Advice of Charge (AOC) Solution in the Cloud

This technical case study describes the MetroAOC service, a cloud-based advice of charge solution from Metronet. Provided in the Software as a Service (SaaS) paradigm, the MetroAOC service is powered by SmartNode VoIP Gateways from Patton.

PATTON®

Let's Connect!™

AOC as a Service

Powered by

SmartNode™ VoIP Gateways *from*

Authored by

Darko Grubisic—Business Support Systems Expert, Metronet
Matko Ugrin—Head of Billing Section, Metronet
Domagoj Mikac—ICT Operations Director, Metronet

Edited by

Ramon Felder—President and CEO, Patton-Inalp Networks

Contents

Abstract

Metronet Advice of Charge (AOC) service is described in the next two chapters, where the main features and benefits are listed. Chapter 4 describes the service architecture from the network perspective. The main networks elements include the Patton Voice Gateway, RADIUS server, Call Detail Record database and Web server. Chapters 5 and 6 explain the rating process and configuration of the service via Web application. The document concludes with the several use case scenarios of using MetroAOC service providing a common case study example.

Introduction

MetroAOC service enables monitoring the costs of telephone call in real time. Metronet developed the service as an answer to the customers' need for controlling telecommunication cost while using local private branch exchanges (PBXs).

The main features of MetroAOC service include:

- Telephone call information delivery towards customer business system over TCP/IP

- Access to the service via ordinary web browser and/or a well defined application programming interface (API)

- Real time rating according to the rating parameters defined by the customer

- Highly configurable rating parameters

- Visibility of calls immediately after their completion

- AOC-E (Advice of charge at the end of the call) functionality - customer is informed about the telephone call cost at the end of the call ([1]),

- Maintaining of Call Detail Record (CDR) data

- Telephone call cost presentation using a modern web application

Benefits

The service follows basic principles of the Software as a Service (SaaS) cloud computing paradigm. It resides on the service provider side and can be accessed over the Internet using a web browser or a well defined API ([2], [3]).

From the customer point of view, the main benefits of the MetroAOC service are listed below:

- No additional software installation is needed (ordinary web browser is enough)

- MetroAOC service reduces initial investment, as well as IT support costs (no additional hardware, deployment or maintenance is needed)

- The customer is not concerned with the tedious replication of the CDR data for backup purposes anymore

- The customer can rent the service on a monthly fee basis (if the service does not fulfill the customer's needs, it can be easily canceled)

