-systems:

- Operation Centre, which provides the exchange of digital messages between user interfaces and sub-systems of Sendy platform and check the payment orders for compliance with imposed requirements and limitations, and issues and delivers the notification messages and reports. Operation Centre contains:
  - Mobile Server, which provides the Customer registration data and interconnection of Customer's Mobile Applications and another component of Operation Centre;
  - Issuing Server, which provides the management of all EPM;
  - Acquiring Server, which provides the processing of payments and transfers.

- Payment Clearing Centre, which provides the payment clearing according the Payment System Rules.

The Bank module shall be placed on the Participation side and provides the interface of Sendy Processing Centre and user interfaces with BCS of Participant.

The functions of sus-systems are described in item 4.

3.3. The exchange between sub-systems and external information systems

To provide the interfaces the Sendy platform provides the following application program interfaces (API):
- Application API – interface of Customer's Mobile Application with Sendy platform;
- POS API – interface of POS-terminals with Sendy platform;
- Bank API – interface between Sendy platform and BCS of participants for integration without usage of the Bank module (item 4.2.1.).

The serial JSON objects are using for messages exchange. The exchange is provided by POST request using the HTTPS protocol for the Sendy messages exchange point for the external information system.

For information security providing, the electronic signature using the closed encryption key is using for all outgoing messages and checks of all incoming messages by open encryption key by recipient side.

The API specifications are described in about separated documents.

To provide the Sendy platform exchange with external information systems, the Adapters – program modules, which provides the information exchange by confirmed external protocols – can be included into Sendy platform. The Sendy platform integration module with WeChat payment system can be an example of such exchange (item 3.6.10.)

Sendy platform must exchange with BCS of Participants and Settlement Centre in 2 different modes:
- Operational On-line exchange – for requests and replies to Participant's BCS for issuing of EPM and authorization of payment transactions of Customers;
- Offline exchange at the end of business day – for delivery after the cut-off time of consolidated Reports.

3.4. The Data models

The Sendy Architecture assumes the single transactional database with access via Operational; Center.

Common Model of data is shown at the figure (fig 3.2).
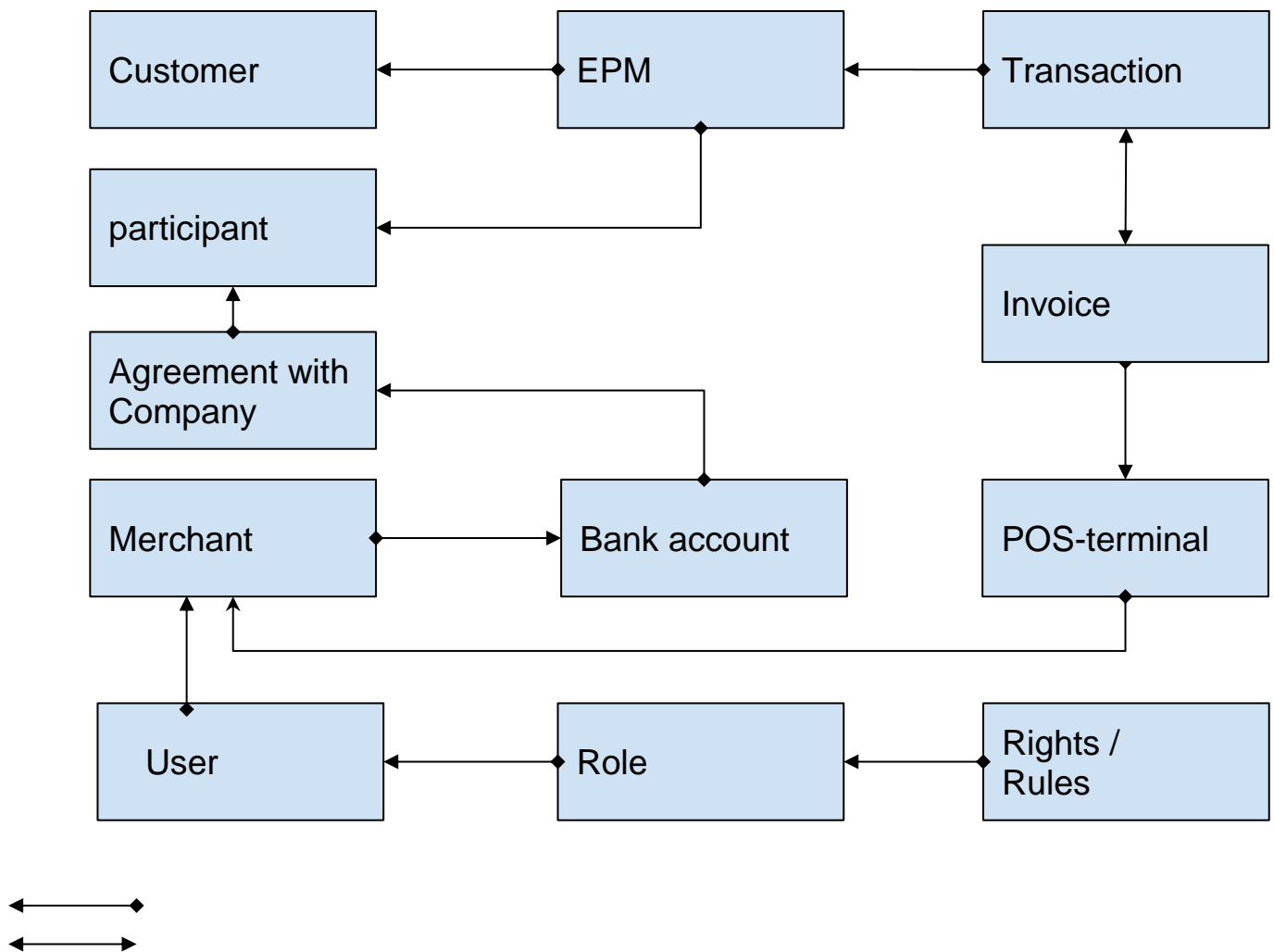
Fig 3.2 The model of data

Customer identification in Sendy platform had to done by subscriber number of mobile device and unique assigned identification number. Sendy platform had not to store the personal data of Customers (like Names, ID details, etc.). The BCS of Participant shall store, update and check the details of such personal information.

