

Vending Technology Revolution

by

Michael L. Kasavana, Ph.D., NCE5
NAMA Endowed Professor in Hospitality Business
Michigan State University

and

Glenn Butler
Chief Technology Officer
Crane Merchandising Systems

When was the last time major vending technology suppliers worked together to produce an industry-wide standard enabling data sharing among competing providers of software products? When was the last time an industry technology standard was created and launched in four months? The answer to both these questions is simply never!

In spring 2009, the NAMA Technology Leadership Committee under the direction of the NAMA Board of Directors, formed a specialized technology task force. The task force was charged with developing a set of NAMA standards that provide a way to share vending data among competing technology providers. These new standards had to ensure reliability, continuity, and longevity. Reliability relating to each participating technology provider of a vending operator receiving identical data files. Continuity in terms of data retrieval and distribution throughout a vending operator's network and longevity by providing assurance to vending operators that interfaces between installed applications and hardware from various suppliers will be supported going forward. As a result, the task force produced NAMA VDI (**V**ending **D**ata **I**nterchange) standards. These standards contain technical specifications that bundle vending machine-level data for easy distribution throughout a vending operator's technology network. The standards can be implemented by technology providers without vending operator intervention.

Tipping Point

Simply stated, vending operators desire technology capable of reliably passing information from one application service provider to another so that multiple application service providers can contribute to a single networked solution. This statement captures the essence of the NAMA VDI standards. In other words, NAMA VDI standards render vending technology capable of linking together diverse software solutions, from different vending technology providers, into unified applications. The expectation being that NAMA VDI standards represent the **tipping point** leading to accelerated adoption of vending technologies as many vending operators' concerns are resolved.

NAMA VDI

NAMA VDI is an innovative set of protocols designed to package vending machine-level data (e.g. DEX data, alerts data, cashless transaction data, etc.) into a message format that can be shared among diverse supplier systems to enable multiple software applications on the same set of data. For example, consider the situation in which a telemetry provider remotely polls DEX data from

a vending machine (e.g. Cantaloupe Systems). The telemetry provider moves the collected machine-level data file to its server (e.g. Seed Server). The server in turn secures the file with a NAMA VDI message wrapper that labels the contents for subsequent communication to any other provider's server (e.g. Crane Streamware or MEI EasiTrax or cashless gateway, etc.) used by the vending operator. Alternatively, the vending operator may have cashless readers installed that are capable of collecting both DEX data and electronic payment data for transmission to hosted software (or VMS) capable of processing DEX data and forwarding cashless transactional data for reconciliation.

Basically, the functionality of the NAMA VDI standards is somewhat analogous to an email communication in that the file of machine captured data forms the contents of the email message while the VDI wrapper is equivalent to an email envelope that enables distribution among any number of file servers (email recipients) associated with installed application software, regardless of supplier or manufacturer. NAMA VDI standards, for example, allow for DEX data to be transmitted by a telemetry device or server in real time. This approach provides a platform for a vending operator's VMS to upload data nightly for use in pre-kitting and/or dynamic scheduling algorithms.

The goal of NAMA VDI standards is to ensure that a vending operator can confidently implement multiple, diverse vending technology solutions and utilize the operational data in existing application software (regardless of supplier). NAMA VDI specifications are designed to be extensible, uniform, and stable as well as manufacturer and device neutral. In other words, NAMA VDI standards are open technology standards.

Vending Data

The Data EXchange standard, DEX, is capable of capturing cash in/out data, product movement data, and audit data. DEX data is designed to assist operators with product replenishment strategies, product mix rotations, and cash management safeguards. In order to optimize contribution margins, while controlling operating expenses, DEX data can play an important role in productivity and profitability improvement. Since standards existed that controlled the collection and storage of data, a Data Transfer Standard, DTS, was devised so that the data could be exported from the machine in a decipherable electronic format. Once the information is transmitted, it can be entered into a vending management software system (VMS) and used to determine product mappings, route coverage, and sales performance. The DTS protocol is often considered an integral part of the DEX standard; not a separate element.