The service uses multi-tenant architecture: each customer uses a customized virtual application instance, i.e. data and configurations are virtually partitioned between customers.
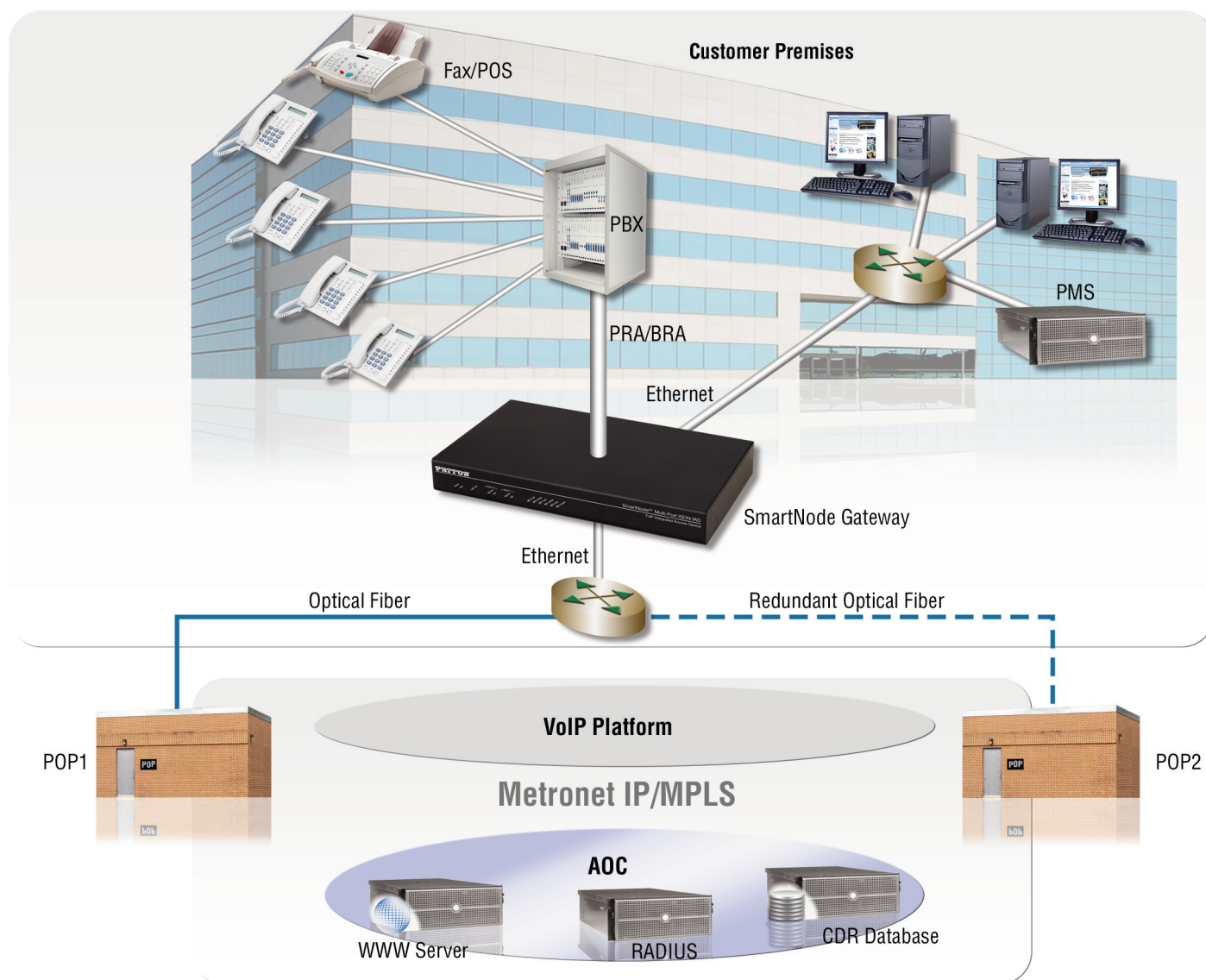
Network Architecture

The main components of the MetroAOC service are (see figure 1):

- Patton Voice Gateway (VGW)

- RADIUS server

- CDR database

- Web server

Patton Voice gateway

In the scenario illustrated in figure 1, the Patton SmartNode™ Voice Gateway located at a customer premises is provided by a Service Provider. The gate-

Figure 1. MetroAOC service architecture

way represents an interface towards the customer's PBX. Furthermore, the gateway operates as a client of the RADIUS accounting server. The client is responsible for passing customer accounting information (telephone call data) received from the PBX to a designated RADIUS accounting server. Accounting data is sent in the form of Call Detail Records (CDRs). The RADIUS accounting process is described in detail in RFC2866 [4]. The MetroAOC solution has been successfully tested with several different models of SmartNode™ ISDN and analog voice gateways.

RADIUS server

The RADIUS accounting server is responsible for receiving the CDRs in the accounting requests, storing them in the CDR database, and returning a response to the client indicating that the server has successfully received the request.

There are two distinctive types of CDRs:

- CDRs which are sent at the beginning of the call (when the call is established),

- CDRs which are sent at the end of the call (when the call is completed).

Corresponding CDRs can be easily identified by the same call ID (call identifier, which is unique in the system). Although both CDRs are stored in the CDR database, only the one being sent at the end of the call is relevant to the rating engine because it contains information about the call duration. The rating engine is described in section *Rating*.

CDR database

CDR database is used for storing telephone calls data.

Web server

The web server delivers call information data to the customer. On customer request, the web server reads call data from the CDR database, calculates the cost during the rating process and returns the call data and cost information to the customer.

