



## National Wide Electronic Monitoring and Road Charging

Design, build up, finance and operation of the Electronic Monitoring and Toll Collection System



### CONTENTS

#### 4 INTRODUCTION

#### 6 OVERALL DESCRIPTION OF THE SOLUTION

#### 7 CENTRAL SYSTEM (CIS)

- 7 Functional Domains of Billien
- 7 Rating
- 8 Billing
- 8 CRM
- 8 Enforcement Support
- 8 Supportive Functions

#### 8 TOLL COLLECTION DOMAIN

- 9 Billien OBU
- 9 Billien Proxy

#### 10 ENFORCEMENT DOMAIN

10	Enforcement Objectives
10	Detection of Incidents
10	Enforcement Process
11	Toll Violation Types
11	Components of Enforcement System
11	Enforcement Backoffice (EFBO)
12	Mobile Enforcement Vehicle (MEV) Application
12	Stationary enforcement

#### 13 AUTHORISATION DOMAIN

13 Subject of Delivery and Service

#### 14 PROFESSIONAL SERVICES

- 14 Life-cycle Activities
- 14 Project Development Services

### INTRODUCTION OF SKYTOLL, A.S.

#### HISTORY AND SUCCESSFUL PROJECTS

SkyToll, a.s. was established in 2008 by a group of technological and financial investors for the purpose of participating in an open tender for provision of the electronic toll collection service in the Slovak Republic.

The National Motorway Company (NDS) is responsible for development and maintenance of the road network in Slovakia as well as for collection of payments for its use. In 2008 NDS decided to develop an electronic toll system on motorways, expressways and 1st class roads for lorries with the maximum permissible weight over 3.5 tons and buses. The project objective was to increase the efficiency of collection of fees for road use and the success rate of toll collection using cutting edge technological solutions (replacement of the existing system of motorway stickers for these categories of vehicles). SkyToll, a.s. won the open tender and on 13 January 2009 concluded the contract with NDS, under which SkyToll committed to design, build and for 13 years of the system operation to provide complex services of electronic toll collection on the specified road sections in Slovakia.

In less than 12 months SkyToll developed a customer service network, necessary infrastructure, implemented information systems and formed an expert team, which provided for the ETC system development and commissioning of the service as such. Since 1 January 2010 SkyToll has administered one of the most cutting edge ETC systems and currently Slovakia is in the group of global leaders in the ETC area. At the system start-up the specified road sections included almost 2400 km of motorways, expressways and selected 1st class roads. After several expansions the system now covers 17,762 km of roads (all motorways, expressways and 1st, 2nd and 3rd class roads). This system uses the satellite GPS-GSM technology, which provides maximum flexibility in expansion of the toll road network within the Slovak Republic. The satellite technology is used to determine the distance driven on the specified road sections by means of the On-Board Unit (OBU). The OBUs used in the Slovak Republic include all three key technologies for international cooperation: GNSS (standardised satellite technology), GSM/GPRS (interoperable network for data transmission) and DSRC (for enforcement interoperability for satellite as well as for conventional microwave systems). The OBU transmits data of the location into the central system through channels of the GSM-GPRS mobile network. The central system informs the toll calculation on the basis of data and it will issue an invoice for the vehicle owner.

The Slovak ETC system is ready for integration with other European systems in the greater area of the European Electronic Toll Service. As a result the Slovak Republic meets all the conditions to offer relevant experience with implementation of the European directives 2004/52/EC and 2009/750/EC on interoperability of the ETC systems in Europe.





SkyToll considers it very important to deal with the issue of data security and personal data protection. Therefore, the company introduced the Information Security Management System according to ISO 27001 and received a certificate for this system.

#### PROFESSIONAL EXPERIENCE AND COMPETENCIES

In the implementation of its projects SkyToll obtained extensive professional experience, which can be applied for the successful execution of the project of electronic toll collection as a compensation for damage caused to the federal roads by vehicles having the permissible weight exceeding 3.5 tons.



#### **Complex solution provider:**

SkyToll designed the complex service of electronic toll collection, built and integrated system domains and service organization, defined efficient operational processes and operates the complex service of electronic toll collection in Slovakia.

