**ATSB-100 PLATFORM
An application: m-VS (mobile vending solution)**

BRIEF DESCRIPTION

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VERSION 1.8

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Introduction

ASYRMA is proud to be ahead of most mPayment-related developments around Europe and around the world. We believe in the bright future of m-commerce and the high revenues that will stream in its wake.

We strongly believe m2m (in general and m-payments in particular) could quickly become a high growth activity for the telecom operator. With the technology now available, mobile machine-to-machine communications could ultimately be bigger than voice telecommunications.

ASYRMA has developed a proprietary solution for mobile vending, the "mVS".

The ASYRMA's m-VS platform is an integrated solution consisting of custom hardware **(ATSB-100)** and software **(mVS gateway)** directed towards the realization of a micro-payment solution, which can be coupled with common machines that accept physical (coins / tokens) or electronic (credit card / smart card) payment.

- It allows any machine to become a part of a distributed network of systems that report status and errors to a central location. [For Remote Control and Monitoring/Telemetry Applications, e.g.: for most electromechanical devices (doors, gates, pumps, vending machines, park meters etc.) as well as living environment (temperature, humidity, etc)].
- Without canceling other forms of payment, it also allows cashless payment using a mobile phone.
- It can operate and control (subject to the internal intelligence of the machine) virtually any type of machine on the market that is equipped with transaction facilities (ticketing, vending, park meters, etc).

The ATSB-100 embedded computer for telemetry is built around an Intel 8051-compatible processor with four design goals in mind: System Expandability (can accept up to 16 functionality-enhancing devices, from relay boards and Digital/Analog I/O boards to LCD screens and keyboard interfaces. New boards can be designed according to the needs of a specific application). System Stability (always-on, always-available device. Includes a 'hardware watchdog' to continuously check operation, making the likelihood of a non-responsive system very small). System Performance: system processor runs at 24MHz, with enough power to drive most demanding applications in this category. If more power is needed a compatible substitute processor can be used without any modifications. System Programming: last but not least, the module is operated by software residing in its FLASH RAM. This software can be updated over the air, without a need for technical expertise on site.

Through its internal serial port and external interface cards, it can be connected to virtually any device that possesses some sort of electro-mechanical system.

Where the ATSB-100 makes sense

ATSB-100 can be used for telemetry purposes, mobile vending applications or as a part of any wireless OEM application. More specifically, it can be used in commercial applications such as:

- **Remote Meter Reading**
Industrial Meters, Gas, Electricity, Water, Fuel, etc.

- **m-Payment / m-Wallet**
Vending Machines, Park Meters, all micro-transactions where ticketing is involved (like METRO, Buses, etc.)
Wireless POS units for shops, Taxis etc.

- **Remote Control and Monitoring**
for most electromechanical devices (doors, gates, pumps, vending machines, park meters etc.) as well as living environment (temperature, humidity, etc).

- **Access Control**
Using mobile phones to open doors or gates by sending an SMS, Voice Call, IVR or USSD codes. Eliminates the need for programmable keys or smart cards. For security purposes, it is possible to control and monitor access to certain areas by knowing who entered and when, as well as remotely revoke access privileges at any time.

- **AVL / Fleet Management**

Tracking vehicle fleets using SMS has become quite common, as it can be preset to send a message, say every 5 minutes, identifying where the truck is; while with EMS it could send more information, such as speed or if the driver's reaction times are sluggish and he needs a break. Another use is a cellphone in a car that shuts the car down if it is hijacked. The Safety Phone will stop the fuel flow to the engine.

Architecture

Overview

When dealing with generic embedded applications, one must design a system that not only satisfies the demands of a particular application but also offers increased functionality, expandability and stability. Since these devices can be embedded inside almost any machine (minimum space occupied is 9 x 9 x 4 cm), they have to be quite flexible and powerful to accommodate for the gamut of existing electronic devices.

What follows is a detailed description of system capabilities, or choices that were made during the design of the product. Even though the design requirement of an ultra-fast expandable controller was met, our top most priority was system stability.

Design Goals

1. System Expandability: with insufficient space to cater for any possible need a modern machine could have, we had to adopt a platform that allows for the expansion of the system. Through its common bus, the ATSB-100 can accept up to 16 devices that enhance its functionality. These devices range from relay boards, Digital Input/Output, Analog Input/Output boards, LCD/Keyboard interfaces and others. New boards can be designed according to the needs of the specific application, and all hardware can be accessed from the application running on the ATSB-100 through specific addressing reserved for device usage.