A Multi-Drop Bus, MDB, is an internal communication protocol designed to ensure that coin mechanisms (coin mechs), bill validators, and cashless payment devices can be properly interfaced to a vending machine controller (VMC) without regard to proprietary manufacturing. MDB, often compared to USB standards used in generic computer component interfacing, replaces prior practices built on supplier-specific design connectivity. An MDB cable (also termed a harness) provides the physical connectivity for peripheral devices to the

VMC and is part of the movement toward open system architecture in vending technology.

In essence, vending machine-level data capture involves the retrieval of stored audit information (a snapshot) via local or remote transfer. In fact, some telemetry providers actively monitor the MDB bus to detect, in real-time product sales movement and operational alerts (e.g. bill jam or exact change). Machine-level data formatting and content derivation conforms to the European Vending Association-Data Transfer Standard (EVA-DTS) and provides access to status data, testing routines, transaction data, and machine setup. In a typical data connection, a device actively surveys the vending machine for stored data then follows DTS standards for transmission. Once the data transfer is completed, vending machine-level data can be wrapped in NAMA VDI messaging for subsequent distribution to installed vending application software servers. See Figure One.

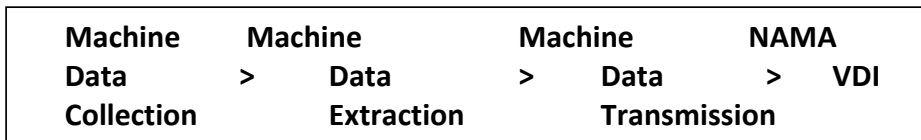


Figure One. Machine Data Transmission to NAMA VDI Application

Open Standard

The purpose of the NAMA VDI standard is to establish transparent, non-proprietary interfaces that enable transportation of data among the main components of a vending system (e.g. vending machine, telemetry system, cashless payment system, specialty applications, and vending management software). The non-proprietary nature of NAMA VDI renders it an open standard.

NAMA VDI relies on messaging standards to satisfy data interchange needs and is not concerned with the entity transmitting or receiving such messages. For example, a messaging standard governing the transmission of machine-level DEX data may originate from the vending machine, an advanced telemetry device, or the file server of another entity. NAMA VDI mandates that the message format conform to the technical specifications of the standard, regardless of the entity creating the message.

VDI Messages

The NAMA VDI Task Force has identified the following seven elements as important to vending data messaging (interchangeable/exchangeable data files):

- 1- DEX data messaging – sent or requested captured DEX data file
- 2- Alert data messaging – may originate from the VMC, DEX, or MDB depending on telemetry provider.
- 3- Device Status -- device configuration and/or service request
- 4- Device Configuration – sent device configuration and/or status reporting
- 5- Security Authorization – defines cooperative agreement partners
- 6- Machine Message – reconfigures machine to EVA standards

7- Device Messaging - provides confirmation of download instructions

Cooperative Relations

The NAMA VDI standard incorporates 'cooperative agreements' among competing vending technology suppliers so that interchanged data will be more meaningfully consumed and effectively applied. Cooperative agreements, often referred to as trading partner agreements, involve written documentation that informs both sender (producer) and receiver (consumer) of NAMA VDI messages the specifics of the message(s) being shared. Descriptive elements include such items as: company profile, security authorization, machine identification, location identification, and type of connectivity (server, web-service, email, etc.). For example, if Provider X is to pass a NAMA VDI data message to Provider Y then the cooperating parties must have transaction information to successfully distribute and utilize the desired data messages. User names, passwords, and web-based SSL encryption also can be used to help insure data transfers are secure and accessible by authorized entities.

Early Adopters

Seven major vending technology providers have volunteered to serve as early adopters of NAMA VDI standards. These firms are Cantaloupe Systems, CompuVend, Crane Merchandising, InOne Technology, MEI Group, USA Technologies, and Validata. Early adopters are actively engaged in NAMA VDI standard development and may be directly involved in field testing of technical specifications prior to finalization and release of NAMA VDI standards. Since vending technology historically involves proprietary, company-specific data, system integration required expensive and intricate custom programming. NAMA VDI standards are designed to replace the custom linkages between competing proprietary supplier products thereby rendering the connectivity as non-proprietary. This is similar to the replacement of specialized train car connectors with non-specialized couplers that enable assembly of the cars in any order or sequence (see Figure Two).