#### Strong experience and successful implementation:

Fast and cost efficient implementation of the electronic toll collection system is possible to achieve in case of having the know-how and the broad experience from successful implementation and efficient operation of a toll collection system. SkyToll offers the experience starting from legislation, complex setup of the solution and guaranties for the delivery including financing and successful and efficient operation.



#### Commercial and technological operation:

SkyToll operates all of the services and components including toll collection, customer services, enforcement services, OBU distribution and maintenance, IT administration and operation (monitoring centre, technological support and maintenance).

# Å

### Optimized operational processes:

The Back-office, the Points of Sale and the Call Center are designed to meet the customers' needs and expectations of customers. All the services covering customer registration, customer data changes, the OBU handover to the customer and its collection from the customer, receiving payments, providing information, receiving of claims are under one roof and ready for communication in several languages, thus being extremely convenient for transit transport drivers.

#### Expert consulting and project financing:

Besides the complex technological delivery, SkyToll is able, based on its experience with financing of the big European projects, to secure financing for the whole project as well as for the toll system operation itself during the period of repayment of the investment by the government.

#### Research, development and innovation:

Thanks to the complex technological platform SkyToll has also the competence to provide the suggestions for further enhancement of the system and for development, delivery and operation of additional solutions and new services.

#### In-house product portfolio for delivering E2E solution:

SkyToll as a solution provider creates the effective end-to-end solution based on the components from its own portfolio. Already today it utilises the unique combination of technologies that represent the basis for the information traffic systems of the future. The application thereof erases the boundary between the present and the future.



#### **Beneficial cooperation:**

SkyToll is a strong partner with experience from implementation and management of real projects. In its design for provision of an integrated service for the Russian ETC project, SkyToll offers long-term partnership and cooperation, consultation and support for ongoing optimisation of the whole service of electronic toll collection as well as for implementation of development requirements for the system or the business.

## **Overall Description of the Solution**

The main goal of this chapter is to describe National wide monitoring and road charging system based on satellite technology which can be used for monitoring purposes, for electronic tolling and enforcement as well. The intention is to implement monitoring based on GNSS technology for heavy goods vehicles and buses. The application of the satellite technology will allow monitoring, toll collection and enforcement in free traffic flow in multiple lanes with no need to change the speed or the direction of driving vehicle. The satellite-based EMS will enable the flexibility of system extension enabling to implement new requirements regarding monitoring, toll collection or enforcement without necessity of building a time and cost-demanding infrastructure. This solution is possible to solve following aims:

- Minimize queues on the plazas and make traffic free flow
- Manage freight transportation using the roads without paying tolls at the time
- Increase vehicle usage ratio while decreasing the number of trips
- Optimize and control use of the roads by heavy freight traffic
- Balance conditions for domestic and foreign hauliers
- Emissions reduction
- Increase of indirect income from taxes

Proposed solution of EMS which is based on maximal reuse of components from the currently operated ITS systems in the governance of the Ministry of Transport and Public Works and its subordinate organizations and uses use of cutting-edge, reliable and future-oriented technologies provides:

- Efficient monitoring and toll collection for use of the national road network
- Non-discriminatory and quick access for users to meet the terms and conditions for using the national road network
- Permanent, error-free and continuous operation of EMS infrastructure and systems resulting in increased comfort for users of the national road network
- Low investment and operating costs

- Cost and time-efficient implementation of legislative changes related to toll roads
- Efficient provision of revenue from toll collection

EMS shall be a technological complex consisting of several information subsystems and specific applications that will ensure all operational processes of monitoring, electronic toll collection and enforcement. EMS shall take into account the applicable legislation of apicable national legislation concerning monitoring, toll collection and enforcement.

Proposed solution is Multi-lane, free-flow GNSS/CN (Global Navigation Satellite System/Cellular Network) based ETC system for commercial vehicles. For vehicle positioning, GPS and GLONASS are currently used, but ETC is ready to be switched to Galileo in the future as well. Toll data collection is based on a self-installable on board unit (OBU) and uses GNSS (GPS), CN (GSM) and microwave DSRC or RFID technology. Enforcement of ETC is based on fixed and portable roadside installations and mobile enforcement vehicles.