2. System Stability: our choice of components was defined by the desire to maintain an always-on, always-available device. ATSB-100 uses off the shelf components for normal applications, (0-70C) and ATSB-100M for applications that demand increased performance under adverse conditions (military specifications, -40 – +85 C). Furthermore, to continuously check operation, a hardware watchdog is implemented. In the unlikely case of a software problem, system will reset itself to initial state, making the likelihood of a non-responsive system very small.

3. System Performance: system processor runs at 24MHz, with enough power to drive most demanding application of this category. If a faster processor is required by the application, there are processors that are pin compatible, running at higher speeds and/or different technologies (RISC) and can be substituted without any modifications.

4. System Programming: last but not least, the module will be operated by software residing in its FLASH RAM. This software can be updated over the air, without a need for technical expertise on site.
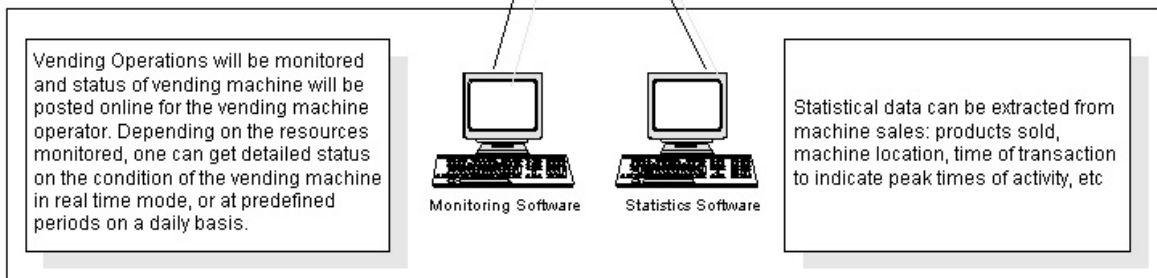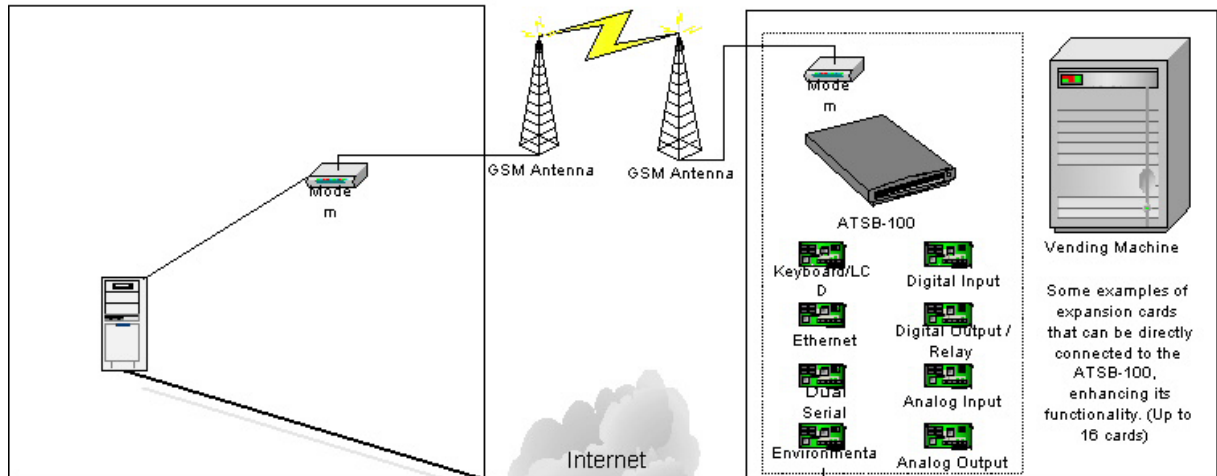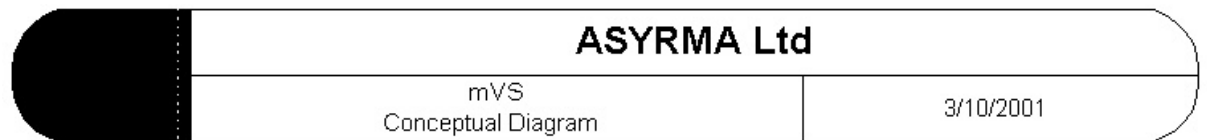
5.