The rating process is described in the following section.

Rating

Cost of the call is determined during a rating process by a Rating Engine (RE). The RE uses Rating Parameters (RPs) and a specific subset of the call information found in the CDR. Rating parameters are defined according to the destination zones (i.e. the customer configures RPs for each zone). Examples of zones include national fixed (calls towards national fixed numbers), national mobile, international, etc.

The most frequently used rating parameters are listed below:

- **Call Setup Fee**—amount of money charged for establishing the call

- **Billing Control Unit**—after the elapse of the time interval defined by the Billing Control Unit (expressed in seconds), charging takes place; the amount of money being charged is determined by the Charging Rate parameter

- **Minimum Cost Fee**—minimum amount that will be charged for a successfully established call

- **Charging Rate**—amount of money charged for each elapse of the time period defined by the Billing Control Unit

- **Profit margin coefficient**—final call cost is multiplied by this factor

The minimum set of information that must be identified inside the CDR in order to make the rating process possible includes:

- **Calling party**—caller, call originator or A-Number

- **Called party**—call destination or B-Number

- **Connect time**—call establishment time

- **Call duration**—duration of the call measured in seconds

A rating process includes several stages:

- Determination of the destination zone

- Determination of the rating parameters

- Call cost calculation

The destination zone is determined according to the B-number of the telephone call. The next step includes determining the RPs relevant for the respective zone. During that process, the Calling party and Connect time information is also used, because RPs could be differently defined for various set of callers and are also subject to change. The call cost is calculated

using the rating algorithm which uses RPs and call duration information as input parameters.

It must be emphasized that only outgoing telephone calls are subject to the rating process.

Rating is done on customer demand (after the customer request for telephone call information delivery is received).

Rating parameters are defined using the web application developed by Metronet (see figure 2).
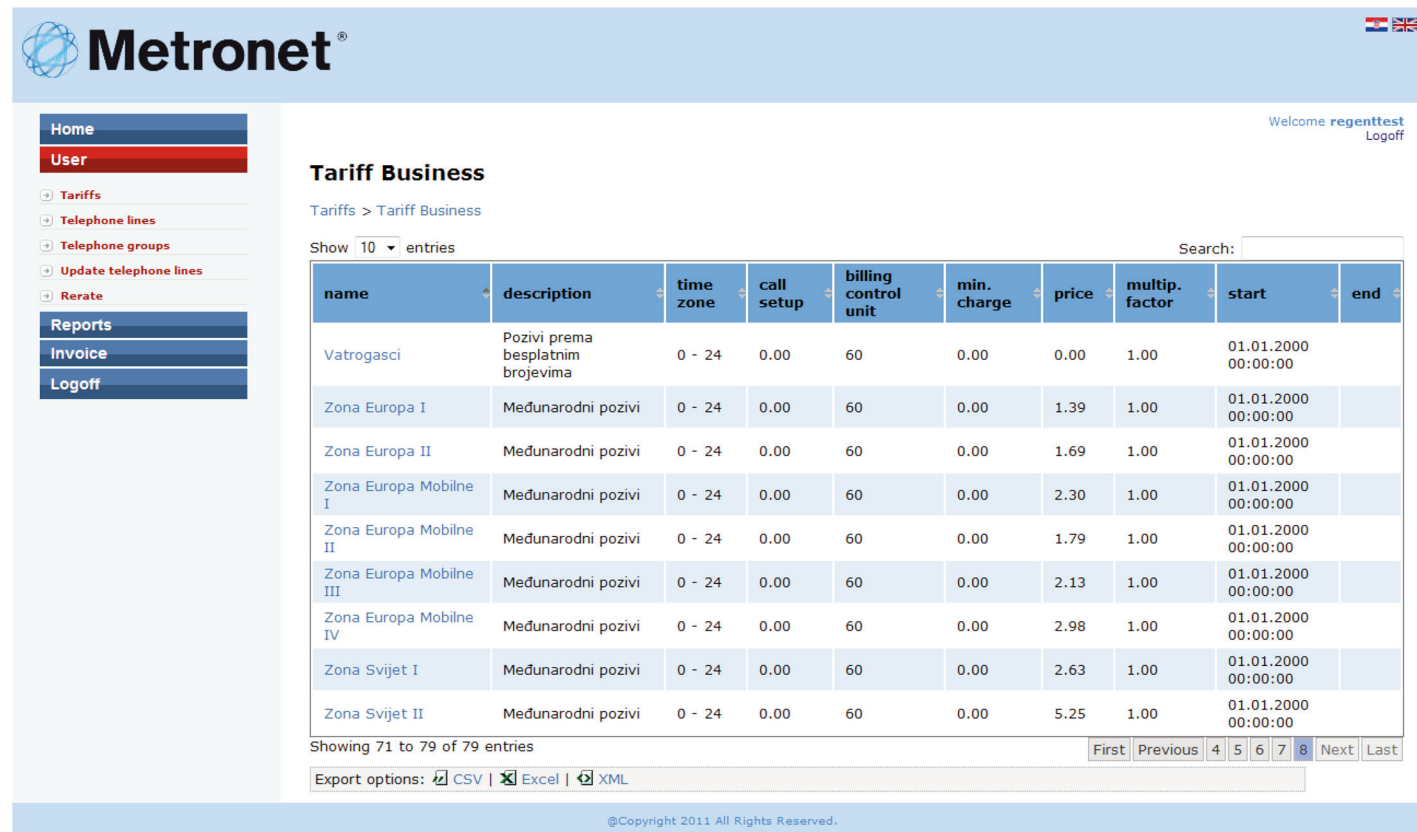
Web application

