



Vending Operations: Reaping the Benefits of Telemetry Technology

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The vending industry has been feeling the squeeze for many years now. Customers want more products, lower prices and better service, while costs are rising for operators to meet these needs. Fuel prices are up. Labor costs are rising. Even the cost of food products is increasing. Even so, operators have not been able to pass on these costs to their customers because with the proliferation of big-box retailers and c-stores, consumers can easily make low-cost purchases elsewhere. At the same time, most operators continue to over-service their machines. To remain profitable, operators must cut unnecessary costs and give their customers more payment options.

Telemetry technology can help. It allows machines to accept cashless payments and enables operators to remotely monitor their machines. Telemetry technology can continually feed operators fresh data about product movement, cash inventory and the physical condition of their machines. This valuable data can help operators manage their routes more profitably and take proactive measures to service their machines and handle maintenance issues.

“There is probably no vending technology application with greater potential for return on investment than remote monitoring,” said Michael Kasavana, PhD, professor of hospitality business at Michigan State University.

What is Telemetry?

Just as a cell phone user doesn't need to understand how their voice is converted into data to make a call, it is not critical for vending operators to understand exactly how telemetry works when using it to improve operations. Simply put, telemetry is a form of wireless communication that transfers data. Although the process of this data transfer is more complex, vending operators just need to know the basics.

Vending operators use telemetry to access real-time information from their vending machines. Whether it is sales revenue, transaction data (product sales or column sales), or machine maintenance (fault alarms), all of this information can be accessed directly at an operator's headquarters and used to operate more efficiently and cut costs.

All telemetry applications involve one or all of the following components:

- 1) A telemeter installed in a vending machine
- 2) A configured cellular device to transmit machine data
- 3) A receiver at headquarters, in a delivery vehicle or at another location
- 4) A software program that records, organizes and manages data

Once those items are in place, operators can apply telemetry technology to multiple aspects of their operations:

- *Curbside polling* – All the machines in a specified area can communicate stocking and maintenance needs to drivers once they are close to the building.
- *Credit/debit acceptance* –Using telemetry’s communication abilities, vending machines can process and accept cashless transactions.
- *Remote Monitoring* – Machines can communicate stock, cash inventory and maintenance needs directly to an operator’s headquarters, storing data for future predictions.

Modular telemetry equipment makes it possible for an operator to deploy one or all of these features. Once the components are in place, they can build on this technology in the future to upgrade and add additional capabilities at a minimal cost.

Why Now?

Telemetry is not new technology. Historically, it’s been used by a wide range of fields, from space exploration to agriculture to healthcare. Most of today’s applications are used to provide users the information they need to do business more cost-effectively and protect their investments through remote monitoring.

So, why are vending operators so slow to adopt it?

Despite its success in other industries, many vending operators consider telemetry to be an unproven technology and are waiting for others to take the lead.

Operators also state that their hesitancy stems from a question as to the costs per machine to implement. Because they have a variety of machine types and ages, they do not have a clear understanding as to the cost of telemetry by machine. In fact, many believe they need to buy all new machines.

In many cases, their existing base of machines can be configured with telemetry equipment. In fact, a major bottling company just finished outfitting more than 2,000 machines with telemetry technology in its second largest market center (see Sidebar, Bottles Up – A Telemetry Snapshot). Because they were all DEX-ready, the bottler did not have to purchase a single new machine.

By making this upgrade, the bottler enabled their machines to accept cashless payments, reduced route costs by servicing machines only when needed, and improved storefront availability by timely notification of machine events when they occur.

How does telemetry work?

The telemeter is the brains of remote monitoring technology. It is a small device that plugs right into a machine’s DEX (data exchange) jack. The telemeter reads the captured DEX information — product sales, payment information, machine malfunctions, and more.

Depending on the application, the telemeter wirelessly communicates this data to a handheld device, credit card clearing house, truck or headquarters for processing. Think of telemeters as

cell phones that communicate DEX information instead of words. Telemeters on each machine “call” a receiver in the truck or an office to report needed information. For example, when a customer makes a purchase or something goes wrong with a machine, the telemeter calls headquarters and sends the necessary data. A partial listing of the errors that can be reported include:

- Bill Validator Full
- Jam in Bill Validator
- Changer Communication Error
- Machine not Cooling
- Temperature too hot
- Column Jam
- Sold Out
- Coin Jam

Telemetry Delivers Intelligence

Vending operators face a particular challenge because their assets are spread all over the place — different buildings, different towns, even different states. With this set-up operators can’t possibly watch all of their machines. Telemetry meets this challenge by letting machines communicate all types of status information that helps operators make the best use of their resources.