The proposed solution is comprised of four parts:

Toll Collection Domain

- Central System (CIS)
  Authorisation Domain
  - Enforcement Domain

**Central System (CIS)** is a complex information system supporting all business activities of a company involved in electronic toll collection.(customer care, creation calculation of toll due of invoices,...).

**Toll collection domain** takes care of collection of information about usage of toll roads and delivery of the information to CIS.

Authorisation domain is responsible for authorisation of payments by bank cards and fleet cards

**Enforcement domain** in the present solution covers Enforcement Backoffice, coordination functions for MEVs and application software for MEV, connects to stationary and mobile enforcement devices that do not belong to scope of the present solution.



## **Central System (CIS)**

The main system is based on Billien product. Billien is a business and operations support system for a companies involved in road user charging and provisioning of toll services. It enables the companies to efficiently manage all activities starting from customer care through rating and billing up to logistics of On-Board Units.

### **Functional Domains of Billien**



### **Mediation**

Functional domain Mediation serves for interworking with subsystems responsible for collection of data about road usage:

- Proxy of satellite systems (GNSS/GSM)
- Proxy of toll gantry subsystem of microwave systems (DSRC)
- Back-office of Automatic Number Plate Recognition (ANPR) systems, etc.

Billien can work with more than one information source contemporarily. The received data is converted it into records for further processing. Control commands are transmitted to connected subsystems, for example commands for control of OBU states.

### Rating

Functional domain Rating is responsible for collection of usage information from On Board Units (OBU) in form of Toll Data Records (TDR), checking of the TDRs and assessing relevant toll using parameters of charging policy and vehicle parameters. The Rating Domain also provides responses and control commands back to the OBUs as one of results of the rating process, for example OBU blocking in case when prepaid credit decreases bellow specifies threshold.

Modules included in the functional domain are as follows:

- Product Catalogue (PC)
- Rating Engine (RE)
- Balance Management (BM)

### Billing

Functional domain Billing is responsible for forming invoices, working with various payment channels, reception and registration of received payments including their pairing to issued invoices and finally also management of debtors. There are also interfaces to an ERP system.

Modules included in Billing Domain are following:

- Billing Engine (BE)
- Creation of invoices for postpaid customers
- Accounts Receivable (AR) Reception of payments and their pairing with invoices and identification of payments for top-up of prepaid customers' accounts
- Dunning (DU) Handling of rolatio
- Handling of relations with debtors
- Revenue Assurance (RA) Registration of events for vehicles (also OBU monitoring data, PoS servicing, registration changes,...) and trip reconstruction.
- Financial accounting (FA) Preparation of financial data for processing in external systems (accounting system, ERP etc.)

### CRM

Functional domain CRM is responsible for keeping records on customer contractual relations, customer care, management of claims and management of assets like OBUs.

Modules in this domain can be divided into two groups:

- Front-end modules (Consoles) presenting comfortable graphical interface to system users and
- Back-end modules performing data processing.

The functional domain contains the following back-end modules:

- Customer management (CM) Storage of customer data
- Request Management (RM) Handling of claims of customers or other persons.
- OBU Logistics (OL) Stock operations and logistics organisation for OBUs
- FCI Management (FM) Handling of relations with fleet/fuel card issuers

The functional domain contains the following front-end modules (consoles):

- PoS Console (POS) Front-end for Point of Sales (PoS) and call centre workplace
- Back-office Console (BO) Back-Office management activities (for example approval of guarantees, resolution of claims, bill cycle management etc.)
- Web Self-Care (SC)
- Application for managing customer information electronically over web, viewing toll transaction information, viewing and downloading of accounting documents etc.

### **Enforcement Support**

Functionality of the enforcement support is comprised by a handful of interfaces that allow interworking with Enforcement Backoffice (EFB0). Most of the information is provided by Customer Management (CM) module.

### **Supportive Functions**

In order to make business of product owner effective the product offers a handful of modules that allow monitoring, management and also provide generation of wide palette of standard and user defined reports. There are also interfaces to a print house for printing of paper documents.

