CASE STUDY ON IMPROVING VENDING MACHINE PROFITABILITY USING IOT

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Improving vending machine profitability with internet of things

Business vertical

The vending industry is undergoing a sea change, taking advantage of new technologies to go beyond just delivering snacks to creating a new retail location. Intelligent vending machines can be found in many public locations as well as company facilities, selling different types of goods and services, including even computer accessories, gold bars, tickets, and office supplies. With increasing sophistication, they may also provide time- and location-based data pertaining to sales, inventory, and customer preferences. But at the end of the day, vending machine operators know greater profitability is driven by higher sales and lower operating costs.

Identification of the product

Intel and ADLINK Technology are delivering products and services based on the Internet of Things (IoT), which refers to billions of Internet-connected devices. It delivers a vending machine management and data analytics solution that connects a fleet of vending machines to the cloud-based tools that can help generate more revenue and reduce maintenance effort.

Features and Services provided by the product

Vending machines can also send real-time updates (e.g., supply and operating status) that can be used to optimize delivery schedules and logistics, and improve inventory tracking and control.

The cloud makes it easier to implement promotional strategies for increasing transaction size and sales volumes, like gifting, dynamic pricing, vouchers, coupons, and loyalty programs, which is virtually impossible with conventional vending machines.

vending machine operators can generate incremental revenue from product manufacturers who want to show directed advertisements to customers and encourage repurchases by sending coupons to their mobile phones.

- **Lower Operating Costs**
  Cloud connectivity enables vending machine operators to diagnose and repair systems remotely, thereby reducing machine downtime and on-site maintenance costs. Vending machines can also send real-time updates (e.g., supply and operating status) that can be used to optimize delivery schedules and logistics, and improve inventory tracking and control.

- **Simplified Deployment and Operation**
  The solution's middleware and cloud service is scalable and secure, helping to streamline edge-to-cloud integration, lower deployment cost, and speed up end-to-end application development.

- **Increased Sales**
  The cloud makes it easier to implement promotional strategies for increasing transaction size and sales volumes, like gifting, dynamic pricing, vouchers, coupons, and loyalty programs, which is virtually impossible with conventional vending machines.

- **New Revenue Streams**
  Vending machine operators can generate incremental revenue from product manufacturers who want to show directed advertisements to customers and encourage repurchases by sending coupons to their mobile phones.

Study of technological stack involved

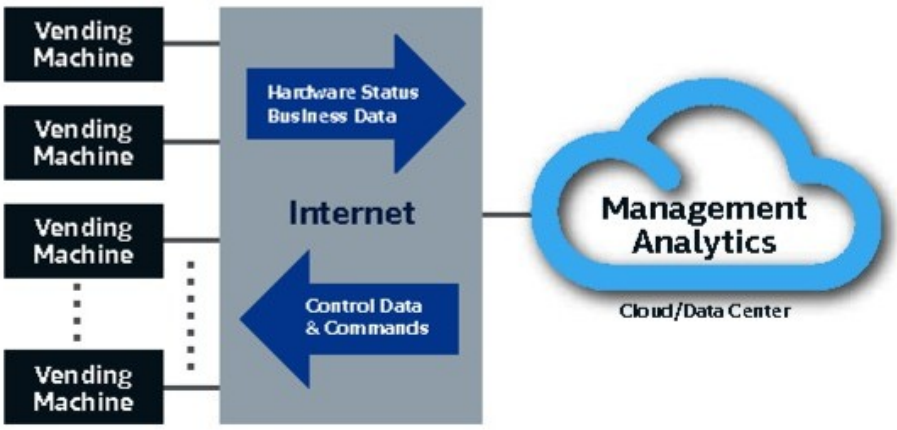

Figure 1. Simplified Representation of Cloud-Connected, Intelligent Vending Machines

As illustrated in Figure 1, a fleet of vending machines periodically sends updates about hardware status and business data to the cloud, and management analytics software running in the cloud sends control data and commands back to the machines. The machine data can be mined for useful information and further analyzed to generate relevant insights, predict consumer trends, an support business decisions.