The Participant's BCS shall hold the balance of Customer's account with cash / electronic money, linked to EPM.

The main details for each object:
- EPM:
  - PAN number - unique 16-digits identification number of EPM;
  - Bank account number;
  - Date of account registration;
  - EPM type for accounting – cash or electronic money;
  - Customer Identification level – anonymous, simplified, full identification тип;
  - Customer status - **personified** or not-**personified**;
  - currency.

- Transactions:
  - Number;

- - Initiation Date;
  - PAN number;
  - Payout Date;
  - Account Number;
  - Contra-agent – the funds beneficiary;
  - Amount;
  - Currency.

- Agreements:
  - Agreement Number;
  - Agreement Date;
  - status;
  - Individual Tax Code;
  - Official Name of Company;
  - Legal address of Company;
  - Contact phone number;
  - Level of commissions.

- Accounts:
  - Current account number;
  - BIC of Bank;
  - Name of Bank;
  - Correspondent account number;
  - Currency of account;
  - Minimal sum of payment.

- Merchant:
  - Name;
  - Address.

- POS:
  - Number;
  - Status.

- Payment receipt:
  - Number;
  - Amount.

3.5. The restrictions and limitations for transactions

Each Sendy platform's transaction had to be checked for compliance of all following conditions below.

3.5.1. The restrictions depending from Customer identification level and EPM status

According the Sendy Payment System Rules the Sendy platform imposed the restrictions (the limits) for the balance of electronic money on EPM account, and the total amount of payments during each calendar month. The ranges and levels are filled in Table 3.1

Table 3.1 – The restrictions for transactions according the Russian Federal Law #161-FZ.

Identification level	Personal data provided by Customer	The effective restrictions for transactions	Identification method
Anonymous	Phone number	Limit of E-Wallet balance: 15 000 RUR Monthly turnover limit: 40 000 RUR	Set up in Sendy platform by default
Simplified (partial)	Names, Individual Tac code or Social Security number, Serial Number of national passport	Limit of E-Wallet balance: 60 000 RUR Monthly turnover limit: 200 000 RUR	Data were inputted by Customer, and were confirmed by ESIA external system
Full	Full data	Limit of E-Wallet balance: 600 000 RUR	The data had confirmed by Customer with presented documents

The EPM status shows the fact of Customer's Full Identification in some branch of any Participant-bank and have 2 values: "personified" or "not-personified". The "not-personified" value is set up by default. The Participant executive provided the full identification and assigned "personified" value for EPM status, is personally responsible for correct data, and Sendy platform had record the reference to this executive.

The identification level EPM status can be changed if Customer provides Sendy with his personal data (for simplified level) or with the original ID documents (for full level), wherein the repeat issuing of EPM had not be happen.

In case when the EPM is linked to existing bank account, the Customer obtains the Full identification and EPM obtains the "personified" value just after linking, and the Sendy restrictions applied as for Full identification.

Participant bank can set up the own limits for e-wallet balances and the own limits for turnover for any period (business day or month). These levels had to be set in his Sendy Bank module.

3.5.2. The restrictions for the Participant balance limit

The Participant balance limit value shall be calculated daily for each Participant to ensure his financial obligations. The level of Participant balance limit shall be calculated on the base of total sum of balances of cash and electronic money on accounts of all Customers in this Participant bank.

If the rest sum of Customer balances for cash and electronic money is less than the Participant balance level, defined in item 4.7.4., the processing of transactions for Customers of this Participant shall be suspended.

3.5.3. The check of Customer data against the black lists

The check of Customers data shall be done by Participant BCS against the black lists of persons and companies, which are suspected in terrorism activity, and the lists of lost ID documents.

If Customer data complies with these black list data, the Participant is obliged to block the all Customer's accounts and EPMs.

3.6. Main business processes

3.6.1. Issuing of EPM

3.6.1.1. Issuing of EPM with "Anonymous" level of Customer identification in on-line mode

The on-line issuing of EPM had the assume that the bank account with electronic money shall be open automatically.

The request for EPM issuing is filled by Customer using the Mobile Application with the choice of Issuing Bank from the list of issuing Participants, which Bank had to open the account for electronic money. Also, Customer shall choice the currency for this account.

Customer shall accept the Offer to open the EPM, which text is issuing and providing by Sendy platform depending onto chosen Participant and currency of account.

Sendy platform shall open the request message for EPM issuing with unique number, deliver this request message to Banking module of issuing Participant. The Banking module exchange with BCS of Bank for opening an account.

After the opening of account and confirmation to Sendy platform, Processing Center generates the unique 16-digits identification number (PAN) and issues the EPM with changing of EPM status. The confirmation of EPM issuing shall be confirmed for EPM Issued Bank through the Banking module.