Version 1.0

The new NAMA VDI standards are being released in sequential stages based on data messaging developments beginning with NAMA Expo 2009. Version 1.0 addresses the most critical area among the several data messages identified by the NAMA VDI Task Force: DEX data messaging. It is anticipated that as the remaining data messages are developed, they will be released and labeled in ascending numerical order (i.e. Version 1.1, 1.2, and so forth).

VDI Benefits

The NAMA VDI standards afford several direct benefits to operators and bottlers, especially those embarking on technology decisions. When purchasing vending technology from a company adhering to NAMA VDI standards, the buyer can be assured that:

1. investment in the compliant technology will be compatible across major suppliers
2. there is no longer a need to rely on the success of a single supplier
3. multiple telemetry devices will work with a variety of VMS providers
4. selling or acquiring VDI compatible components simplifies continued operations

See Figure Three for an illustration of the NAMA VDI standards application.

Summary

Major vending technology providers participating in NAMA VDI development have created a tipping point for accelerating the implementation of vending technology. Increased interest in addressing operator concerns has resulted in an unprecedented cooperation among vending technology suppliers to enable harmonic data interchange. NAMA VDI ensures that operators can feel confident in technology investment, choice of suppliers, and be assured that hardware and software will work together now and in the future. There has never been a better or safer time to invest in cashless vending, remote machine monitoring, or VMS technology.