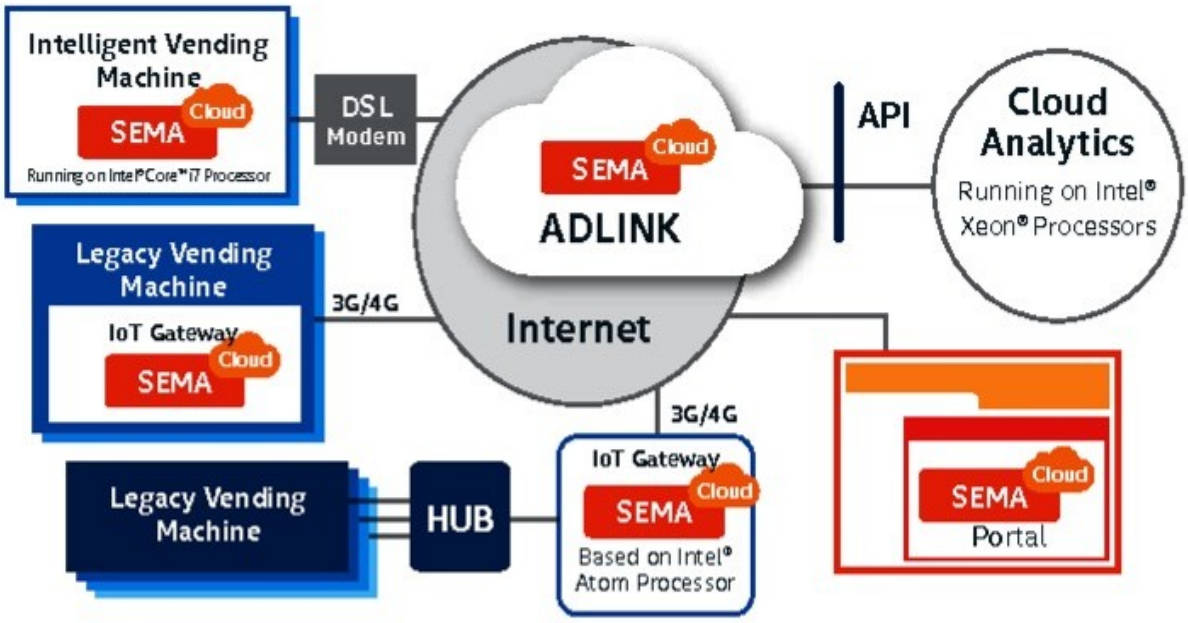

Figure 2. High-Level, End-to-End Architecture

High-Level Architecture

Figure 2 shows the end-to-end architecture of the vending machine management and data analytics solution based on hardware, software,

and cloud technologies from Intel and ADLINK. Using this solution, new or legacy vending machines can be connected to the Internet via broadband or wireless connectivity.

Vending machine data are aggregated by IoT gateways and stored in the cloud, where the data can be accessed via web-based portal or retrieved by external applications for analytics purposes. Cloud applications also send commands and data to remotely manage, control, and configure the vending machines. This includes capabilities to do remote diagnostics on individual vending machines as well as push software updates to the entire fleet.

with the Internet of Things (IoT)

The key solution building blocks are:

- **Intelligent vending machines** based on an ADLINK solution: single board computer (SBC), modular, or custom
  - Generate machine data, collect information from peripherals, and support remote management, control, and configuration.
- **ADLINK IoT Gateways** based on the Intel® IoT Gateway:
  - Aggregate data from multiple vending machines and connect securely to the cloud over the Internet.
- **ADLINK Smart Embedded Management Agent* (SEMA*) Cloud Solution:**
  - Enables edge-to-cloud integration, and supports cloud-based management of vending machines and real-time monitoring of machine data.
- **ADLINK SEMA Cloud API:**
  - Exports machine data and control points for use by external applications.
- **ADLINK SEMA Portal:**
  - Provides System managers easy access to data and analytics through a cloud portal, using any device such as desktop PC, tablet, or smartphone.