Customer obtains the rights for transactions after new login to Mobile Application.
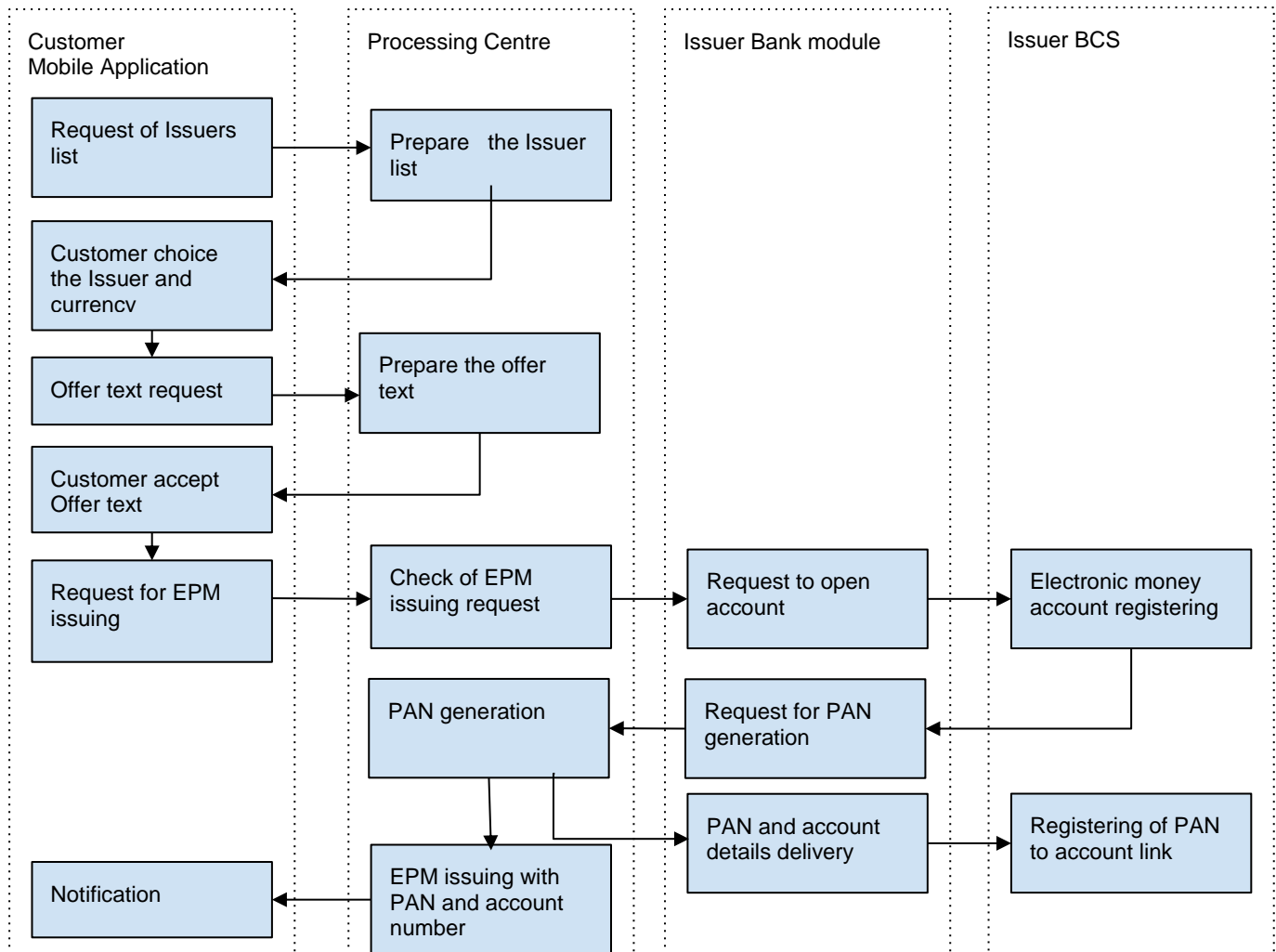
Fig 3.3 The figure of EPM issuing process for the "Anonymous" Customer identification

3.6.1.2. The EPM issuing with linking to existing cash or electronic money account of Customer

The on-line issuing of EPM with the linking with the existing bank account with electronic money shall be open by Issuing bank executive in off-line mode using the Bank's web-page.

If requested, Bank executive provides the registering of bank account following the Bank procedures with the necessary checks. Bank executive shall input the phone number of Customer into Bank web-page. The SMS-message with confirmation code shall be sent to phone number of Customer to obtain the reply of Customer to Bank executive. The Bank executive shall input the confirmation code in the web-page, and the number and balance of linked account.

The account details are delivering from Bank web-page through the Bank module shall be delivered to Processing Centre. Processing Center generates the unique 16-digits identification number (PAN) and issues the EPM. The confirmation of EPM issuing shall be delivered to EPM Issued Bank and notification message shall be delivered to Customer.

3.6.2. Fulfillment of EPM balance.

The fulfillment of EPM balance by electronic money shall be done by following procedure.
1. Customer choices the EPM, input the amount with source of funds.
2. The request shall be delivered to Sendy platform.

3. The check of EPM balance limit depending on the EPM identification level (item 3.5.2.).
4. The check of real balance of Customer's EPM account.
5. Calculation of fulfillment amount and the exceed sum over the limit:
    - If EPM limit is not exceeded by adding of requested fulfillment amount, the EPM account shall be credited onto requested amount;
    - If the EPM limit is exceeded, the fulfilment amount is credited the only difference between EPM limit and the balance on EPM account.
6. The EPM account had to be credited on the fulfillment amount.
7. The rest of requested amount over the EPM balance limit had to be saved onto Bank account for unfinished reconciliation amounts of electronic money.

After the customer will charge the EPM account, the Customer's balances from Bank account for unfinished reconciliation amounts of electronic money will be automatically credited to EPM account with using the effective limits.

As there are no limits for cash account balances, the limit check for this account shall be not implemented.

3.6.3. Providing of funds transfers

The access to Internet connection for Customer's mobile device is necessary for funds transfers. The fund transfer transactions are possible only for "Simplified" and "Full" levels of EPM identifications. If the EPM identification level is "Anonymous", the funds transfers are possible only between different EPM accounts, issued to the same Customer phone number.