The MetroAOC web application resides on the web server and is used for service configuration, as well as for monitoring of calls costs and reporting purposes.

The main features of the Web application include:

- Overview of the customer telephone lines (each line represents a corresponding physical connection and can be mapped to it; the mapping is done during the initialization process)
- Ability for combining telephone lines into logical groups
- Definition of the rating tariffs and their associations with the telephone groups
- Overview of the calls costs for either a single or a group of telephone lines during an arbitrary time period

Rating tariff defines values of the rating parameters or each destination zone over the time period. The customer could create an arbitrary number of rating tariffs,

Figure 2. Rating parameters

name	description	time zone	call setup	billing control unit	min. charge	price	multip. factor	start	end
Vatrogasci	Pozivi prema besplatnim brojevima	0 - 24	0.00	60	0.00	0.00	1.00	01.01.2000 00:00:00	
Zona Europa I	Međunarodni pozivi	0 - 24	0.00	60	0.00	1.39	1.00	01.01.2000 00:00:00	
Zona Europa II	Međunarodni pozivi	0 - 24	0.00	60	0.00	1.69	1.00	01.01.2000 00:00:00	
Zona Europa Mobilne I	Međunarodni pozivi	0 - 24	0.00	60	0.00	2.30	1.00	01.01.2000 00:00:00	
Zona Europa Mobilne II	Međunarodni pozivi	0 - 24	0.00	60	0.00	1.79	1.00	01.01.2000 00:00:00	
Zona Europa Mobilne III	Međunarodni pozivi	0 - 24	0.00	60	0.00	2.13	1.00	01.01.2000 00:00:00	
Zona Europa Mobilne IV	Međunarodni pozivi	0 - 24	0.00	60	0.00	2.98	1.00	01.01.2000 00:00:00	
Zona Svijet I	Međunarodni pozivi	0 - 24	0.00	60	0.00	2.63	1.00	01.01.2000 00:00:00	
Zona Svijet II	Međunarodni pozivi	0 - 24	0.00	60	0.00	5.25	1.00	01.01.2000 00:00:00	

yet at least one must be defined in order to use the Metronet AOC service. Each telephone group can use any of the defined tariffs (see figure 3).