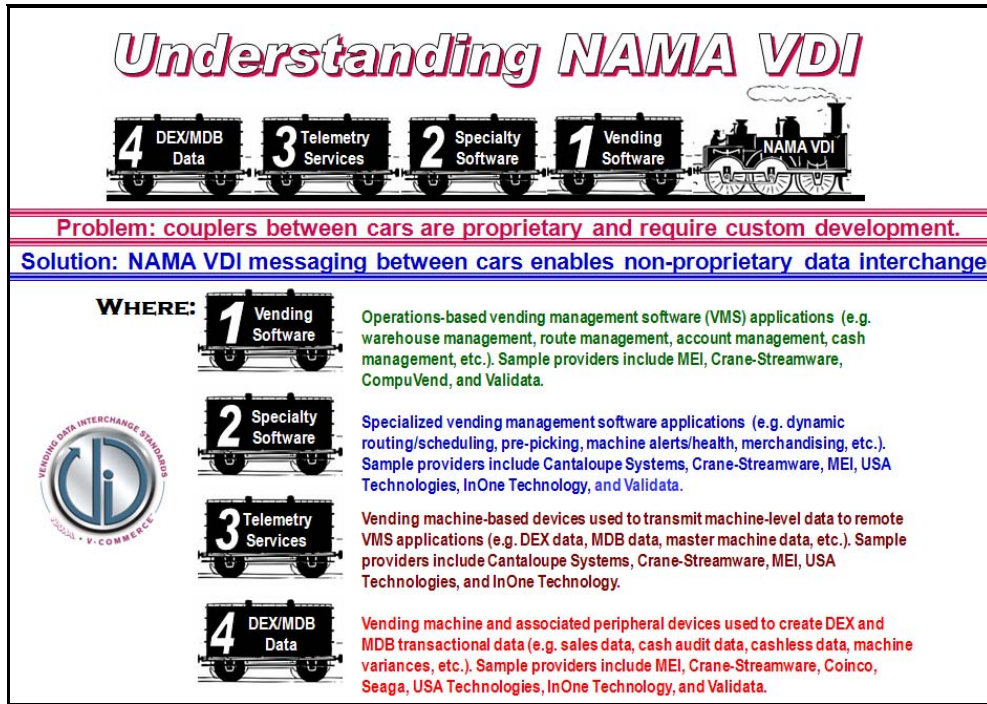


Figure Two. Understanding NAMA VDI Standards

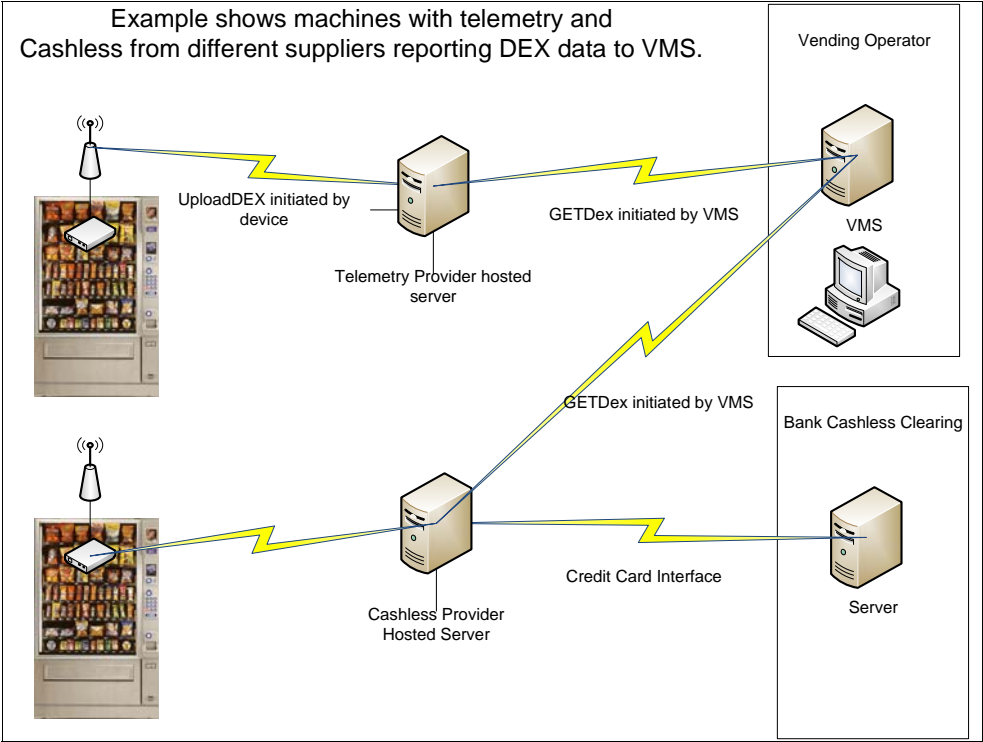


Figure Three. DEX Data from different telemetry and cashless providers reporting into an operator's VMS

NAMA VDI Standard **Frequently Asked Questions**

1. How does vending machine collected DEX data (raw data) compare with NAMA VDI DEX messaging?

Answer – the difference is that raw data is collected on the vending machine controller (VMC) inside the vending machine. In turn, this data is collected by a cashless / telemetry device and transported to a technology provider's server or VMS for subsequent processing. DEX messaging refers to the NAMA VDI standards that apply a wrapper to the received DEX data so it can be transported to another system server (or servers) for additional, actionable processing.

2. Is there an analogy that makes understanding NAMA VDI standards easier to comprehend?

Answer – Yes. Consider an email analogy where DEX data represents the contents of an email message and NAMA VDI DEX messaging forms the envelop, stamp and post office functions needed to move the message from one provider's server onward to a different, second provider's server.

3. How does machine-based alert data (found among DEX data) differ from NAMA VDI alert messaging?

Answer – Similar to DEX messaging, transported alert data will also receive NAMA VDI message wrapping. Different telemetry and cashless providers use various algorithms to detect and compute alert conditions, so standardizing this functionality is more challenging than messaging DEX data.

4. Can NAMA VDI standards help identify a product 'sold out' condition?

Answer – Yes – but determination is dependent on the capabilities of the telemetry provider and VMS system. The NAMA VDI standards allow for this type of alert.

5. NAMA VDI standards involve both server-to-server (S2S) and device-to-server (D2S) communications. What does this mean?

Answer – Most remote monitoring solutions utilize telemetry devices connected to a hosted server via cellular and internet communications. In most cases, the NAMA VDI standards will utilize S2S protocols between a telemetry provider's server and an operator's VMS server. However, the NAMA VDI standards are also designed to be configured for direct

communication (D2S) between a telemetry device and VMS.

6. Vending technology providers establish data interchange relationships through 'cooperative agreement'. What does the phrase "cooperative agreement" denote?