The structural sequence of funds transfer proceeding is shown on Fig 3.5.
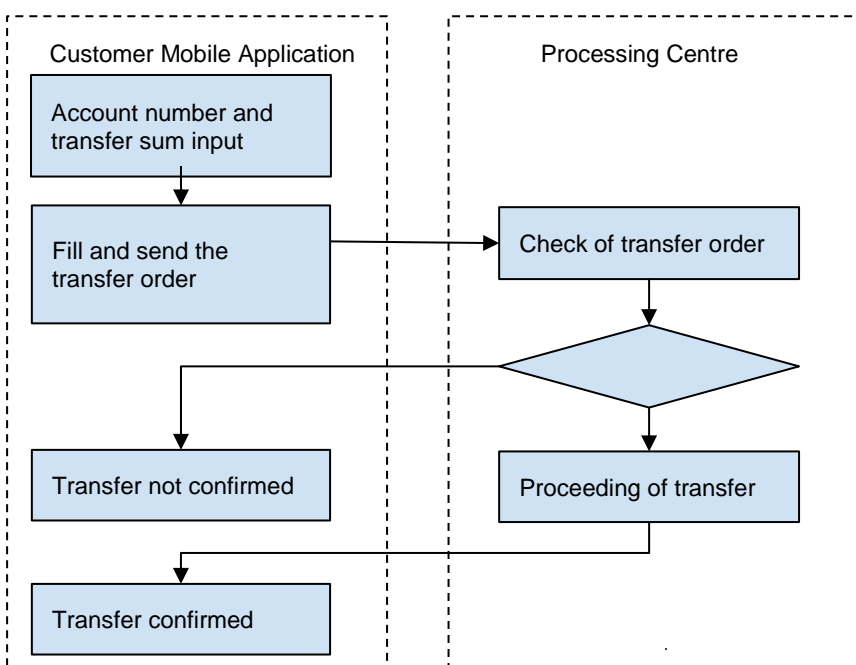

Fig 3.5 The process of fund transfer

For transfer order the Customer shall fill the following data:
● The initial EMP details, which is the source of fund transfer;

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- The amount of funds for transfer to beneficiary;
- The target EPM details, which account shall be credited for transfer amount.
  The payment information with EPM details can be filled in the necessary fields of Mobile Application manually, and payment information can be filled by scanning or upload from beneficiary issued QR-code.
  The Money Transfer Control Number-unique identification number has been assigned for transfer request, also the necessary control data are defined, which allows to all modules and subjects to control the authenticity of this money Transfer during the latest processing.
  The refund and refusal of the money transfer operation are not envisaged.

3.6.4. Purchase payment transaction using POS-terminal in on-line mode

It is necessary to have the on-line Internet connection for POS-terminal and mobile device of Customer to provide the purchase payment in on-line mode.
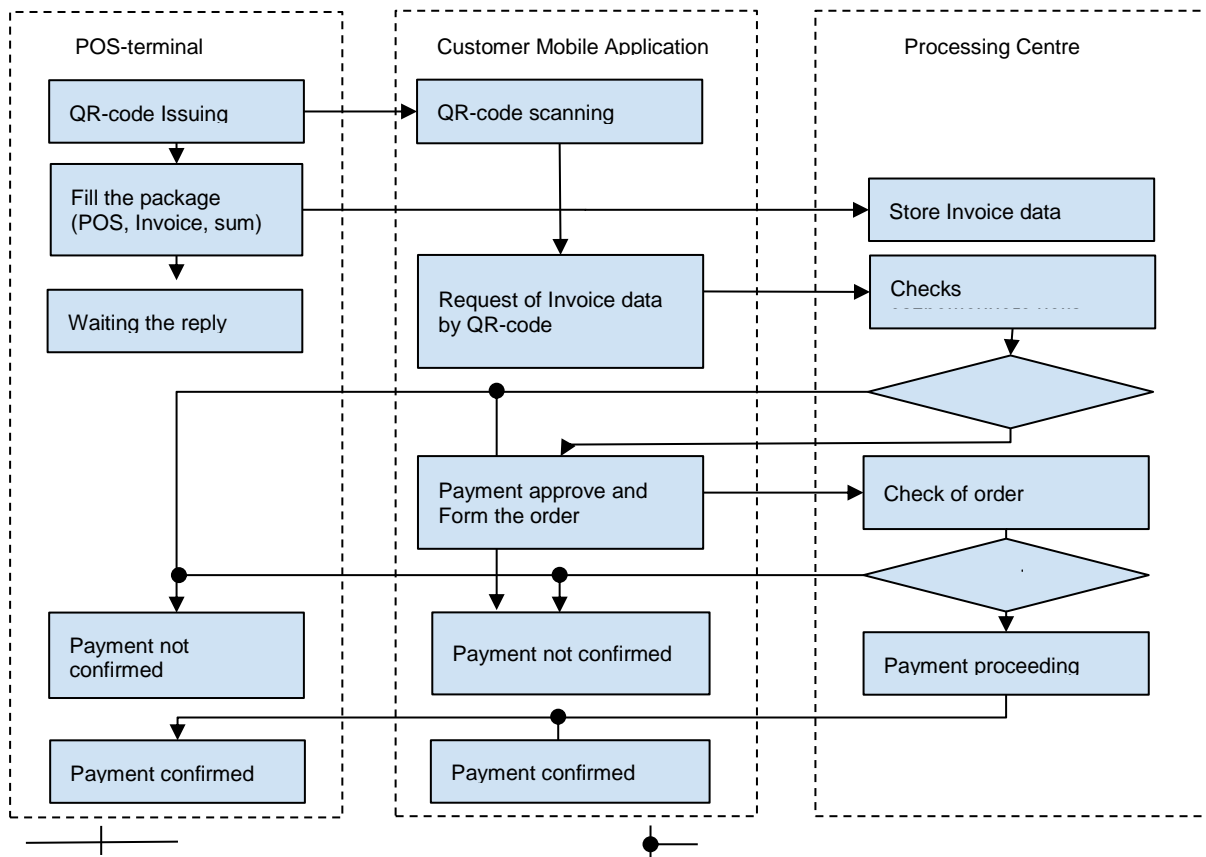
Fig 3.6 The process of purchase payment
using the POS-terminal in on-line mode

The purchase payment can be provided in off-line mode in case of connection lost on Customer mobile device and impossibility to deliver the payment message to Sendy processing center (item 3.6.5.)
The Merchant executive have the possibility to confirm the successful finish of payment transaction in Sendy web-page of Merchant in case of connection lost on Merchant POS-terminal after delivery of purchase receipt and absence of reply with confirmation of payment.
The Check procedure of payment request for compliance of existing requirements is described in item 3.6.6.