System Core Components

The ATSB-100 is based on the following components:

1. <u>Main processing unit</u>: the main unit possesses the capability to drive external peripherals and accept / send commands to the GSM modem connected externally. Software application resides in FLASH RAM, and all operating tables are kept in the non-volatile memory. Retrieval of processed data is possible either through two-way dialogs via SMS or through a GSM data. The main unit also possesses a real-time clock and time measurements can be integrated in the logic of the application.

2. <u>GSM modem:</u> any modem that possesses GSM capability and communicates with the GSM AT Command set can be connected to the ATSB-100 through its serial port. The system will be upgradeable to GPRS, TETRA, etc., when such wireless modems become widely available.

3. <u>Expansion Slots:</u> additional units can be connected to the main one; their functionality has been incorporated in the design on the main unit. Resources have been reserved exclusively for expansion cards, excluding any possible conflicts between devices.

m-VS: ASYRMA's m-Vending Solution

A conceptual diagram follows that demonstrates logic of system operation.

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mVS Conceptual Diagram	3/10/2001

GSM Antenna   GSM Antenna

Modem

Modem

ATSB-100

Keyboard/LCD
Ethernet
Dual Serial
Environmental

Digital Input
Digital Output / Relay
Analog Input
Analog Output

Vending Machine

Some examples of expansion cards that can be directly connected to the ATSB-100, enhancing its functionality. (Up to 16 cards)

Internet

Vending Operations will be monitored and status of vending machine will be posted online for the vending machine operator. Depending on the resources monitored, one can get detailed status on the condition of the vending machine in real time mode, or at predefined periods on a daily basis.

Monitoring Software   Statistics Software

Statistical data can be extracted from machine sales: products sold, machine location, time of transaction to indicate peak times of activity, etc

Description of Conceptual Diagram:

User purchasing from a vending machine equipped with an mVS will contact the machine using SMS, WAP or IVR and send a request for a particular product the machine possesses. Upon reception of the message, the machine records data concerning the purchase and sends a reply to the user of the service. This reply outlines the terms of the purchase and confirms reception of order. Besides the actual order, order data is kept inside the module where it will be useful for statistics.

Upon completion of order, reply is sent at the user's mobile terminal, and a confirmation can be sent to the user, or retrieved later in the form of a list to the management station.

Information is collected there and posted on a web/application server that performs two distinct functions:
1. Collects monitor indicators that describe the status of the vending terminal, its problems and operation
2. Collects, tabulates and reports statistics that indicate patterns of usage

Web Server will display data based on access rights of individual requesting the data. The monitoring and statistics areas are two distinct areas and individuals will gain access to them only through an authenticating process.

The above diagram portrays a distributed vending system that allows a two-way dialog between remote machine and control server as to exchange operation and usage data.

The mobile Vending Complete Solution:
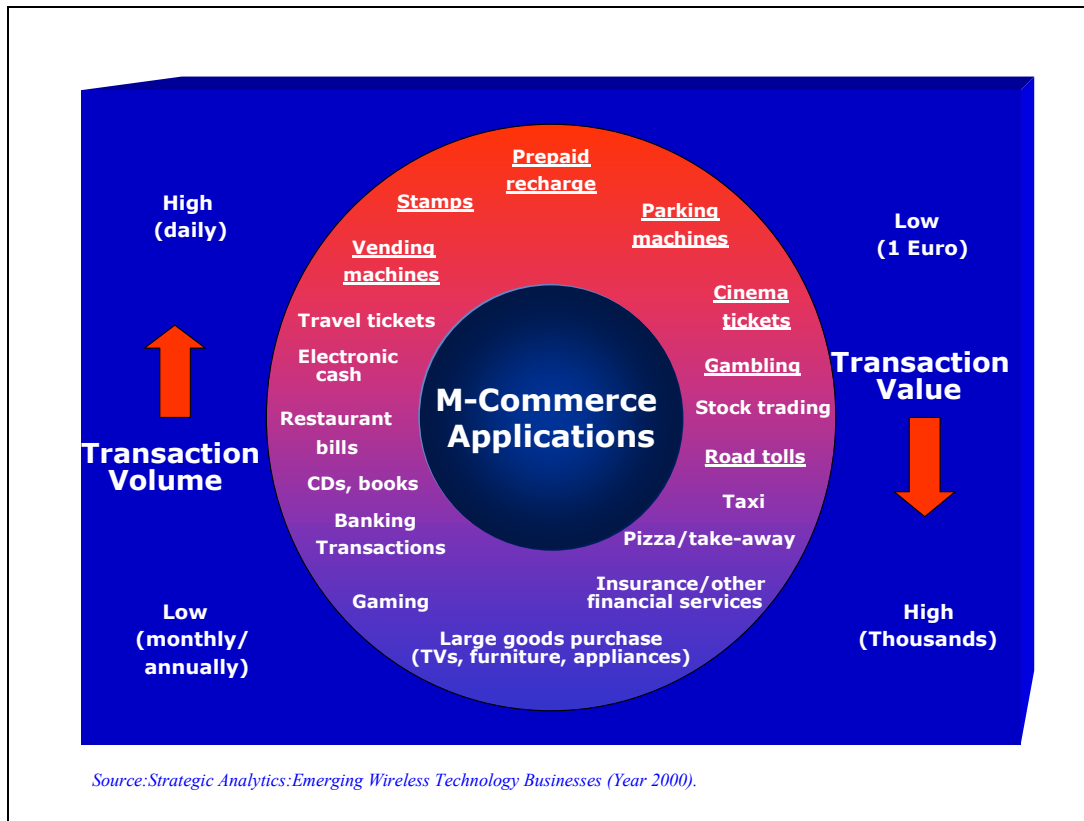
❑ **m-Vending:**