Answer – a cooperative agreement indicates a working relationship between two or more providers who agree to share NAMA VDI messages (agreement of cooperation). Trading partner documents are used to identify authentication and validation as well as indexing of data files. In other words, an agreement is established between providers/suppliers in order to facilitate either a request or receipt of a data message from a participating partner. Cooperative agreements therefore enable diverse servers to exchange (interchange) data in a singular network.

7. How are NAMA VDI standards being released?

Answer – NAMA VDI Version 1.0 will include messaging to transfer DEX data. Beyond that, the NAMA VDI Task Force will test and release subsequent versions.

NAMA VDI Task Force Membership

**Chris Lilly, Chair
Michael Kasavana, Coordinator
Mary Rampe, NAMA Board Liaison**

Chris Lilly, Best Vendors

**Louis Beaudoin, Cantaloupe Systems
Bob Williams, Canteen Franchise Group
Bud Nixon, Canteen Technology Group
Tom Howell, Coca-Cola
Ron Hoorman, Coinco
Mark Kronenberg, CompuVend
Glenn Butler, Crane Merchandising Systems
Craig Lewis, Crane Merchandising Systems
Gene Ostendorf, InOne Technology
Don Finley, MEI
Mary Rampe, MEI
Michael Kasavana, Michigan State University
Dan Mathews, NAMA
Don Merchant, Seaga Manufacturing
Cary Sagady, USA Technologies
Billy Irvin, Validata
Philips, Jeff Mayoras, Wittern Group**

Deleted: Warren

Deleted: , Validata

A very special thank you to each member, and their employer, for their time and dedication to this project and the work still ahead.

NAMA VDI Glossary of Terms

NAMA VDI Task Force

Service	Description
Vending Machine	An unattended point of sale that dispenses product or service in return for a payment. Traditional and non-traditional machines include: snacks, hot and cold beverages, food items, ice cream, change machines, kiosks, DVDs, electronic gadgets, phone card dispensers, revalue stations, etc.
DEX	<u>D</u> ata <u>E</u> Xchange protocol governing transaction, audit, alerts, alarm, and configuration data as defined by EVA DTS 6.1; involves data for transport from a vending machine controller (VMC) to an external device (e.g. handheld PC, communication device, storage device, etc.). Also may be called DTS data.
Audit Data	Data provided by DEX or other means (telemetry or cashless monitoring of MDB data). [Note: many cashless monitoring devices push the MDB specification beyond its definition].
Telemetry Device	Device for communicating remote transaction, audit, alerts, alarms, and configuration data to a central server.
Cashless Device	Device with optional modem controlling the authorization and settlement of cashless transactions; may also communicate DEX data and alerts or alarms to a central server.
VMS	Vending Management System provider. Software used to support vending operations. Typically includes customer account management, warehouse inventory management, route accounting, collections processing (cash and non-cash), plan-o-gram management and route scheduling. Field service management may be included or offered as a separate system.
Machine Health Alerts	Designed to monitor the continuous operation of a vending machine. This service distributes alert information that can be used by a VMS, field service mgt system or mobile device.
Inventory Monitoring	Monitors inventory levels in a vending machine and sends alerts when certain inventory levels/milestones are reached.
Non-cash Payment Acceptance	Device used to authorize a non-cash payment transaction. May be debit/credit card (open system) or stored value card or account (closed system) payment device.
Non-cash Payment Processing	Service used to settle non-cash payment transactions. Designed to ensure Vending Operator is properly reimbursed.
Price Management	Service used to remotely manage vending machine prices.
Device Configuration	Service used to provide the current status and configuration settings of the vending machine or telemetry device as well as a capability to change settings based on instructions from the VMS.

Consumer	Individual purchasing goods/services from a vending machine.
Client	Primary “customer” through which vending agreements are made; allows consumers access to machines on client premises.
Client Relationship Manager	Company who owns client relationship and offers vending services to those clients. Examples: Best Vendors, Canteen Vending Services, Coke, Pepsi
Vending Operator	Company that operates vending machines. Examples: Canteen Vending Services, Coke, Pepsi
Service Provider	Firm providing vending-related services that allow Vending Operator to efficiently manage business operations while providing vending services to Clients and Consumers.