3.6.5. Purchase payment transaction using the POS-terminal in off-line mode

The off-line mode had to be used in case of Internet connection absence on Customer mobile device and existence of Internet connection on Merchant POS-terminal.
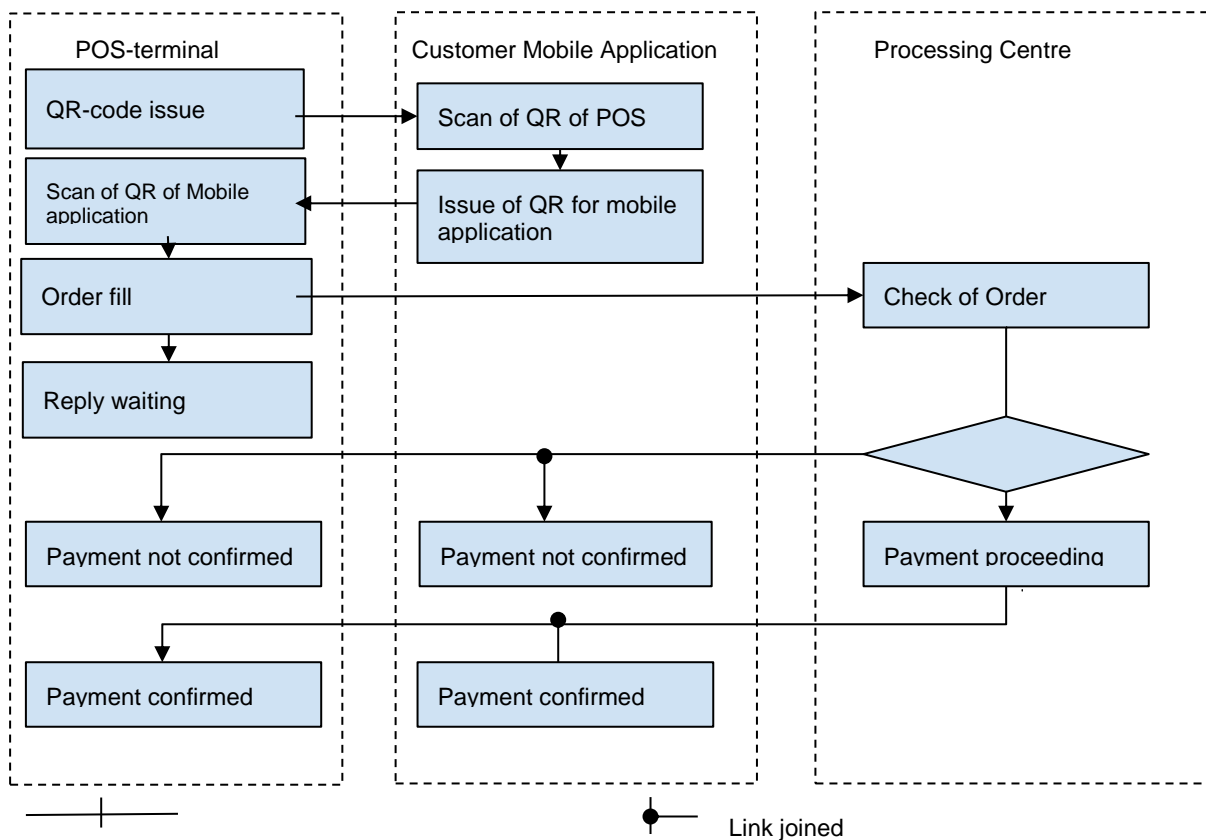

Fig 3.7 The process of purchase payment
using the POS-terminal in off-line mode

The Merchant executive have the possibility to confirm the successful finish of payment transaction in Sendy web-page of Merchant in case of connection lost on Merchant POS-terminal after delivery of purchase receipt and absence of reply with confirmation of payment.

The QR-code, issued by POS-terminal, contains the details of receipt. The QR-code, issued by Customer mobile device, contains the identification details of Customer. The confirmation of payment transaction from the Customer side in off-line mode is not envisaged.

The Check procedure of payment request for compliance of existing requirements is described in item   3.6.6.

3.6.6. Check procedure for payment request

The Sendy Operation Centre provides the following checks after obtaining of payment request.
1. Check the integrity and completeness of payment request – mathematical confirmation of electronic signature, presence of mandatory details of request and compliance these details for the required formats.
2. Check of sufficient balance of Customer bank account with consideration of implied limit (п. 3.5.2.).
3. Check of sufficient balance on Customer EPM account for this transaction.
4. Definition of EPM type (cash or electronic money), the Customer identification level and status.

5. Check the transaction compliance with requirements due the EPM type and Customer identification (item 3.5.1.).
6. To obtain the effective limit levels of Issuer Bank, the request to Issuer BCS should be done for the following check of transaction against these limit levels.

If the results of these checks are positive, the payment request proceeds for payment. If the result of any these checks is negative, the necessary message about the refuse of processing had to be issued and deliver.