Wireless application – M-Vending

Highlights:

✓ Insufficient change
✓ It can work alongside existing coin systems, giving customers either purchase method option.
✓ Proven increased sales.
✓ Improved customer convenience (Itemized printed receipts /every month – to keep tracking of expenses).
✓ Fun and easy to use.

Emerging Wireless Technology Businesses:

This application has the potential to cover a wide range of fields, but we believe that everyday **micro-payments** and all micro-transactions where ticketing is involved will be the segment to be targeted for now and many years to come.

High (daily)

Low (1 Euro)

Prepaid recharge

Stamps

Parking machines

Vending machines

Cinema tickets

Travel tickets

Electronic cash

Gambling

Transaction Value

Restaurant bills

M-Commerce Applications

Stock trading

Transaction Volume

CDs, books

Road tolls

Banking Transactions

Taxi

Pizza/take-away

Gaming

Insurance/other financial services

High (Thousands)

Low (monthly/ annually)

Large goods purchase (TVs, furniture, appliances)

Source:Strategic Analytics:Emerging Wireless Technology Businesses (Year 2000).

It is expected that m-payment will be used primarily for micro-payments such as parking tickets, travel tickets and vending-machine purchases. m-payment is therefore not expected to replace credit cards, but to be a substitute for coins. The idea of m-payment is to make the payment more convenient for the customer, but not necessarily cheaper.

On a country with more mobile phones (65+% penetration) than credit cards, where access to a mobile phone (prepaid or contract) is easier than access to the banking system, the ease of everyday micro payments has massive potential.

Payments		
	Micro	**Macro**
Online	Information, Communication & infotainment	Investments, Bank Transactions & Internet Shopping
Onsite	Vending machines Ticketing (cinema, metro, bus), park meters, road tolls, p2p (person-to-person money transfer)	Shopping with a Credit Card

❑ **m-Monitoring:**

Wireless application - Monitoring

Highlights:

✓ Machine contents
✓ Mechanical Defect
✓ Money collector full
✓ Optimized network usage through off–peak "batch" communication
✓ Optimized route planning directly in the morning

FILL ME UP!

COLD DRINKS

m2m communications involves equipping a machine with a small computerized apparatus that can read the machine's status, sense various changes or even be the heart of the machine. The machine then calls a second machine and submits info, usually in the form of SMS or data calls, on what has occurred or needs to be dealt with.

❑ **m-Statistics:**

Wireless application - Statistics

Highlights:

✓ Web-based access from any location

✓ Two-way communication with vending machines

✓ Consolidated information on status of all machines

✓ Market / Sales statistics from the source of sale

ACCESS CONTROL

TECHNICAL SERVICE REPORTS

CASH ACCOUNTABILITY

SALES REPORTS

DISTRIBUTION

SPACE TO SALES

All electronic equipment outputs data. We can now collect this data automatically and transfer it when and where we want to without physically visiting the site.

According to the recent Economist Mobile Internet Survey – page 22 [Oct. 13, 2001] - mobile payment solutions combined with monitoring and statistics capabilities can increase revenue per vending machine by up to 70%.

Maybe one day Greece will have SMS-enabled vending machines too.