Vending machine operators utilizing ADLINK's embedded building blocks and SEMA Cloud service can perform repairs, maintenance, and upgrades with a single centralized operation. SEMA Cloud allows for remote monitoring of machine status, diagnosis of problems, and complete system management from anywhere, at anytime, over the Internet.

Study of impact of product on end User

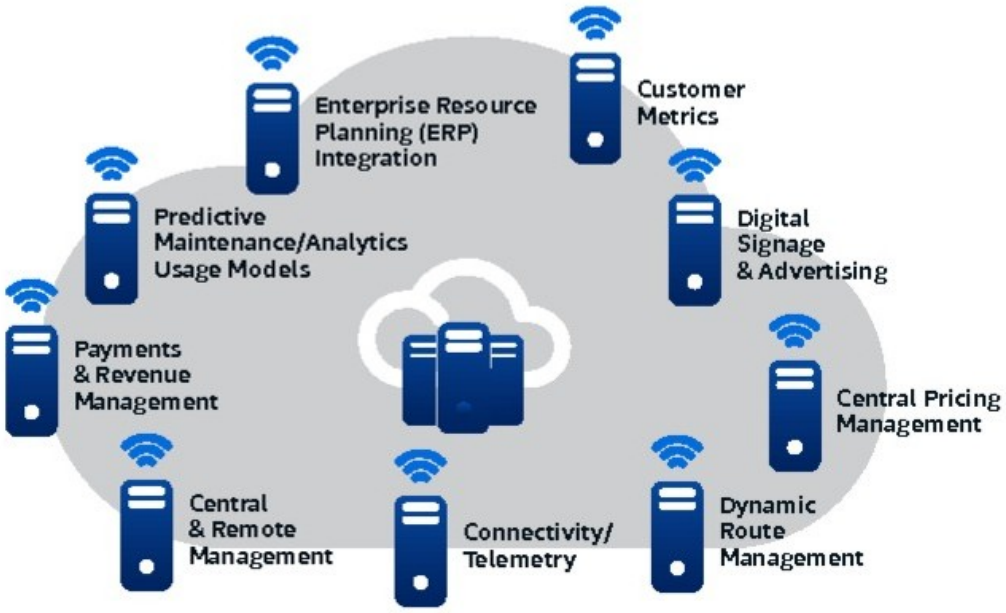

Figure 3. Examples of Cost Reduction and New Business Opportunities Enabled by the Internet of Things

Example Usage Models

Connecting intelligent vending machines to cloud-based applications opens the door to many cost reduction and new business opportunities, including those represented in Figure 3.

1. **Digital Signage and Advertising**
   By taking advantage of new technologies, each vending machine can now become an intelligent system that offers a richer, more engaging customer experience, whether it is selling soft drinks or services. Sixty one percent of respondents to an Intel survey[1] said they would like their vending experience to be more interactive and fun, with 62 percent expressing a desire for touch screens, and 17 percent wanting to operate machines using hand gestures.

2. **Customer Metrics**
   Some of today's machines not only "know" what was purchased, but what was looked at and not purchased, giving product manufacturers and operators more insight into the drivers of sales and customer satisfaction. They are also detecting and messaging specifically to individual patrons with directed advertisements based on their demographics.

3. **ERP Integration and Predictive Maintenance**

   Vending machine operators can automate and streamline their business by tying machines to corporate systems, such as Enterprise Resource Planning (ERP) and central pricing. Intelligent machines can potentially save cost by accessing cloud-based services, for example, dynamic route management condition-based maintenance, which identifies excessively worn parts so they can be replaced before they fail.

4. **Payment and Revenue Management**

   The vending industry needs no longer rely on customers to have cash in their pockets. Intelligent vending machines deliver more payment options, like credit and debit cards, QR codes, swiping a phone using near field communications, and other contactless payments methods.

   In much greater numbers, shoppers will conduct transactions for goods or services made by scanning, tapping, swiping, or checking in with a mobile phone at the point of sale. A recent eMarketer study projects mobile payment transactions in 2016 will reach $26.5 billion (USD), more than 25 times the slightly over one billion in 2013.[2]

Study on the performance of the product

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