3.6.7. Proceeding of payment

In case of positive result of checks the Sendy platform had issue the transaction record.

The meaning in request amount (cash or electronic money) had be blocked (hold) on Customer account and became unavailable for further transactions. The balance level of EPM had to be debit for amount of transaction.

Some money, not credited to account due the limit compliance reason, is any, should be automatically credited to EPM account, using the limit restrictions for this Customer EPM.

3.6.8. Refund of payment transaction

Sendy platform provides the full or partial refund and refusal of payments. The Refusal of transaction requires the request of payment transaction refusal till the end of this banking day, the refund of transaction can be done after the end of banking day of payment transaction.

The funds shall be refunded into the Customer EMP account, which was used to initiate the payment transaction.

The request for refusal or refund shad to be sent by Merchant from POS-terminal or mobile application Sendy POS, with mandatory details, like number of merchant receipt, which was the base for payment transaction. The refusal or refund amount cannot exceed the amount of this receipt amount.

The refusal of transaction provides the refusal of full amount.

The refund of transaction requires the additional back-directed transaction, required by Sendy payment system for the owing of commission amount for the initial payment transaction.

3.6.9. Payment clearing procedure

Payment clearing procedure – the method for cashless settlement between banks, based onto equivalent netting of payments, and Sendy platform provides and calculates the net currency positions for clearing on the netto-base.

Payment clearing had to be provided by Sendy Payment Clearing Centre according the Payment System Rules for payment clearing and settlement.

Sendy Payment Clearing Centre provides the preliminarily revises of all transactions for the settlement period. If the any discrepancy is found, the message with description of happened mistake had to be delivered to responsible executives by SMS or/and e-mail. After the analysis and data fixing, the revise procedure shall be repeat again.

After the finish of revises, the calculation of net currency positions shall be provided for all Participants. The net currency position is calculated for Participant as a difference between the amount of all payments, when this Participant was funds paying party, and the amount of all payments, when the Participant was a funds receiving party.

Because of clearing procedures, each Participant shall obtain the report, which contains the lists of all amounts, debit and credit for all payment transactions, happened in this banking day, and the calculated shares of commissions, with the calculated totals of net currency positions.

The detailed report for results of payment clearing execution shall be delivered to Sendy platform operators.

After the finish of Payment Clearing procedures, the Sendy Payment Clearing Centre shall download of List of Payment orders to Settlement Centre. The Settlement Centre shall execute the Participants payment orders by debit and credit of funds for each bank account of Participants.

3.6.10. Integration with WeChat payment system

WeChat is the mobile telecommunication system for text and voice messages exchange, was developed by Chinese company Tencent. There are the money transactions within the WeChat with two main payment methods: using the e-wallets and using the bank cards, linked to WeChat user account.

Sendy platform provides the Chinese tourists the feature for purchase payments for goods and services among Russian merchants, using the WeChat mobile application. This service is implemented in off-line mode, together with refusal, full and partial refund of payments.
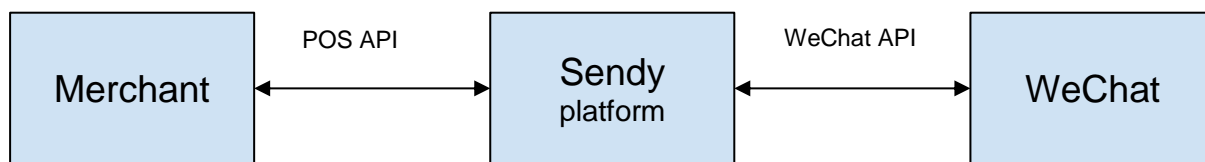
Fig 3.8 The exchange process between Sendy platform and WeChat system

Sendy platform is registering in WeChat as a merchant vendor, and Sendy Merchants are registering in WeChat as merchant POS locations.

The Payment procedures using the WeChat mobile application are providing by the same was as payment procedures using the Sendy mobile application, in on-line and off-line modes, by scanning of QR-codes. The Procedures are described in User Manual of Sendy POS mobile application.

The information exchange between Sendy platform and WeChat is providing via WeChat API. The usage of electronic signature and packages encryption for financial transactions, defined by WeChat API, to ensure the information security.

The daily revises of WeChat transaction lists with Sendy transaction lists had to be done. If the any discrepancy is found, the analysis and data fixing shall be provided.

4. Description of Sendy platform sub-systems

There are described the functions of Sendy platform.

4.1. Customer Mobile Application

4.1.1. Purpose and functions

Customer Mobile Application is the main tool for Customer interface with Sendy platform and it allows to fill the payment orders for transactions and control the results of these transactions. The available functions list depends of EPM identification level provided by Customer (item 3.5.1.)

Customer Mobile Application provides the functions below.
- Management of Customer registration record:
    - Initial registration of Customer;
    - Access renewal for registered Customer;
    - SMS forwarding for registration and access renewal.
- Issuing of e-wallet (EPM).
- Fulfillment of e-wallet:
    - EPM Balance update.
- Money transfer:
    - Transfer of funds within Russia and abroad;
    - Transfer between own EPM.
- Purchase payment using QR-code:
    - On-line mode;
    - Off-line mode.
- Dashboard of executed transactions (payments and transfers).
- Notifications in phone and in mobile application:
    - Receiving of money transfer;
    - Refund or refusal of payment;

4.1.2. The requirements for hardware and software resources

Customer Mobile Application is operational on mobile devices under Android operation system version not less than 4.4. The presence of photo camera is mandatory.

The installation of mobile application can be done from Google Play.

The installation procedure is described in "User Manual of Customer Mobile Application".

4.1.3. Exchange between Sendy platform sus-systems

Customer Mobile Application exchanges with Sendy Processing Centre. The API Application program interface is using for this exchange. The API specification is described in separate document.