Maintenance: A telemeter constantly monitors each of the machines, provides important status information and reports faults. It notifies operators immediately of mechanical problems that impact product availability and payment acceptance including power fluctuations and malfunctioning peripherals. For example, they can know almost instantly if a machine’s coin changer has jammed or the machine has stopped accepting cash, or if a machine is not properly cooling a product.

There are many things that can wrong — product jams during dispensing, burned out indicator lights, open doors, and refrigerator temperature changes. The telemeter can advise an operator within seconds of developing problems. It can report on a range of alarms either from the vending machine itself or from external sensors. It can also help pinpoint the source of the problem, saving diagnostic and repair time. Some problems that can lead to an operator failing health and safety regulations, like temperature changes, are difficult to detect without ongoing monitoring. This real-time notification means that operators discover problems before their customers do. Responding quickly reduces downtime and leaves more time for the machines to make sales transactions. Real Time alarm notifications also allow operators to properly assign resources to fix a machine. If a column is jammed or a validator is full, the operator does not need to send an expensive service tech. This results in labor cost savings.

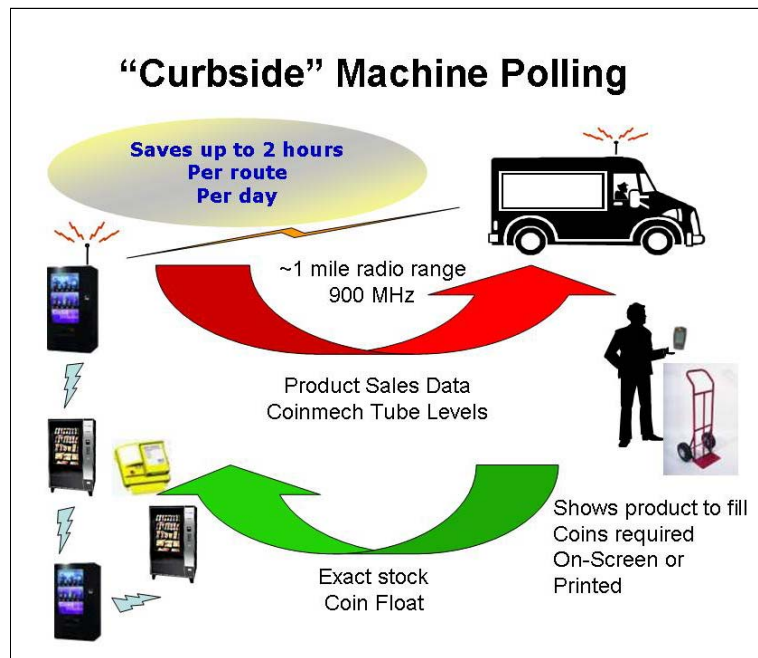
Cash Management: Telemeters notify operators when machines require cash collection and replenishment, so drivers only visit machines that need servicing and know exactly what to bring with them. Servicing cash levels translates into cost savings and maximized sales. Telemeters can also make it possible for machines to accept cashless payments, giving more purchase options to customers and potentially reducing the amount of cash that needs to be managed.

Inventory Stocking: Telemeters tell operators which machines require which products and how many of each. When this information is uploaded into their vending management software, operators can use par stock (desired quantity) or mini-mac (predetermined order points) methods to accurately plan service calls that do not waste driver time and gas.

Better-Selling Inventory: Telemetry lets operators capture market trend information. By analyzing the sales of different brands, locations, sites, time, machines and regions, they can determine a profitable product mix for every location. Operators can respond quickly to popular products that are sold out, so they don't miss a sale. Knowing in advance how to replenish all their machines allows operators to pre-pack products for faster delivery.

More Efficient Routes: By using information supplied by a telemeter, vending operators can schedule routes and stops according to the needs of individual machines to reduce the number of visits and the time spent at each visit. This makes their operations "dynamic." A 2006 NAMA white paper "Remote Machine Monitoring" estimated 11 to 15 percent driver-time savings from dynamic scheduling, and estimated that 20 percent of machine visits per route could be avoided using dynamic routing.

