
**TITLE OF NOMINATION: THE KENTUCKY EPAYMENT GATEWAY: ENTERPRISE SERVICE
FOR PAYMENT PROCESSING**

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EXECUTIVE SUMMARY

THE eCOMMERCE CHALLENGE

In 2001, the Commonwealth of Kentucky processed over \$30M in annual receipts from credit and debit card payments via a variety of access mechanisms including web-enabled applications, point-of-sale devices, and interactive voice response (IVR) systems. Agencies across State government were already doing business on the web, selling goods and providing services, and collecting payments through software applications ranging from online stores to complex back-end systems. However, lacking an enterprise standard for collecting payments, these systems were often supported by manual, report driven processes that at best made consolidated reporting difficult, and often provided little to no audit support or control over the transactions. Most systems provided little or no automated support for reconciliation and accounting, or system specific, custom automation.

THE SOLUTION: ePAYMENT GATEWAY

In 2002, the Commonwealth, lead by the Governor's Office for Technology (GOT), was rapidly moving forward with an enterprise portal initiative. At the same time, Kentucky was also preparing to renew the state contract for merchant services. Recognizing the opportunity presented by these converging events, and faced with the challenge of accounting for the transactions processed by a disparate set of manageable—but rapidly growing—number of eCommerce-enabled applications, the Commonwealth saw that strengthening the enterprise infrastructure to support eCommerce was critical. In response, the Kentucky Finance and Administration Cabinet initiated a project to design, build and implement an ePayment Gateway to process all eCommerce transactions within the Commonwealth.

In June 2002, the Kentucky Finance and Administration Cabinet partnered with American Management Systems, Inc. (AMS) to augment the Commonwealth's financial system with the ePayment Gateway. The Management and Administrative Reporting System (MARS) is an implementation of the AMS ADVANTAGE® Financial, Procurement and Budgeting systems. Developed in partnership with the Commonwealth of Kentucky, AMS now offers AMS ADVANTAGE ePay to state and local organizations throughout North America.

RESULTS

Within its first three months in operation, the ePayment Gateway:

- Was supporting over 130 Commonwealth merchants and locations;
- Had successfully processed approximately 25,000 transactions via web-enabled applications alone;
- Had processed \$3M in receipts from credit card, debit card, eChecks, and ACH debit payments via web-enabled applications and point-of-sale devices.

Now a cornerstone of Kentucky's enterprise architecture, the ePayment Gateway simplified the implementation and management of applications that handled filings, fees, license renewals, and selling of goods and services on the web in Kentucky by offering a single shared service across the enterprise.

The ePayment Gateway has enabled the Commonwealth to transition from a collection of disparate payment processing solutions to an infrastructure based, online service that supports transactions from end-to-end and provides enterprise management and reporting functions.

**DESCRIPTION OF THE PROJECT, INCLUDING
LENGTH OF TIME IN OPERATION**

Faced with the challenge of accounting for the transactions processed by a disparate set of manageable but quickly growing number of eCommerce-enabled applications, the Kentucky Finance and Administration Cabinet initiated a project to design, build and implement an ePayment Gateway to process all eCommerce transactions within the Commonwealth. The purpose of the ePayment Gateway was to provide the Commonwealth's Agencies and other partner organizations with:

- A shared service that includes a standard application program interface (API) to the Commonwealth's Merchant Service Provider (MSP);
- The ability to automatically reconcile real time orders and authorizations with batch settlements;
- Automation of revenue accounting, including the ability to automatically generate revenue transactions to account for all payments processed by the Commonwealth's MSP and to split transactions into agency defined account codes and revenue accounts.

In June 2002, the Kentucky Finance and Administration Cabinet, in conjunction with the Governor's Office for Technology (GOT), partnered with American Management Systems, Inc. (AMS) to augment the Commonwealth's financial system, Management and Administrative Reporting System (MARS), with the ePayment Gateway. The Commonwealth designed, developed, tested, and deployed the ePayment Gateway in seven months – from June 2002 through January 2003.

The steps in the design phase included: identifying the application audience; discussing business scenarios; validating and in some cases developing the application requirements; and, documenting the design (through use cases, UML diagrams, and an object model). The project team interviewed nine different organizations responsible for thirteen different eCommerce applications. The interviews consisted of a series of general, functional, and technical questions that were submitted to each customer prior to a detailed discussion of the questions and answers.