4.2. Bank module and Web-page of Bank executive

4.2.1. Purpose and structure

There are two variants for exchange between Sendy platform and BCS of Participant bank.

The Bank module and Web-page for bank executive were developed, as a client-server application, which provides the integration of Sendy platforms and BCS, for UNISAB and DIASOFT BCS systems.

The Participant bank have the feature to install this application on his side as a standard integration solution.

The Bank module is a server part of application, which provides the information exchange between Sendy platform and BCS of Participant. Also, the Bank module contains the database file for Web-page user's registration information and their rights without the special database software.

The client part provides the user interface as a Web-page for Bank executives. This Web-page provides the bank executives with features to look through the transactions lists of bank clients, control of EPM issuing, manage the information about agreements, invoices, merchants and POS-terminal details.

If the Participant uses the another BCS or Participant provides the integration with Sendy platform by himself, the Sendy Bank API should be used for integration. Then the user interface should be developed by Participant in his system by himself.

The exchange between Bank module and Participant BCS can be done by 2 ways: through the buffer database or through the exchange directory by uploading of information files in suitable format for Participant BCS. The integration variant shall be chosen by Participant, wherein the variant with buffer database have better exchange speed and reliability, in comparison with files exchange variant.

More detailed description of integration variants and different scenarios of Bank module implementation are written in "Description of Bank module" document.

The distributive package of Bank module and Bank executive application is delivering as software archive for Participant. Installation procedure and step-by-step settings are described in "Manual for Bank module settings" document, included into distributive package.

4.2.2. Features of Bank executive application

The following functions are provided by Bank executive application menu.
- In Search item of menu:
  - Search page for "Acquiring" section.
- In Lists item of menu:
  - "Report of balances";
  - "List of reports for settlement transactions with WeChat";
  - "List of reports for payment transactions".

In "Acquiring" section the following functions:
- In "Transactions" item:
  - Review of transaction list;
  - Review of chosen transaction full details.
- In "Agreement" item:
  - Registration of new agreement;
  - Review of agreement details;
  - Management of chosen agreement implementation: review of accounts details, update of agreement full details, block of agreement implementation, closing of agreement, delete of agreement block.
- In "Accounts" item:
  - Registration of new merchant account;
  - Review of account details;
  - Management of chosen account usage: review of merchants linked to account, update of account full details, block of settlement with account, delete of account block.
- In "Merchants" item:
  - Registration of new merchant;
  - Review of merchant details;

- Management of chosen merchant: review of POS-terminals of this merchant, update of merchant full details, block of merchant, delete of merchant block.
  - In "POS" item:
    - Registration of new POS;
    - Review of POS details;
    - Management of chosen POS: activation/deactivation request, block of POS.

In "Issuing" section the following functions:
  - In "Transactions" item:
    - Review of transactions lists;
    - Review of chosen transaction full details.
  - In "Customers" item:
    - Review of Customers lists;
    - Update the chosen Customer balance.
  - In "Issue" item
    - Issue of EPM with Cash / electronic money.

Also, the Bank executive application provides the management of another Bank users records:
- Add, delete, renewal of user records;
- Update of user record, including the renewal of password;
- Management of user rights.

The access to functions depends of the user rights, approved by Application administrator.

4.2.3. The requirements for hardware and software resources

The Bank module and Bank application shall be installed onto server under CentOS 7 operation system. The Database MS SQL shall be used if the integration variant based onto exchange database.

The usage of Bank executive application is requiring the internet-browser, installed onto personal computer of executives.

4.3. Web-page for Company

4.3.1. Purpose and functions

Sendy Company's Web-page provides the executives of company or merchant the management features for POS-terminal details and review of payment transactions for purchases in POS locations.

Features of Company web-page.
  - In "Main" menu item:
    - Activity Information for all actual accounts, working accounts, POS-terminals, processed invoices;
    - Result information for incoming funds by payment transactions, refunds, refusals, shown in diagrams;
    - Details of Company records.
  - If "Profile" item:
    - Update of user profiles;
    - Update of Company profile.
  - In "User management" item:
    - Registering of new user;
    - Review of user record;

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- - - Update of user record details;
    - Update of user rights;
    - Delete of user record;
    - Renewal of deleted user.
  - In "Roles management" item:
    - Registering of new role for user;
    - Review of role;
    - Update of role;
    - Delete of role.
  - In "List of accounts" item:
    - Review of account;
    - Review of Merchant locations.
  - In "List of locations" item:
    - Review of location;
    - Review of POS-terminal list in location.
  - In "List of POS" item:
    - Registering of new POS-terminal;
    - Review of POS-terminal details;
    - Activation of POS-terminal record;
    - Deactivation of POS-terminal record;
    - Delete the POS-terminal record.
  - In "List of invoices" item:
    - Review of issued invoices.
  - In "Reports" item:
    - Review of chosen report;
    - Sending of chosen report by e-mail;
    - Download of report in XML format.

4.3.2. The requirements for hardware and software resources

The Sendy Company's Web-page is web-application with open access for Merchant after the signing of commercial Agreements with acquiring Participant for purchase payments for goods and services using the Sendy payment system and settlement procedures.

Usage of this Web-page can be done by Internet-browser from personal computer or mobile device with Internet connection.

More detailed description of Web-page settings and usage is written in "Description of sections and functions of Company's Web-page" document.

4.4. POS API

Sendy POS API is the application program interface which provides the exchange between POS-terminal with Sendy platform. The direct exchange with Sendy platform can also be implemented in Merchant information system using the POS API.

The following functions are available.
- Service operations:
  - Activation of terminal;
  - Settings of terminal.
- Payments:
  - Payment operation in on-line mode;

- Payment operation in off-line mode;
- Full or partial refund operation.
- Invoices management:
  - Review of invoice;
  - Refusal of invoice;
  - Search of invoice;
  - Result of trade session (Z-Report).