## **Toll Collection Domain**

### Introduction

Toll/event collection domain will ensure collection of events related to each ride of a vehicle on a national road network. It will be based on a mandatory OBU for heavy good vehicles and buses. Additionally will provide processing and storage of monitoring data by following functions:

- Collection of data about heavy goods vehicles and busses driving on the national road network using OBUs
- Assessment of obtained data
- Trip reconstruction
- Traffic analysis

Data about vehicles driving on the national road network, including the current setting of the number of axles, i.e. monitoring events recorded by the OBU, will be sent at defined intervals (usually every few minutes) for further for processing. Events sent from OBUs shall be processed by near-real-time process.

Detection of road usage shall be carried out by the OBU using the Geomodel. The definition of the national road network through the Geomodel will enable fast and flexible adaptation of a regulation, monitoring and toll collection changes and expansion of the monitored road network. When the monitored road network is modified or expanded, it will only be necessary to update the Geomode and distribute it to the OBUs, i.e. all activities will be carried out by changing the system parameters without a loss of income and no impact on the operation.

Toll Collection Domain comprises of two parts:

- On-board units Billien OBU
- Management system Billien Proxy

### **Billien OBU**

On-board unit is a key component of Electronic Toll Collection system. Its main purpose is creation of toll event records based on analysis of motion of a vehicle with toll liability. Then records are sent by OBU to Billien Proxy for additional handling.

Note: Toll event is understood as a usage of a toll road section by a vehicle with an obligation to pay a toll.

Key functions:

- Creation of toll event records
- Indications and setting of axles amount by a vehicle driver
- Indication of logical status of on-board unit by a vehicle driver
- Recording of operational events and sending them to Billien Proxy.
- Software updates, changes of configuration parameters and geographical model of toll sections

Billien OBU allows easy mounting. It is fixed to front window by means of a suction pad or in case of fixed installation by means of gluing. Mounting is easy and straight forward, no special knowledge is required.

On-board unit is uninterruptedly supplied by means of 12/24V cigarette lighter or fixed installed cables.

OBU is capable to be switched on/off based on ignition state of a vehicle in case of fixed installation. In case of power supply by means of 12/24V cigarette lighter, it is switched on/off based on motion detection.

Optionally, an end user can require extension of GNSS and GSM antennas and install cables, e.g. for installation inside vehicle with a metal front window shield.

#### **Technical description**

Billien OBU consists of a compact cover (dimensions 145x92x40 mm, weight cca. 300g), resistant against shock, humidity, chemicals, UV radiation and temperature. It is equipped with a holder, for fast and easy installation on the front window.

Holder with four sucker pads allows fixed and reliable placing on a front window and as well allows installation/uninstallation by a vehicle driver. Built-in antennas allow elimination of harm of external antenna cabling.

Functions of OBU:

- Creation of records of toll events
- Management of OBU
- OBU Monitoring
- Administrator supervision
- Communication
- Logging
- Security
- Support of Enforcement technology
- Logical states of OBUEnergy consumption regimes
- Dormant regime



### **Billien Proxy**

Billien Proxy is a key component of Electronic Toll Collection system. Its main purpose is management of OBUs and establishment of interface to CIS. Billien Proxy is a provider of toll data records about road section usage to the Rating Domain where the charging is performed.

To follow the intention of directive 2004/52/CE and decision 2009/750/CE to not discriminate users, the Billien Proxy provides configurable content of toll data record to enable flexible definition of charging schemas.

Billien Proxy is also internally prepared to support multiple toll regimes.

Key functions:

- Handling of toll records from OBUs
- Management of OBUs
- Update of OBUs
- Monitoring of OBUs
- Communication with OBUs
- Communication with CIS
- User interface

## **Enforcement Domain**

The enforcement domain shall carry out verification of the compliance with the obligations given to vehicle owners and drivers in the context of electronic monitoring and identify non-compliance. In addition to checking and identifying non-compliance, the enforcement shall also provide for the management of incidents, including the provision of evidence (evidence documentation) for those cases where a breach of the obligation has been identified.

### **Enforcement Objectives**

Enforcement strategy is a list of goals and resources to ensure the goals achievement and also approach how to achieve the goals.

Strategy ensures the achievement of following primary objectives:

- Compliance with legislation
- Discouragement from deliberately violating the toll obligation
- Hold number of toll violators on minimal level
- Ensure efficient enforcement coverage with optimal operating and maintenance costs
- Achievement of toll collection efficiency
- Identify violation and send information about the violation to authorized institutions.