The interviews also included reviews of business scenarios developed by the project team such as the scenario depicted in Figure 1, which depicts the data flow (and application integration) between 1) consumers; 2) agency web-enabled applications, 3) the ePayment Gateway; 4) the Commonwealth's MSP; 5) credit processing networks (e.g. Visa, MasterCard, American Express, etc.); 5) the consumer's bank; 6) the Commonwealth's bank (Farmer's Bank); 7) the Department of the Treasury; 8) the Commonwealth's financial system (MARS); and 9) agency staff responsible for, among other things, reconciling authorizations and deposits.

The interviews clarified the customers' needs and validated that the solution addressed the problems that customers are currently experiencing (such as a cumbersome, and in some cases ineffective, reconciliation process). The design called for the construction and implementation of an ePayment Gateway, a Virtual Terminal, and a Reporting Database.

Reconciling a Credit Card Payment Submitted Via a Web Application and Generating Accounting Documents

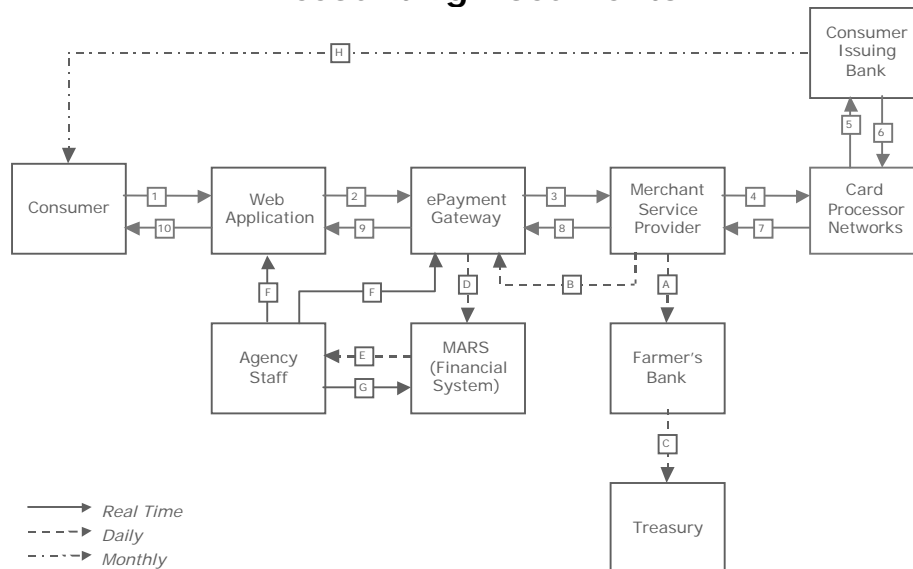


Figure 1 - Sample ePayment Gateway Business Scenario

The ePayment Gateway Supports an extensible list of payment instruments including credit cards, debit cards, eChecks, and ACH debit payments. Commonwealth applications have direct access to the ePayment Gateway functionality via a web service. To minimize the effort required to convert existing applications, the system includes adapters for applications that lack support for the web service API. The adapters support legacy ASP, .NET (e.g. C#), and Java applications. The web service and the adapters provide agency applications with back-end connectivity to payment processing networks. The ePayment Gateway maintains a complete history of all transactions to support audit, reconciliation and integrated accounting requirements.

The Virtual Terminal is the ePayment Gateway's browser-independent graphic user interface, and supports Administrators, Merchant users, and Operators.

Administrators have the ability to:

- Configure application options (e.g. setup ACH configuration information);
- Register agency merchants and locations; and,
- Create and maintain user accounts through the Virtual Terminal.

Merchant users have the ability to:

- Configure their merchant accounts (e.g. administer fee structures);
- Process payments through a web-based cash register; and,
- Search, review, void, and credit previously processed payments.

Operators have the ability to:

- Refresh reference data from external accounting systems;
- Generate ACH debit transfer files;

- Automatically reconcile real-time payment authorizations with nightly batch deposits; generate cash receipts; and,
- Perform other administrative functions.

The Reporting Database supports ad hoc analysis, on-line reports, and the periodic generation of standard reports. It provides the Commonwealth's users the ability to research individual transactions and generate management reports. In addition, it functions as the eCommerce subject area in the Commonwealth's financial data warehouse.