A WIN – WIN Situation:

What's in it for:

❑ **End-User:**

(+) Improved choice and convenience
(+) Added value to the vending experience
(+) No need to worry about having the right change, not to mention the "Euro Coins" issue
(+) Easy and quick to use
(+) Machines more likely to be working
(+) Itemized printed receipts (every month – to keep tracking of expenses)
(+) Unattended purchase option
(+) Targeting also at elderly and/or disabled people

❑ **Vending Machine Operator: (see also Appendix I)**

(+) Improved customer service & image
(+) Better service – customisation of machines/ Machine almost always functional
(+) No Coins → Increase of Sales/revenue
(+) Reduce risk of theft, vandalism due to cashless vending, monitoring and electronic locking
(+) Better tracking of purchase habits of clients + by launching customer loyalty and promotion programs your customers will no longer be anonymous =>learn how to encourage them to buy more.
(+) Revenues no longer restricted to product sales. Substantial new revenue streams can be achieved by adding interactive multimedia units to vending machines to run additional applications, such as: advertising, couponing, surveys and games – (such content must be highly targeted and localised, so vending machines are a unique channel to provide it – ensuring that consumers get real value, and drawing them back to the machine time after time).

❑ **Telecom Operator:**

(+) Dual role ASP / airtime (ASP through ASYRMA).
(+) As a Tele-operator will have interest increasing air-traffic and provide VAS (value added services).
(+) Always interested in high revenue applications
(+) Strategically can play the role of Market Maker and will become a "Payment-Provider"
(+) Brand building and first to Market advantage. Many of the Applications still in pioneer stage
(+) Gain/attract more corporate clients and more subscriptions!

Given the high market penetration rates for mobile phone usage in many parts of the world, it is not surprising that mobile payments (m-payments) are expected to claim an ever-larger share of retail payments. With the introduction of 3G networks and applications m-payments may become a standard feature alongside location-based services and multi-media messaging. By 2003, one estimate puts the value of m-commerce at $13 billion.
Because of their existing customer base, technical expertise and familiarity with billing, mobile telephone operators look like natural candidates for the provision of mobile payment services. However, the issue is complicated by risk management and the need to ensure the cooperation of different providers to achieve interoperability in an efficient m-payment system.

Telcos already bill their own customers for voice services now, a method which actually involves the extension of credit to customers over a period of one month.

Mobile payments by phone are a reality in Germany, Spain, Austria and Sweden (and plans to launch in the UK later this year).

m-Vending Proven Benefits:

- ❑ Every machine is able to maintain regular, wireless and secure contact with your office.
- ❑ Our powerful data mining tools tell you which machines need product, maintenance, or other attention.
- ❑ You can reduce losses by tracking stock from depot through point of   sale
- ❑ You can monitor who opens each machine, and when.
- ❑ It can work alongside existing coin systems, giving customers either purchase method option.
- ❑ Vending Machine Operators' ability to streamline delivery routes
- ❑ Proven increased sales, improved customer convenience and reduced overheads.
- ❑ Last but not least: (source IDC and MDA): SMS is driving data usage and revenue - SMS is efficient use of the network and high revenue per message - The MDA announced that during March 2001 the total number of UK chargeable SMS messages sent was 864 million. – In Greece the average usage of SMS per subscriber per month is 35 SMSs = 210M.

So, **Why choose to offer m-payments?**

- ❑ Improved customer service & image.
- ❑ New sales channel, workflow efficiencies, cost savings…
- ❑ Better tracking of purchase habits of clients + By launching customer loyalty and promotion programs customers will no longer be anonymous =>learn how to encourage them to buy more.
- ❑ Brand building and first to Market advantage. Many of the Applications still in pioneer stage.
- ❑ SMS is driving data usage and revenue - SMS is efficient use of the network and high revenue per message.

About ASYRMA Ltd.

ASYRMA (Applications and Services for Wireless and Mobile Systems Ltd) is the Greek provider of wireless data and mobile Internet solutions. Its mission is the development and integration of solutions enabling business clients to fully utilise the potential of mobile data. ASYRMA also distributes and supports hardware and software for mobile platforms in Greece. Future expansion plans include Cyprus and the Balkans.

Established in mid 2000, this start-up company has a diversified product and services portfolio ranging from m-payment solutions and machine-to-machine communications to Automatic Vehicle Location systems and workforce mobilisation solutions.

Through its worldwide contacts and partnerships, ASYRMA offers a particularly high level of service to our clients who wish to obtain sustainable and profound competitive advantages.

ASYRMA is a member of the Mobile Data Association, Associate member of Ericsson Mobility World and MobiCom SIG member.