

## **SIEMENS M-PAYMENT PLATFORM SYSTEM**

Zoran Ž. Avramović<sup>1</sup>, Obrad Spremić<sup>2</sup>

<sup>1</sup>Saobraćajni fakultet u Beogradu

<sup>2</sup>Siemens d.o.o. Beograd

**Abstract:** *The is aimed to describe a wealth of new opportunities to its large volume of prepaid customers, way ahead of international standardization efforts. It will include progressive features such as Premium-SMS charging, MMS charging, charging for value-added Internet content and last but not least SMS-MO charging for Telekom Srbija's roaming prepaid subscribers. Furthermore, the launch of progressive prepaid recharging capabilities via secure connections to local banks together with the introduction of micro and macro m-payment pave the way for the establishment of next-generation web shopping applications.*

**Keywords:** *m-payment, SMS-MT, SMS-MO, Premium-SMS, Payment@vantage*

### **1. Introduction**

As a response to Telekom Srbija's request for proposal for the delivery of a new m-payment platform, Siemens prepared an exclusive offer to substantially upgrade and extend the portfolio of Telekom Srbija's services in the field of mobile payment.

Business cases best illustrate the scope, versatility and sophistication of a comprehensive system. Thus, the a major part of this solution is dedicated to provide a 'business case by business case' analysis of the newly envisioned, best-in-class Siemens network entities, nonetheless always keeping a special focus on Telekom Srbija's latest prerequisites.

### **2. M-Payment Platform System Overview**

#### **2.1. Comprehensive High-Level Architecture**

The architecture includes currently existing network elements plus new entities that are part of the present Siemens solution. The system including Siemens' equipment, i.e.: the Home Location Register (HLR), the Mobile Switching Center (MSC), three Service Control Points (SCP), three Service Management Points (SMP), the ServiceXpress customer care system (SX), the @vantage Commander (@COM), the

Serving GPRS Support Node (SGSN), the Gateway GPRS Support Node (GGSN) and the Mobile Session Managers (MSM). Secondly, equipment like the two Short Message Service Centers (SMSC) and the Multimedia Messaging Service Center (MMSC) are also part of the system.

The heart of the present Siemens m-payment platform solution is the Siemens Payment@vantage (P@v). This platform is the key element to open the door to the world of mobile real-time payment. The introduction of P@v entails the installation of so-called Payment PlugIns on various network entities. These Payment PlugIns allow an efficient communication between P@v and the corresponding network elements.

Secondly, as a most valuable extension to P@v, Siemens' latest product for establishing connections between the network operator and FIs – Payment Coordinator (PCoo) – is an integral component of the Siemens solution. PCoo reliably and securely bridges Telekom Srbija's network with the world of FIs, e.g. banks, ATMs, etc. PCoo evolves the network operator's business from charging for content and events (with P@v) towards the handling of payment requests involving a direct connection to FIs.

Thirdly, the contemporary Siemens Partner Accounting and Clearing (PAC) component provides management of Telekom Srbija's partner's data, accounting of Telekom Srbija's partner's revenue for products and/or services charged through P@v and the reporting of accounted data. Featuring comfortable, easy-to-use graphical user interfaces and a robust architecture, PAC is a productive and reliable system for partner accounting.

Finally, the Siemens Mobile Smart Proxy (MSP) is being added as WAP Gateway, which not only radically enriches the MMS feature spectrum by adding e.g. content compression and caching, but also enables Telekom Srbija to participate in the lucrative market of real-time prepaid (and post-paid) content charging.

## 2.2. Platform Components

P@v is dedicated to the provisioning and execution of real-time payment requests in the area of e- and m-commerce. In order to match the various use cases the Siemens payment solution consists of modular components, which can be perfectly integrated with the existing legacy environment and the involved systems of the service provider.

Within the Siemens' payment solution P@v acts as a central network element and is responsible for control and monitoring of entire charging transactions in the trusted domain, i.e. access is assumed as verified and trusted. A charging transaction is defined as the complete process from the initiation of the charge transaction by the customer, up to the booking of the transaction to the customer and supplier accounts by the operator of the real-time payment suite.

P@v is able to offer the following functions to perform comprehensive transaction tasks:

- determines the chargeable amount based on various parameters received from the network, e.g.: MSISDN, service ID, URL, time, bearer, etc. (it controls the tariff-/price determination in close cooperation with the online accounting systems),

- determines the account management system involved in the charging transaction based on the received MSISDN (the determination is done via an internal 'address resolution table' or by inquiring a User Repository),
- initiates synchronizes and controls the booking of the appropriate amounts to the involved consumer accounts (from point-of-view of P@v the amount is stored as a reservation on P@v),
- communicates the successful / unsuccessful reservation back to the requesting server for delivery,
- reservation is time limited, so after the expiry of reservation the amount is free to be used for other purposes (no additional handling of expired reservations needed),
- further monitors the transaction until having received a final confirmation of the delivery from the partner network element (the response of the corresponding partner network element is confirmed in a ticket for subsequent billing or statistical evaluations) and
- all transactions are uniquely identified via a special ID.