Using telemetry for curbside polling, drivers can save the time they would normally take to walk through an entire building or area to physically check what machines need, whether it be cash collection, replenishment or product stocking. The telemeter in each machine communicates directly to drivers in the truck via a handheld telemeter. This reduces the time drivers spend making trips back and forth to the truck. It also lets them service the site and move on to their next stop on the route faster.



Reduced Inventory Costs: During telemetry trials, the bottler referenced above saw reductions of about 25 to 40 percent in the amount of unused products hauled back for warehousing after a route's completion (see Sidebar, Bottles Up – A Telemetry Snapshot). The data captured by a telemeter leads to more informed merchandising decisions and better planning, cutting warehouse and truck inventories and resulting in less capital tied up in inventory.

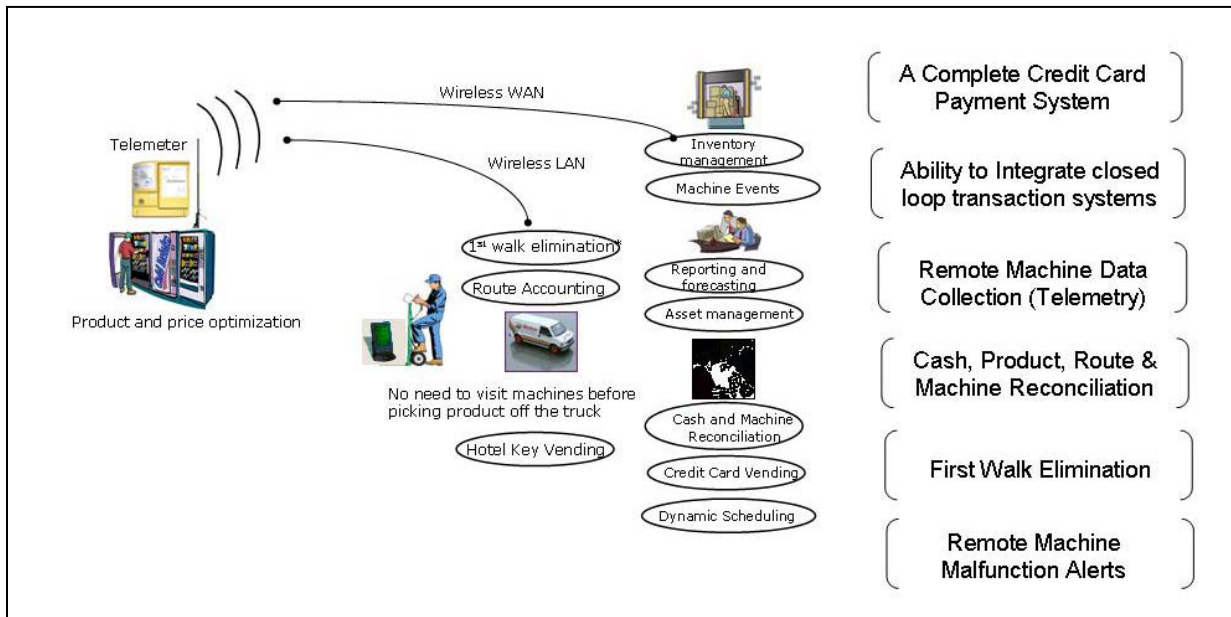
Loss Prevention – Because a telemeter captures and records driver entry to every machine, operators have an audit trail for machine revenues. They can hold drivers accountable for cash or stock discrepancies and shortages that take away from their bottom line.

Telemetry Networking Options

There are two main ways that telemeters from different vending machines communicate with one another and with remote sites.

WAN: A wide area network (WAN) configuration operates on a cellular phone system. It is actually a radio that transmits data over a cellular network. This configuration works best for stand-alone machines, and its installation process is simple.

LAN: Wireless local area networks (LANs) operate more like a satellite system that networks many vending machines together. A LAN connection uses short-range radios to share data between multiple machines that lie within a close distance of one another. This can range up to 1 mile outdoors, but could be much less if machines are inside buildings. Some telemeters allow clusters of machines operating under a single LAN to share one cellular connection. With each cellular connection costing about \$7 to \$10 per month, the cost savings can add up quickly and create a competitive advantage.



