«TANDEM» PAYMENT SYSTEM

Brief description

General Description

"Tandem" system is a set of software and hardware solutions designed for the organization of the processing center, whose main function is to accept payments in favor of various service providers.

The basis of acquiring network systems is the payment terminals, in which the means of payment is cash. The acquiring network can be expended by connecting other devices and organisations working in the banking or financial field, such as set of ATMs, other processing companies, websites of corresponding orientation, mobile operators etc. To connect the system, comfortable and simple (by using common technologies) protocols are provided, which can be easily implemented.

Logically the system is organised in a way that allows connecting terminals and other devices belonging to the third parties – companies-agent. Agents are provided with simple, convenient and fully functional web-based interface, allowing monitoring the work of the belonging terminals and managing them in a real time from everywhere, delivering detailed information about the operations carried out on the terminals, receiving various reports and statistical information. The simplicity of using the system allows the agents, after a brief training, install terminals themselves, connect them to the system and service them, minimizing the participation of the specialists in the system.

The system allows implement various schemes of working with the agents, such as the presence or absence of the security deposit in the account, flexible mechanisms of commissions and so on. Wide customization options allow you to have different types of configurations for terminals and agents, when necessary, to limit the range of services offered to a particular agent or at a specific terminal.

The modular architecture used in the system makes it easy to connect it to the billing systems of companies, aggregators, and / or service providers, constantly expanding the scope of services. In addition to online solutions, the system also supports the «in-house» solutions for companies-providers that do not have direct interfaces to billing systems. In such a case, the database service provider and the debt providers may be on the servers of the “Tandem” system, and information about the payment periodically (e.g. every day) will be sent to the provider.

FUNCTINAL OPPORTUNITIES OF THE SYSTEM

ACCORDING TO SUBAGENTS

- organization of the set of subagents (owners of terminals) into a tree with the support up to 10 levels of nesting
- support of the following types of commission for the subagents:
    - commission paid by the service provider in the form of reward
    - commission charged from the client by the system
    - commission charged from the client by the owner of the terminal
- flexible configuration schemes of commissions:
    - ranges of sums
    - time ranges
    - minimum and maximum values for the commission
    - calculation of commissions as a percentage or fixed amount
- calculation of commissions in the automatic mode during direct payment for all participants on sub-agents tree
- review of reports on subagents:
    - flow of funds on accounts
    - reports on the conducted payments with the possibility of grouping according to different criteria
- control of subagents' accounts, freezing of funds during payments, calculation of the current account, the accumulation of credit and debit commissions on the temporary accounts with periodical mutual settlement between the participants of the system
- automated interface for accepting payment orders on the accounts of agents from financial institutions
- the possibility of issuing overdrafts to the subagents with calculation of the daily commission
- opportunity to transfer funds from the account of one sub-agent to the another's (up and down through the tree)
- configurable system of automated notification (with the possibility of further sending via e-mail and / or SMS) for sub-agents on various events, such as
    - achieving the threshold limit on the balance
    - accrual of funds on the account
    - registration of new service providers in the system
    - configuration change
    - commission change
    - emergency situations and failures
- manual sending of notifications

ACCORDING TO PROVIDERS

- support of unlimited number of service providers with grouping by types

- support for unlimited number of payment gateways for communications with service providers and aggregators, with the support of the main and backup communication channels for each gateway
- support of the three methods of payment according to providers on terminals:
    - always offline with the further sending on host
    - offline, when it is not possible to send on host at current moment
    - only online
- organization of payments queues on the host in the absence of communication with service providers and aggregators, check-out of the status of payments
- cancellation of payments
- payment redirection from one aggregator or service provider to another
- reporting:
    - on providers grouped by various criteria
    - on terminals
    - on terminal's encashment