Significant impact on the effectiveness of the enforcement process has the penalty for violation assessed by the authorized institution. Sufficiently high penalty has a positive impact on the enforcement process as well as on the toll collection effectiveness. On the other hand, low penalty encourages the vehicle operators to infringe the toll duty.

### **Detection of Incidents**

Ensuring effective functioning of the enforcement domain, the following key processes shall be implemented:

- Stationary enforcement carried out by means of enforcement gantries
- Mobile enforcement carried out by mobile enforcement vehicles. Expansion of the scope of the mobile enforcement shall be provided by hand-held enforcement devices
- Manual data processing manual completion or, if necessary, correction of LPN including the country of vehicle registration, and vehicle category provided when they have not been determined with sufficient accuracy by technical equipment of enforcement gantries
- Incident Management complex administration of incidents and respective documentation

Each passage of the vehicle obliged to pay toll by the enforcement equipment is checked by enforcement network. The compliance with the toll obligation is check for each such vehicle. Following attributes are checked:

- Paid toll,
- OBU status,
- Ticket existence and validity,
- Toll event history.

### **Enforcement Process**

To ensure the fulfilling of the electronic toll collection system efficiency it is very important to design enforcement processes in the way that every vehicle using toll roads is during average journey at least once checked by enforcement system, which means the vehicle appearance is identified. Recognition efficiency is defined as 98% and will be reached in the way described in next picture.



#### **Processing at Control Gantry**

Each passage of the vehicle underneath the control gantry is detected. For the detection are used sensors for each lane. Each vehicle passing by the gantry is classified by classification sensors, if they are present. If yes, the gantry creates records only for vehicles obliged to pay toll, i.e. for vehicles heavier than 12 tons. If the classification sensors are not present or they are malfunctioned, the gantry creates records of all passages of all vehicles.

#### **Processing at MEV**

Mobile enforcement vehicles are responsible for checking the compliance with the toll duty. They are not allowed to prosecute or stop violators.

#### **Processing at Enforcement Back-Office**

#### Automatic processing

The Enforcement Back-Office (EFBO) receives records from all control gantries and MEVs and automatically processes them by several processes.

Records, which automatic evaluation was not successful, are forwarded to manual processing.

#### Manual processing

Manual processing serves only for recognition of data red by enforcement gantries or MEV, the automatic recognition of which was unsuccessful. Manual recognition shall be done only by seeing real situation and this can be done only by a human

#### **Registry of Violations**

The output of the enforcement process is the register of all identified violations. Data about identified toll violations are via dedicated interface sent to the Ministry of Interior, which is responsible for the prosecution of the toll violation.

#### **Lists Management**

The list management process ensures that enforcement can:

• Recognize all vehicles, which are exempted from the toll duty based on the exempt list.

- Recognize all vehicles, which have any problem with the OBU and the problem was reported by the driver or the vehicle operator based on the white list.
- Recognize all vehicles, which are notorious violators (using toll road network permanently with e.g. negative prepaid balance, without OBU and ticket, etc.) based on the black list.

Exempt and white lists are managed by the staff responsible for the registration process and staff responsible for drivers and vehicle operators support (Call Centre).

Black list is managed by enforcement staff competent to perform vehicle trip analysis, violation analysis, etc.

### **Toll Violation Types**

Identified toll violations can be divided into following types:

- Unregistered vehicle, i.e. the vehicle has no OBU neither no issued ticket
- Registered vehicle using OBU which is not registered to this vehicle
- Registered vehicle with negative prepaid balance
- Registered vehicle with blocked OBU
- Vehicle with expired ticket
- Vehicle with ticket detected on wrong (unpaid) toll road segment
- Vehicle with ticket used more than once within defined period and route

### Components of Enforcement System

Enforcement system offered within this Proposal is comprised of three parts:

- Stationary Enforcement System,
- Mobile Enforcement System,
- Enforcement Back-Office.

### **Enforcement Backoffice (EFB0)**

#### **Evaluation of Toll Incidents**

Main task of the EFBO application is processing of records from stationary and mobile enforcement devices. Stationary enforcement devices, are installed along toll roads and provide continuous monitoring of single lane or multi-lane traffic. Mobile enforcement devices can either be installed in Mobile Enforcement Devices (MEV) or can also be represented by handheld enforcement devices;

Either type of enforcement device provides basic processing of recorded data and transmits completed enforcement records for processing in EFB0.