Depending on the payment use case one or more network elements can interwork with P@v. All systems are controlled and synchronized by P@v via defined interfaces. A number of these interfaces relies on the communication between P@v and the so-called Payment PlugIn, which is based on HTTP servlet pages or Java API, and is installed on the respective communication partner entity, e.g.: Payment PlugIn on SMSC, on application servers.

The new and highly scalable Telco Service Platform, fulfilling a wide range of performance and availability requirements, acts as the solid basis for P@v. The initial (standard) product release consists of a 2-node cluster of FSC machines being supervised by the @vantage Commander.

To sum it up, P@v is targeted at network operators and service providers who want to position themselves in the rapidly growing market of e- and m-Commerce. The target system can be flexibly configured based on the business model plus perfectly integrated with the existing legacy network environment. Network operators can use P@v in order to enhance their current business from charging for simple 'transport network services' towards content and event charging.

The Payment Coordinator (PCoo) is an extension to P@v offering a reliable and simple solution for connecting the network operator with financial institutions (FIs).

PCoo supports a PlugIn technology to communicate with FIs. PCoo PlugIns use a standard subset of the ISO 8583 interface for communication with FIs in order to perform ATM and POS Recharges.

With PCoo applications and real goods can either be charged to the subscriber's bank account or to the subscriber's prepaid or post-paid account (by redirecting the charge requests to P@v). Such applications and real goods are either located in Telekom Srbija's domain or within the Internet. Application servers located in Telekom Srbija's domain are handled directly by P@v. P@v supports all major account management functions: it receives a charge request from an application server (e.g. WAP Gateway, Web Server, SMS-C, Portal, etc.), identifies and locates the account(s) involved in the charge request and finally monitors and supervises the entire charging transaction.

PCoo provides the same interface towards applications as P@v. Therefore all applications developed for P@v can also be used together with PCoo (by applying minor

changes or no changes at all). By using this approach the functionality of P@v can easily be extended in the following way. Applications will use P@v for micro payment, charging the mobile subscriber's prepaid or post-paid account, whereas the PCoo will be used for macro payment, charging the mobile subscriber's credit card or bank account.

A typical use case requiring a connection to an FI (bank) is 'mobile sports betting'. The subscriber uses his mobile phone to place a bet for e.g. the outcome of a soccer game. First the user has to subscribe to this service and in this context communicates his bank account number to Telekom Srbija. Then he connects to the server of the betting office via Siemens Mobile Smart Proxy (MSP) or just uses an SMS to transmit the required parameters, such as: the soccer game, the predicted outcome and the amount of money to gamble (stake). The stake is either deducted from his prepaid (or post-paid) account or removed from his personal bank account. In case the subscriber wins the bet (and a large amount of money), the proceeds (monetary prize) are transferred to his private bank account.

The behaviour of the web proxy component is compliant to the P@v PlugIn interface specification in order to fulfil the portability of applications among different mobile operators, which are utilizing the Siemens Payment PlugIn specification. PCoo is completely transparent to the applications, which are using prepaid accounts located on the IN system or trying to charge post-paid subscribers (ticketing interface) for telecommunication services (micro-payment). The HTTP interceptor/router will forward HTTP request towards P@v and vice versa. This functionality covers basically applications that require so-called 'split-charging', e.g. the fee (claimed by the network operator) to place a lotto bet is deducted from the subscriber's prepaid account, whereas the stake is removed from his bank account.

The main function of the Central Logic is to process requests from applications and to forward them to P@v or to FIs. It also processes ATM and POS recharge request from FI and forwards it to P@v. Each transaction is logged and logs are stored for further disposal (controlling), statistical examination or post processing with the Partner Accounting and Clearing (PAC) product. If the application is situated outside Telekom Srbija's domain, PCoo will provide an authentication of the application that intends to perform charging.

Communication between PCoo and FI will be realized through PCoo PlugIns. Each FI will be covered by its own PlugIn. The transaction flow is secured by applying the security mechanism requested by the specific FI. A central logic will deliver messages to PlugIns and these will then return responses from FIs. PlugIns will handle protocol/message format conversions between PCoo and FIs. PCoo for Telekom Srbija includes one PlugIn towards an FI.

### **3 Use Cases and Workflows**

#### **3.1.1. Premium-SMS Charging**

SMS is one of the most successful applications in today's mobile networks. Online charging of short messages for prepaid users is one of the main objectives of the network operators. Rather than waiting for a standards-based CAMEL Phase 3 or even CAMEL Phase 4 solution, P@v offers a lucrative alternative to support instant charging for mobile terminating SMS (SMS-MT, e.g.: Premium-SMS, which has to be paid by the

receiving user) and for so-called Roaming-SMS (where the prepaid subscriber sends an SMS from abroad).