ACCORDING TO TERMINALS

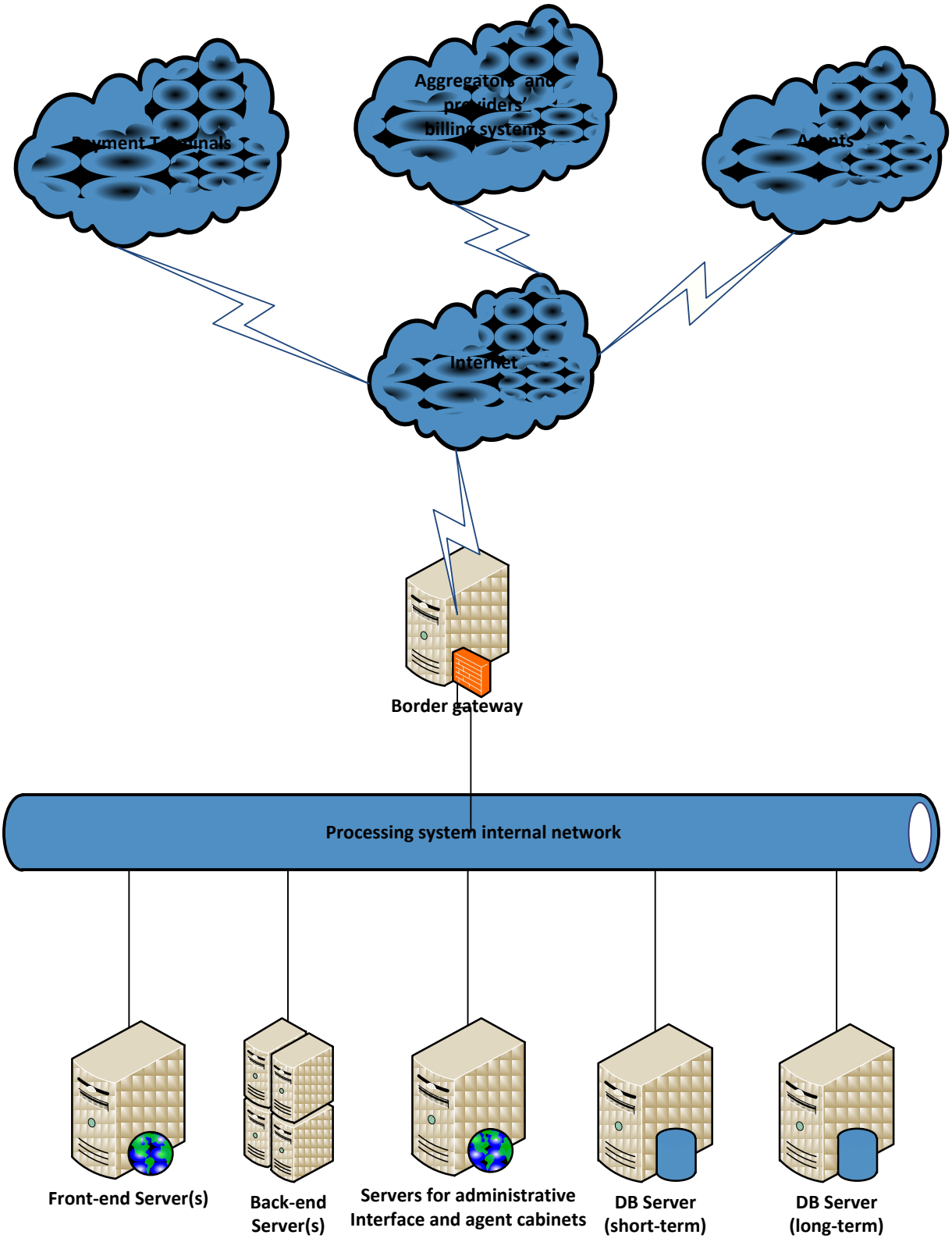
- remote terminal management:
    - setting the parameters
    - software reboot
    - OS reboot
    - remote upgrade of the terminal software
- control of the devices' and operating system's condition (banknote and coin acceptor, printer, GSM modem, balance of SIM card account etc.)
- reporting on cash funds in the terminal:
    - sum
    - number of banknotes
    - number of coins
- management of groups of terminals

FOR CLIENTS

- opportunity of registration in the system as a user for:
    - accrual of unused funds on their own account with the possibility of future use
    - review of a list of recent payments with the possibility of re-payment for the same number again and recurring print out of the receipt for the earlier conducted payment

SYSTEM STRUCTURE

GENERAL NETWORK SCHEME



The system consists of the following modules or components:

TERMINAL MODULE

Main feature

- provides an graphical interface to the customers who want to pay for services. The interface can be remotely set from the processing center (to change the list of services, texts and pictures, input fields etc.).
- provides cash-in (identification of different currencies depends on the model and firmware of the acceptor)
- provides the verification of the subscriber in the system provider, request for debt service (s)
- provides payments receipt???, with the possibility to control the amounts (minimum and / or maximum amount of payment, the multiplicity of the sum of a certain number), with the opportunity to calculate and display the commissions charged from the client
- allows to save any unused funds of the client on a virtual account with the possibility of their subsequent use on terminals or on the web-site of the system
- allows to replenish virtual accounts using different methods (cash payment, payment by credit card, electronic money)
- receipt's printout on the printer (design and content of the receipts are customizable)
- provides messages exchange with the frontend system
- provides service interface for carrying out technical services, settings, encashment etc

Terminal's software allows to work not only online but also offline, in the absence of the connection with the processing, which allows to avoid inconveniencies in case of bad connection