#### Architecture

Architecture and interfaces of EFBO are illustrated in following picture.



#### **Exception lists**

Each vehicle with confirmed violation of toll rules is put on special black list that is used for achieving effective coordination of MEVs. The system also supports white list of vehicles with exemption (permanent or temporary) from toll duty.

#### **Coordination of MEVs**

In order to achieve coordination of MEVs the EFBO allows organisation of dispatcher workplace. Operator at the workplace – the dispatcher – receives selected information about confirmed violations of toll rules. The dispatcher has also information about positions of all presently active MEVs. Combining the information – can initiate pursuit of toll violator by giving orders to MEV in the most favourable position.

#### **User Interfaces**

All Graphical User Interfaces (GUI) described in this chapter are implemented using thin client technology.

- Manual Compliance Verification Console (MCVC)
- Dispatcher Console
- Administration Console

### Mobile Enforcement Vehicle (MEV) Application

Mobile enforcement vehicles will be equipped with enforcement technology. All devices will be adjusted to the connection in vehicle using a battery (with alternating current convertor) so that at least 4 hours of autonomous operation of mobile enforcement devices or, as the case may be, charging while driving is ensured. Mobile enforcement devices are designed with regard to required functioning in any environmental and technical conditions of the vehicle.

#### Description

MEV equipment shall consist of:

- Camera system with automatic licence plate recognition for vehicle identification
- RFID communication system
- GPS system
- GSM/GPRS data modem
- MEV computer
- Hand-held scanner

#### **User Interface**

MEV application is used in mobile enforcement vehicles. Mobile communication channel over GSM/UMTS network is used for communication with EFB0. Taking into consideration unpredictable condition of mobile network coverage the application is implemented as a thick client (self-contained application package).



The application package itself is composed of two parts – server and client GUI (local thin client). The server part is responsible for integration of all devices belonging to set of devices installed in a MEV.

The client GUI supports toll officers in their work in the field. It allows them:

- Browsing and evaluation of enforcement records created from information collected by enforcement devices of MEV,
- Transmission of local enforcement records to EFBO,
- Calculation of supplementary toll to be collected,
- Shift management (handover, closing).



### Stationary enforcement

Under the stationary enforcement gantry, we understand a structure (portal) located on a concrete foundation on the sides of the road and led over all lanes of the road including the safety lanes, on which enforcement devices are installed. Stationary enforcement gantries will be positioned near monitored road networks connected to the Central Enforcement System. An integral part of every gantry will be also the external air-conditioned box in which the entire IT technology of the gantry is installed.

The Stationary Enforcement System will be composed of Steel structure and several subsystems that will work relatively independently and will provide their data to the management server (MLC server).

Among these subsystems will be:

- System of vehicle detection and classification
- Camera system with automatic licence plate recognition
- Overview cameras to capture contextual side images of the vehicle
- RFID communication system
- Other complementary functions

## **Authorisation Domain**



The authorisation domain concentrates processes and activities related to processing of electronic payments, administration, supervision, management and servicing of payment terminal networks.

The central authorisation system and terminals, which are distributed throughout the whole territory, enable payments made with fleet cards and, in cooperation with the partner bank, it is also possible to accept payments made with all regular bank cards.

Our company implemented and integrated a unique solutionenabling acceptance of the relevant bank and fleet cards at one EFT POS terminal and thus enabled collection of tolls within the scope of and using standard electronic payment tools. By the high commitment and cooperation with prestigious companies, we developed a central system enabling customers and contractual partners to use payment tools that represent the general European standard.

An authorisation centre enabling acceptance of fleet and bank cards to be used within one terminal and thus covering the wide scope of the accepted fleet cards in combination with the bank cards has not existed in Europe until now.

Authorisation domain provides following services:

- authorisation and consequent clearing of accepted electronic payments made with fleet cards through own authorisation centre;
- in cooperation with the partner bank, as a trans-authorisation switch, authorisation of transactions made with bank cards;
- delivery, operation and servicing of the network of EFT POS terminals that process electronic transactions;
- provision of the services of integration of payment systems for toll system operators, petrol station networks, self-service zones, dedicated payment terminals and fleet card issuers; non-stop technical support.