Use cases

There are two possible use case scenarios of using MetroAOC service:

- MetroAOC service integrated with the customer Property Management System (PMS) through MetroAOC API interface
- . MetroAOC service as a stand-alone solution

PMS integration

MetroAOC service could be used as an addition to the property management system (PMS) in one of the following ways:

- Rating process is handled by PMS—PMS collects raw CDRs and performs rating process by itself
- Rating process is handled by the MetroAOC service—PMS collects already rated data

In either case, the PMS must be able to communicate with the MetroAOC service API in order to collect telephone calls data on a regular basis.

Figure 3. Overview of the calls cost

Stand-alone solution

MetroAOC service could also be used as a stand-alone solution, in which the PMS is not needed. This may be interesting for startup, small and medium size businesses or hotels whose demands do not exceed functionalities provided by a web application.

Example of the MetroAOC service as a complete solution is described in the following case study.

Case study

As an example scenario we present a customer who owns a family hotel with several guest rooms. The customer has a small PBX with BRI interfaces, and a Patton SmartNode™ voice gateway model SN4634/3BIS/EUI provided by the IP-Telephony Service Provider. The customer uses the MetroAOC service to fulfill his needs for monitoring the costs of the telephone calls.

According to the estimated call cost, the customer is able to charge hotel guests in a way that ensures a certain profit. The guest will be charged more than the real cost of the calls. The real cost of the call represents the amount of money that will be paid by the customer to the ISP for a certain call.

The configuration of the service is described below.

Two tariffs are defined:

- **Business tariff**—The Rating Parameters of this zone will have the values provided by the Service Provider. The cost presented by the MetroAOC service for the telephone lines that are using this tariff will be about the same as the one presented by the Service Provider for the respective telephone lines, i.e. about the same as the real cost.

- **Tourism tarif**—The Rating Parameters have the same values as the ones defined in the Business tariff except the Profit margin coefficient parameter whose value is 2. The cost presented by the service for the telephone lines that are using this tariff will be twice the real cost.

The telephone lines are combined into three telephone groups:

- **Business group**—contains private customer telephone lines

- **Guest group**—contains telephone lines from the guest rooms

- **Call box group**—telephone line located in the hotel lobby

Business group is associated with the business tariff whereas Guest and Call box groups are associated with the Tourism tariff.

For the above configuration, the service will present telephone call costs:

- As a real call cost for the telephone lines defined in the Business group

- Two times bigger than the real cost for the telephone lines defined in the Guest and Call box group

Figure 4. Overview of the calls cost (invoice format)

References

[1] Advice of Charge—End of call (AOC-E):
http://www.etsi.org/deliver/etsi_tr/102000_102099/102088/01.01.03_60/tr_102088v010103p.pdf

[2] Cloud computing: http://en.wikipedia.org/wiki/Cloud_computing

[3] Software as a service (SaaS): http://en.wikipedia.org/wiki/Software_as_a_service

[4] RADIUS Accounting: http://tools.ietf.org/html/rfc2866

Glossary of Acronyms

AOC-E—Advice of charge at the end of the call

API—Application Programming Interface

CDR—Call Detail Record

ISDN—Integrated Services Digital Network

ISP—Internet Service Provider

IT—Information technology

PMS—Property Management System

PBX—Private Branch eXchange

RADIUS—Remote Authentication Dial In User Service

RE—Rating Engine

RFC—Request for Comments

RP—Rating Parameter

SaaS—Software as a Service

VGW—Voice Gateway

www.patton.com

Patton Electronics Co.
7622 Rickenbacker Drive
Gaithersburg, Maryland 20879
USA
Phone **+1 301 975 1000**
Fax **+1 301 869 9293**
E-mail **sales@patton.com**

Patton-Inalp Networks AG
Meriedweg 7
CH-3172 Niederwangen
Switzerland
Phone **+41 (31) 985 25 25**
Fax **+41 (31) 985 25 26**
E-mail **sales@inalp.com**

Patton Hungary Zrt
Gábor Dénes utca 4.
Infopark Building C, Budapest H-1117
Hungary
Phone **+36 1 439 4840**
Fax **+36 1 439 4844**
E-mail **ce@patton.com**

PATTON®
Let's Connect!™