The ePayment Gateway is a Java 2 Platform, Enterprise Edition (J2EE) architecture-based application. The components of the application were developed using Rational XDE, WebSphere Studio Application Developer (WSAD), Rational ClearCase, Oracle Relational Database Management System (RDBMS), and Crystal Reports. The application was deployed on a Unix (AIX) server running IBM's HTTP Server, WebSphere Application Server (WAS), and Oracle RDBMS.

**SIGNIFICANCE TO THE IMPROVEMENT OF THE
OPERATION OF GOVERNMENT**

The ePayment Gateway, through the components described in the previous section, strengthens the enterprise infrastructure and enables integration, inter-operability, and sharing of eCommerce information. The primary improvement of the ePayment Gateway is that it simplifies the implementation and management of applications that handle filings, fees, license renewals, and selling goods and services in Kentucky by offering a single shared service that meets all payment processing needs. A key goal was to transition from a collection of disparate payment processing solutions to an infrastructure based, online service that supports transactions from end-to-end. The ePayment Gateway helped to achieve that vision.

The ePayment Gateway changes the way the Commonwealth of Kentucky handles tens of millions of dollars in annual receipts. When a citizen visits a merchant's web site and makes a purchase, the transaction data is passed from the agency's application to the ePayment Gateway for processing. The ePayment Gateway securely routes the transaction through a merchant service provider to the appropriate financial network or bank, ensuring that the customer is authorized to make the purchase. The end-to-end transaction is accomplished within seconds.

Agency merchant applications can directly access the ePayment Gateway via a web service. The ePayment Gateway web service shares payment processing business logic, data and processes through a programmatic interface across networks. The ePayment Gateway web service allows different applications from different sources to communicate with each other without time-consuming custom coding, and because all communication is in XML, the web service is not tied to any one operating system or programming language. For example, Windows- and Java-based merchant applications can talk with the ePayment Gateway, regardless of the platform on which the ePayment Gateway is deployed.



Figure 2 - The ePayment Gateway gives agency merchants a variety of integration options.

In addition to providing a key component in the State’s enterprise architecture, the ePayment Gateway benefits consumers, taxpayers, agencies, and the Commonwealth as described and quantified in the following sections.

**BENEFITS REALIZED BY SERVICE RECIPIENTS,
TAXPAYERS, AGENCY OR STATE**

The benefits of the implementation of the ePayment Gateway to **consumers** include:

- Increased range of payment options – The ePayment Gateway provides the Commonwealth’s merchants with the ability to accept credit card, branded debit card, eCheck, and ACH debit transfer payments. Prior to the ePayment Gateway, consumers had a limited number of payment options.
- Reduced transaction costs – The ePayment Gateway enables the Commonwealth to reduce transaction costs and pass on the savings to consumers by maximizing the transaction volume processed through a single, enterprise merchant service provider. In other words, the ePayment Gateway enables the Commonwealth to achieve economies of scale when (re)-negotiating MSP fees for processing credit cards, branded cards, and eChecks. In addition, the ePayment Gateway eliminates MSP ACH debit transfer fees by interfacing directly with financial institutions.

The benefits of the implementation of the ePayment Gateway to the **Commonwealth’s Agencies and its affiliates** include:

- Easy to implement; it facilitates integration – The ePayment Gateway provides multiple mechanisms for integrating a single, shared payment processing service with agency applications. For existing applications, the ePayment Gateway can be easily integrated into an existing agency merchant eCommerce solution in less than a day. For new applications, it allows the agency to focus on user functionality without building redundant payment processing into each application.
- Configurable to support any eCommerce application; it is interoperable – The ePayment Gateway is ideal for Commonwealth applications that require a high degree of customizability to accommodate a variety of different agencies' needs, from simple shopping cart-based applications, to custom revenue solutions. Agencies process payments through their own applications maintaining complete control of the purchasing experience.