### Subject of Delivery and Service

The subject of the delivery is a solution for authorisation of bank and fleet cards with the support of selected banks and fleet card issuers designed for processing of payment transactions expected from the electronic system in local country.

#### **Authorisation System**

The authorisation of payments is secured by the ASORS system in case of the bank cards and the FCC system in case of the fleet cards.

The ASORS system carries out payment authorisations under the online regime, while the process of carrying out a payment transaction includes its authorisation in relation to the partner bank.

#### **Payment terminal network**

The authorisation centre operates its own network of payment terminals supporting static terminals , mobile terminals as well as kiosk terminals.

#### Back office system

The Back Office system was built for efficient facilitation of specific processes related to the services provided.

#### Integrated partners for authorisation

Important card associations as the partner companies of fleet cards issuers:

- VISA
- Eurocard / Master card
- Diners Club
- Amex
- CCS Toll
- DinersClub
- DKV
- EuroShell
- Routex (Agip, British Petrol, ENI. Statoil)

• Eurotoll

• Euro WAG

- OMV
- UTA
- Slovnaft
- TOTAL

## **Professional services**

System integration covers processes and procedures from gathering requirements, system and architecture design, interface definition, systems management, and solution development for the purpose of developing large-scale complex systems. These complex systems involve hardware and software and coupled with new requirements to add significant added functionality. Systems integration generally involves combining products of several contractors to produce the working system.

Services listed below can either be provided for overall solution or only for partial segments of the solution.

### **Life-cycle Activities**

Application of systems integration processes and procedures generally follows the life cycle for systems engineering. Minimally, these systems engineering life-cycle phases are requirements definition, design and development, and operations and maintenance. For systems integration, these three phases are usually expanded to include feasibility analysis, program and project plans, logical and physical design, design compatibility and interoperability tests, reviews and evaluations.

### **Requirement Analysis**

Requirement analysis at project offering services concentrates on high-level analysis of tender documentation and/or other documentation relevant to phase before submission of binding offer. The services focus on:

- Requirement analysis / Impact analysis
- Financial planning
- Operational strategies for CRM
- Operational strategies for COO

### **Solution Design**

Solution design at project offering services concentrates on high-level solution design that respects rather limited information available in tender documentation and, prospectively, also other relevant documentation. The services focus on:

- Project plan definition
- Business analysis
- IT Analysis
- Functional design of solution
- System architecture / Infrastructure/ Interfaces

### **Project Development Services**

Project development services (also known as build-up services) focus on establishment of overall solution up to the moment when the solution is put in full operation and it enters support phase.



#### System Integration

System integration services support composing overall solution from selected components including partial and complex testing. The services focus on:

- Integration
- Individual testing of system components
- Individual functional testing of processes
- Public WEB/ Self Care Testing
- Integration testing
- Performance testing
- Penetration testing
- CRM processes E2E testing
- Test Coordination

#### Validation

Validation phase of the project covers detail planning of the validation campaigns to confirm the readiness of the system to start official operation. The services focus on:

- Complex evaluation test preparation
- Complex execution test preparation
- Individual testing of system components
- Individual functional testing of processes
- Public WEB/ Self Care Testing
- Integration testing
- Performance testing
- Penetration testing
- CRM processes E2E testing
- Validation test coordination
- Execution of pre-registration
- Cost of people who do validation test
- Physical driving is excluded from the offer

#### Launch

- Supporting activities related to starting the operation
- Supporting external activities related to starting the operation

#### **Project Management**

Project management covers coordination of activities related to preparation of specification documents, customization, deployment, testing, training and handover to support organization.





SkyToll, a.s. Westend Square, Lamačská cesta 3/A, 841 04 Bratislava, Slovak Republic

E: info@skytoll.com T: +421 2 3260 7011 W: www.skytoll.com F: +421 2 3219 9403

Company ID No.: 44 500 734 Tax ID No.: 2022712153, VAT ID No.: SK2022712153 The company is recorded in the Companies Register of the District Court Bratislava I in Section: Sa, Insert no.: 4646/B