The Siemens M-Payment Platform solution supports the real-time charging of an SMS-MT service to prepaid and post-paid accounts. An MSC or content server forwards the SMS to the SMS-C, which initiates an online charging dialogue with P@v. After confirmation of the charge request by P@v to the SMS-C, the SMS is processed and delivered. The SMS-MT scenario provides the basis for consumer MT tariffs, but also for the charging of SMS value-added services by the operator as well as Premium-SMS content charging.

### **3.1.2. Roaming-SMS Charging**

In some cases network operators already have a satisfactory hot billing or a proprietary online SMS-MO solution for their PPS subscribers in their home network. However, such solutions usually do not support the online charging of SMS-MO for roaming PPS subscribers, because very few operators have access to other network operator's SCPs via CAP3 (or even proprietary connections). Therefore charging of Roaming-SMS comprises an enormous revenue-generating potential. The Siemens solution supports real-time charging of SMS-MO for roaming PPS subscribers, because the charging is always performed by an SMS-C in the home network.

The charging of Roaming-SMS is primarily based on the fact that the SMS-C not only forwards the MSISDNs to the P@v system, but also sends an identifier (VLR-ID) indicating that the currently processed SMS was sent from a roaming subscriber presently being abroad (in another network / VPLMN). Please note that if P@v shall only treat Roaming-SMS (and not each and every SMS-MO), the SMS-C must be capable to differentiate between roaming and non-roaming SMS and thus only forward Roaming-SMS to P@v.

P@v utilizes the VLR-ID identifier to append an additional rate to the regular SMS charge. This method gives the network operator the ability to charge the transport of SMS in diverse variants. The additional rate applied for an SMS could either be identical for each and every roaming case or could be changed depending on the country/operator the subscriber is visiting. Furthermore, short messages being sent from roaming subscriber A to roaming subscriber B could also be charged with yet another rate. Thus, P@v is able to process a variety of different Roaming-SMS rating scenarios, which could incidentally also be utilized to apply special rating of regular SMS-MO.

### **3.1.3. MMS Charging**

The real-time charging of MMS messages is realized by utilizing the existing MMS-C. The MMS-C is equipped with a Payment PlugIn for efficient communication with P@v.

The Payment Transaction Control (PTC) takes care of the handling of the charging process. The Address Resolution Control (ARC) retrieves the information on which system the consumer account is located.

### **3.1.4. Internet Service Provider Content Charging**

The MSP introduces a new feature module called the MSP Service Charger. The Service Charger provides a flexible flow control and metering solution that goes beyond regular IP-flow level accounting to actively monitor the data traffic and filter out those

requests to which it should apply certain charging policies. Using session and subscriber information, it interacts with the operator's online charging system to charge the requested content in real-time. While interacting with the online charging system the Service Charger controls the user flow to display the price and block the content until the account balance has been verified and the user has confirmed the price. In addition, the Service Charger meters the Internet traffic and correlates related Internet transactions to create billing events that contain all the information necessary for post-processing and offline charging with conventional billing systems.

### 3.1.5. Micro Transactions

Micro payments can either be charged to the subscriber's prepaid or post-paid account via P@v. According to the amount of money or some other parameter, the request from the application server will either be forwarded to P@v or will be sent to the FI via PCoo. To fulfil the portability of various applications among members of global mobile operators using Siemens' Payment Plugin specification, the behaviour of the web proxy part has to be compliant to the Payment Plugin specification. PCoo is completely transparent to all applications that charge prepaid accounts located on the IN system or charge post-paid subscribers via ticketing interface. The HTTP interceptor/router will just forward HTTP request towards P@v and vice versa.

## 4 Conclusion

The P@v platform has been dimensioned in order to meet the terms of Telekom Srbija's prerequisites and expected traffic load numbers. Telekom Srbija's assumed m-payment traffic load can be summarized in the following way: PCoo utilizes Intel-based computers in a cluster with shared storage. PAC utilizes Intel-based computers in a cluster with shared storage. The MSP 3.0 stores the MSP services configuration and user profile data in an Oracle 9 database. Sun Solaris 8 is used as operating system. The MSP is available in three different configurations that allow the system to scale with the utilization and availability requirements of the system.

**Sadržaj:** *Sistemi mobilnog plaćanja proizvoda i usluga postaju sve aktuelniji. U radu je prikazan Siemens-ov sistem mobilnog plaćanja razvijen za potrebe Telekoma Srbija. Prezentovane su osnovne karakteristike ovog sistema i istaknute su prednosti u odnosu na postojeće sisteme. Posle predstavljajanja funkcionalnih mogućnosti ovog sistema izloženi su i hardverski zahtevi za instalisanje.*

**Ključne reči:** *mobilno plaćanje, SMS-MT, SMS-MO, premijum-SMS, miko transakcije*

## SIEMENS-OV SISTEM MOBILNOG PLAĆANJA

Zoran Ž. Avramović, Obrad Spremić