The benefits of the implementation of the ePayment Gateway to the **Commonwealth** include:

- Lower barriers to offer eCommerce – The ePayment Gateway standardizes an easy to implement, repeatable solution; the standardization resulted in lessons learned and in-house payment processing expertise for the Commonwealth. As noted above, the ePayment Gateway can be easily integrated into an existing agency merchant eCommerce solution in less than a day.
- Reduced staff time – The ePayment Gateway dramatically reduced Commonwealth staff time previously dedicated to manual reconciliation and accounting processes.
- Enterprise management and inquiry of eCommerce activity; it facilitates data sharing across the Commonwealth’s Agencies and affiliates – The ePayment Gateway enabled the Commonwealth to host a central data store to facilitate audit, automated reconciliation, integrated accounting, analysis, CRM, and other functions.
- Eliminates dependence on a particular merchant service provider – The ePayment Gateway provides for integration with a merchant service provider; it enables the Commonwealth to negotiate merchant service provider services as a commodity without impacting agency applications. In other words, the Commonwealth was able to reduce its per transaction costs by loosely coupling their merchant service provider to their merchant applications through the ePayment Gateway.
- Built for state and local government – The ePayment Gateway was designed specifically, completely and exclusively to meet the unique financial needs of the Commonwealth and state and local governments in general. We did not attempt to “force fit” a product to meet our accounting standards and requirements.

**RETURN ON INVESTMENT, SHORT-TERM/LONG-TERM PAYBACK
(INCLUDING SUMMARY CALCULATIONS)**

The universe that was envisioned when designing the ePayment Gateway went beyond the State Government “proper” enterprise. It is conceived that local governments, universities, and quasi-governmental entities will use the “statewide” Merchant Services contract and reap the benefits provided by the ePayment Gateway infrastructure from full backend system integration to manual report based interaction between systems.

Understanding the nature of its audience, the client group might be broken down into large, medium, small, and transient applications. The highest number of applications will be in the medium to small range within state government “proper”, although there will be a dozen or more large applications that will dwarf the field in both dollars and transactions. And, finally there are those “transient” applications that will come and go based on periodic events or temporary programs. The decision to go to a web based solution from the traditional paper based collection methods is grounded in a couple primary motivations:

- **Customer Service** (Effectiveness) – by making the experience convenient and less of a burden. Achieving this goal improves the collection effort and reduces the forced compliance costs. Further, credit cards shift the collection experience from the agency to the card company.
- **Cost to Process and Account** (Efficiency)- by removing steps, physical handling, and manual processes, the resources employed to process transactions, dollars, and accounts for both in the agency compliance system, accounting system, and the bank will diminish. This allows agencies to make resource allocation decisions that they could not do before such as:

- Re-deploy staff to other critical areas (Cost Avoidance)
- Reduce Staff (Cost Cutting)
- Indirect benefits-improving performance of other manual processes as pressure is relieved.
- Use excess resources to invest in “repeatable solutions” that exploit opportunities, thus creating “productivity and capacity” with fewer, or the same, resources.

The success of the agency in creating capacity, freeing up resources to repeat the cycle, or cost cutting represent the most significant portion of return on investment.

The role that the ePayment Gateway is providing in essence is that of facilitator. Agencies that could afford to build web enabled collection systems were faced with manual backend processes or building complex functions to reconcile that were still less than perfect. Recognizing the issues flushed out by the eCommerce pioneers, the ePayment Gateway goal was to solve those problems common to everyone. The shared service concept has achieved several objectives in its role as a facilitator:

- Reduced the cost of building revenue producing web applications, thus allowing more agencies to enter this arena.
- Provided a virtual terminal, so agencies can accept credit cards to manually process from any data source.
- Handled ACH debit transactions “in-house” and making them basically free to agency applications or the virtual terminal.
- Reduced labor necessary to account for and reconcile deposits at both agency and the state treasury levels.
- Improved reporting capabilities at both the agency and central level for problem solving, auditing, and analytical purposes to support marketing efforts.
- Consolidated transactions for maximum contract negotiation purposes.
- Separated web applications from the backend processes in order to be assured of the best price for transactions to and from the card processors.
- Placed the Commonwealth of Kentucky into position to purchase gateway software and become certified to clear processed transactions directly with the credit card networks if volume creates the business case.
- Introduced a centralized control structure for transaction processing and reconciliation.
- Reduced audit costs by providing system auditors with a standard process and set of data to reference outside individual agency web applications.
- Common API and backend services make the “Kentucky eCommerce Mall” an attractive alternative to building independent web applications. Agencies without application development capabilities can “rent space” in the mall for simple applications.

The success of these objectives places agencies in a position to invest in “repeatable solutions” that exploit opportunities to create capacity or reduce resource requirements.