FRONTEND MODULE

- provides communications and messages exchange with the terminals
- provides interface for connecting payment terminals and/or other payment accepting systems
- provides communications and messages exchange with online systems of aggregators and service providers
- provides communications and messages exchange with the backend system
- provides web interface for the owners of virtual accounts, which allows to pay the services on the system's website via internet, look through the list of last operations, and fill in the virtual account etc.
- provides web-interface to the system's administrators and operators for system management, accomplishment of the current work, system configuration and other functions
- provides web-interface to the agents (agency office) allowing agents follow their subnet of the terminals, the volume of transaction, receive reports and statistic information

ADMINISTRATION MODULE

Current module is a part of the system with the help of which main set of administrator's and operator's functions are executed:

- management of the list of service providers (adding, editing, deleting, managing commissions, managing types of services of current provider, managing formats of checks for services)
- management of terminals (adding, editing, deleting, reviewing and filtrating of operations' list, managing parameters and configuration of terminals, review of log information on the terminals, certificates generation)
- management of agents' list (adding, editing, deleting, managing accounts and commissions)
- generation of various reports on operations with possibility of filtration of terminals, providers and services, agents, date and time, transaction completion status etc.

BACKEND MODULE

- provides communications and messages exchange with frontend module
- executes interfaces with database

Each of the system's components (including database server) is equipped with backup servers and this allows to provide continuity of system work upon failure of components and data integrity

RECONCILIATION AND MUTUAL SETTLEMENT MODULE

This module provides the implementation of periodical checks of payments with providers, the calculation of commissions according to providers and agents, the formation of the necessary payment orders or transfers, exportation of data on operations for providers and agents.

SCALABILITY

When increasing the number of points of payment, service providers, conducted transactions and other indicators, the system can be scaled by adding additional frontend servers and /or additional backend servers.

Connection of additional servers can be performed both for the discharge on all the functionality that is server will be fully interchangeable and each of them will be able to provide a full range of tasks, and for distribution of separate functions into separate servers.

For example, one server may be responsible for communications with the receivers of payments, and the second one for management of payment queues to the service providers and aggregators. Round Robin DNS (RRDNS) technology is used to provide front-end scalability. To ensure scalability of front-end technology RoundRobinDNS (RRDNS) is used.

A DNS server is configured so that in response to inquiries of the payment points about resolving a domain name it returned the clients different IP-addresses from a predefined set.

IP-addresses are allocated from the set one by one. To ensure the distribution of load on the RoundRobin principle, few A-type records will be added to the DNS, corresponding to the same domain name. Each entry indicates one of the Web frontend servers, between which the load will be distributed.

For example:

www IN A a.b.c.2

www IN A a.b.c.3

When a client accesses a DNS server with a request to inform him of IP-address of processing's network, the names' server returns the first one from the IP-addresses corresponding to the domain name www.

When referring to the DNS server of the second client server returns him next IP-address from the current list. By the end of a list DNS server goes to its beginning.

Scalability of backend is ensured by means of the software that allows using multiple backend systems.

In each front-end server, addresses of available backend servers will be registered, software of the front-end server will randomly choose a backend server from the list and use it for servicing the request.

To distribute the load on the server of the service database, the system supports the use of two database servers. The first server is designed for short-term storage and contains data for a certain period (the last month or several months, from the beginning of the current year, etc.).

The data of the first server fully provides operational work of the system – making payments, registration of payment points, the work of administrators and operators, the work of agency and user's cabinets, etc.

Periodically the data from the first server is pumped on the server of long-term storage, which may contain data for both for the lifetime existence of the system and for a certain period after which data is archived on the external media and removed from the server. The long-term storage server can be used for calculating statistics, reporting and analysing over long periods of time.

ADDITIONAL OPPORTUNITIES AND FEATURES

Due to the presence of acquiring interface that allows you to connect not only terminals, but also other processing solutions, current system can be regarded as a universal set, allowing on the one hand to apply the whole range of payment services, and on the other hand to accept a variety of means to the payment, ranging from cash and ending with bank cards and the electronic money.

Advantageous difference from other similar systems is that despite the fact that the terminals don't return the change, customers can keep all the money to the penny, by converting them to a virtual account. It is attractive to the customer, and it is also a guarantee that the client will use the services of the system at least once more.

The system includes many mechanisms to protect against failures in the terminal, due to problems with communication or other malfunctions. These mechanisms allow for uninterrupted operation of terminals, and in most cases guarantee protection from situations with discrepancies in the calculations, the confusion with the calculation of assets and other contingencies.

SECURITY ASPECTS

The applied information security technologies allow to ensure the integrity and privacy of data transmitted from the terminals and the other participants of acquiring structure, which increases the security of the system from hacking attempts or fraud.

Data transmission from the terminals to the processing takes place on a secure channel with the using client SSL-certificates on the terminals. As an additional means of authenticating in messages the serial number of banknote acceptor is used as a password. To monitor the integrity of all important types of messages the use of checksums is intended.