POS API specification was written in separate API Technical description document.

4.5. Sendy POS Mobile application

4.5.1. Purpose and functions

Sendy POS mobile application allows use the universal mobile device (smartphone, tablet) as POS-terminal and accept the Sendy and WeChat electronic payment means for purchase payments for goods and services in merchant locations.

The functions are available:
- Registration and activation of terminal;
- Blok and unblock of terminal;
- Sendy EPM payment in on-line mode;
- Sendy EPM payment in off-line mode;
- WeChat EPM payment;
- Refusal of payment transaction;
- Full or partial refund of payment transaction;
- Search of payment transaction and review of payment details;
- Issuing of result report for trade session (Z-Report).

4.5.2. The requirements for hardware and software resources

Sendy POS mobile application shall be installed onto mobile devices (smartphones, tablets) operating under operation system   Android version 4.4 and later.

Mobile device shall be equipped with camera.

Sendy POS mobile application shall be installed by Merchant executive which is responsible for technical support of equipment with usage of Google Play.

The application installation procedure is described in user manual "Mobile application Sendy POS" document.

4.5.3. Exchange with Sendy platform sub-systems

Sendy POS mobile application exchanges with the Processing Centre of Sendy platform. The POS API program interface is using for this exchange.

4.6. Application API

Application API is the program interface of application, which provides the exchange of Customer Mobile Application with Sendy platform. The exchange with Sendy platform can be implemented in external mobile applications using the Application API.

The functions are available.
- Application service requests :

  - ○ Request for application settings;
  - ○ Request for application activation;
  - ○ Request for application registration.
- Management of invoices:
  - ○ Review of invoice information;
  - ○ Confirmation of invoice payout;
  - ○ Transfer between different EPM.

The technical description of Application API is written in separate document.

4.7. Processing Centre

Sendy platform Processing Centre is a kernel of information system and provides the Se payment system functions.

Sendy platform Processing Centre consist of components:

- Operational Centre;
- Payment Clearing Centre;
- Adapters to external information systems.

Operational Centre provides the functions:

- Check of Customer payment orders for compliance with applied requirements, check for funds availability to proceed the Customer payment orders, wherein checks of limits for transaction amounts and limits for EPM turnover, following the Sendy payment system Rules, and the settlement limits for related Participant;
- Authorizing of payment transaction in real-time mode;
- Issuing of Report forms;
- Issuing and deliver the notifications for platform users.

Payment Clearing Centre provides the functions, following the Sendy payment system Rules:

- Accept procedure of Participant payment orders, including the checks of orders for compliance with the applied requirements, check the funds availability for Participant payment orders processing and calculation of Participant payment net-positions;
- Issue and deliver the Participant's List of payment orders to Settlement Centre for settlement between bank accounts of Participants as result of payment clearing;
- Issue and deliver to Participants the notifications (confirmations) of payment orders in form of List of payment transactions, and the List of payment orders with marks of execution.

The Adapters to external information systems were developed for Sendy platform's integration exchange with each external information system.

Attachment 1. Glossary

Subscriber number – mobile phone number which was granted to Customer by cellular telecommunication operator on the signed mobile communication agreement. The mobile communication agreement shall envisage the possibility of the exchange with voice requests and SMS-messages using the Subscriber number.

Authorization – the approval for transaction processing.

Customer – private person or legal entity, private entrepreneur, which uses the payment services within Sendy payment system.

Transaction – the money transfer or purchase payment for the goods and services.

EPM Balance – the Participant liability amount for Customer in paid funds by Customer. The balance shall be counted for each Sendy EPM.

Merchant - legal entity or private entrepreneur, which provides the purchases of goods and services and signed the agreements with any Participant for accepting of the purchase payments using the Sendy EPM and the settlement services for these transactions.

Transaction – the payment operation of funds movement from one account to another for purchase deal.

Participants – operator of payment services, including the EPM operators, Government bodies of the Federal Treasury, international finance organizations, foreign central (national) banks, foreign commercial banks, which joined the Sendy payment system and have provided the banking services for Customers and Merchants.

Acquirer - Participant, which provides the services for accept the payment cards for purchase payments for purchase deals of goods and services.

User Authorization – assignation of rights to proceed the necessary actions to user, and the process of checks (confirmations) of these rights to user after request to do such actions by user.

Electronic money – the funds amount, which paid by Customer in advance to Participant, which shall be calculated and hold by Participant without opening the current bank account, to proceed the Customer obligations for third parties, and which funds can be transferred by Customer with the only usage of electronic payment means.

Electronic Payment Means (EPM) - the tool or/and the method for Customer to fill the request, to confirm and to deliver the payment orders of funds and electronica money to move the money using the information technologies for cashless settlement, the electronic information devices, including the payment cards and another technical device.

Company - legal entity or private entrepreneur, which manage of one or few merchant locations.

API – Application program interface - the ready-for-use set of classes, procedures, functions, structures and constants, provided by allocation developer for the implementation in external software systems for integration and exchange.

QR – graphic matrix code.

POS-terminal – software and hardware complex, allowing to provide the purchase payments by cashless settlement using payment cards or other means.

Attachment 2. List of used abbreviations

BCS – bank core system

ESIA - Joint service of simplified identification, Ministry of telecommunication of Russia Federation

NCO - Limited Liability Company Non Bank Credit Organization "Russian Financial Society" - LLC NCO "Russian Financial Society"

Payment system Rules – the document with the rules of Sendy payment system, approved by Decision of members meeting of "Digital Payment", LLC #84 dated 19 September 2017 and published at Sendy site http:\\sendy.land

EPM – Sendy electronic payment means

PAN - personal account number – unique 16-digits number of separate EPM in Sendy platform

VPN - virtual private network