Data Query and Collection Using Telemetry

The familiar DEX protocol enables different makes and models of machines to communicate consistently. Operators using telemetry can collect DEX data from machines in three ways: at the machine, curbside and remotely. Compared with traditional manual delivery schedules, each of these data collection methods offers increasing time savings and efficiency.

By polling a machine directly, drivers are able to capture stored DEX data about sales and inventory on a handheld device and transmit all of that data to headquarters. Operators can access this polled data through a single software program and use this information to forecast and execute dynamic routes that save time and money.

Curbside polling further cuts time at each stop and lets drivers service more sites in a day. Using a handheld device or PDA, drivers poll a machine when they arrive on-site to access the DEX data. If the machine does not need anything, they continue to the next location. If it needs restocking, cash replenishment or emptying, drivers know exactly what to take from the truck into the building. If there is more than one machine in a building, drivers can poll them all at once, and then service only those that require it. This is particularly useful in developed areas where access is limited and machines are located on many floors of a building.

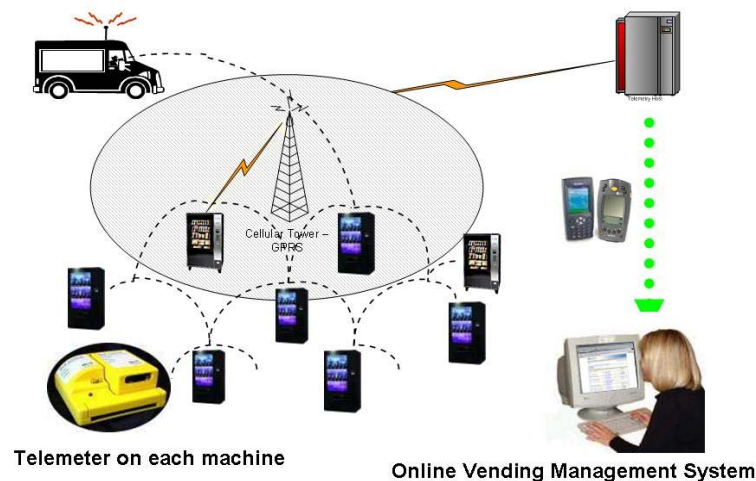
Polling remotely (also called remote monitoring) gives operators up-to-date information before a driver leaves the warehouse, so they can plan routes accordingly. Being able to access all the machine's DEX data from headquarters also lets operators automatically generate purchase orders and invoices, eliminating handwritten paperwork. Finally, it virtually eliminates the manual entry of sales data, increasing the accuracy of invoices, meter readings and pricing. Automating these processes dramatically reduces labor costs, fleet costs and fuel costs.

An operator can minimize their data entry by ensuring that the data collected can be easily downloaded into their vending management system. If they cannot, there could be additional manual data entry that decreases the efficiency of the data collection and analysis process.

Maximizing Data

Regardless of which polling method is used, operators need a vending management system to process the data and present it in a usable format via alerts and reports. This software system is typically Web-based, and it stores and manages the data received from machines daily. Advanced programs can calculate data, and using algorithms, generate predictive modeling to help forecast the most efficient routes based on sales history (see Sidebar, Bottles Up – A Telemetry Snapshot). The major bottler previously referenced plans to eliminate one in four routes with predictive modeling based on telemetry data. With each of its routes costing up to \$100,000 a year, the potential savings of telemetry speak for themselves.

Wide Area Wireless - Dynamic Scheduling & Routing



Sidebar: Bottles Up – A Telemetry Snapshot

A leading full-service bottler had enough of relying solely on fixed service to manage its routes. As many vending operators know, this model often leads to over-servicing and less profit. Every operator has different needs. This particular bottler was looking for:

- More detailed DEX data
- Improved space-to-sales ratios
- Reduced percentage of product being hauled back to the warehouse after a route

The company turned to telemetry technology and outfitted about 2,200 of its DEX-ready machines with telemeters. Using strategic WAN, LAN and WAN/LAN configurations, all the machines communicate on about 550 cellular connections — eliminating the monthly connection fee on about 75 percent of the equipped machines.

Using telemetry, the bottler has seen a 25 to 40 percent reduction in haul-back rates, and projects to eliminate 1 in every 4 routes using its vending management system's predictive modeling capabilities.