

Online Document Vending on Campus

A White Paper

Abstract

Although many campuses have taken measures to control their network printing expenses, document output and the technology demands on campus are quickly evolving. Digital MFPs, changing card technologies, and one-card campus ID systems are tools which provide campuses with more control capabilities, but remain isolated from traditional pay-for-print applications.

This white paper describes the predominant issues related to traditional offline vending cards and equipment, the benefits of transitioning to Equitrac Express, an online document output management system, and the relative ease with which the transition occurs.

Introduction

This section provides a summary of document production on university and college campuses, and illustrates how the evolution of technology on campus is driving the need to better manage all output devices.

History of document vending in universities and colleges

The IT revolution

Prior to the advent of desktop computers, the most advanced technical equipment found in a university library was likely an analog photocopier with a large steel coin box strapped to its side. As desktop computers became more prevalent, schools began to dedicate space for computer labs, providing computer stations with access to a handful of dot matrix printers.

Technology on campus continues to develop at high speed, and in the current information age, IT services are compulsory on every campus. Students and faculty require 24-hour access to computers, internet, email and printing services. With the implementation of LANs and WANs, any network user can print to any available output device on the network. But at what cost?

The cost of document production

At one time, using coin boxes to enforce payment at an analog copier seemed an easy solution to an expensive problem. As technology progresses, digital copiers replaced the library copier, and high-speed, color-enabled digital multi-function printers (MFPs) replaced the dot matrix printers in the computer labs. Scattered across the campus in convenient locations, today's digital output devices provide an assortment of copy, scan, print and fax services.

Individual departments often purchase their own output devices, and charge for their use, which causes students to flood other departments where output devices are not controlled. In an effort to manage output, individual departments begin to source their own vending equipment; some coin-based, others card-based with offline control terminals to enforce payment of documents.

Students are often required to purchase multiple cards to use equipment in different locations on campus. The need for a unified system becomes clearly evident as demand for document output capability continues to increase, administration becomes increasingly difficult to manage, and expenses rise as the campus attempts to maintain an adequate level of service.

Stored-value card vending challenges

Management limitations with coin vending

While coin payments were once adequate for copiers, they are not practical for digital printing services. When a student submits a network print job, a third-party software application stops the job to wait for payment before forwarding the document to the output tray. If a student wants to release many print jobs at once, they must feed copious amounts of change into the coin box. Precise page costing to the penny is not possible because coin controllers cannot accept denominations less than a nickel. Additionally, staff time must be allocated to periodically empty each and every coin box.

In an attempt to overcome accounting challenges, some manufacturers designed units that provide printed audits of device activity, which reconciles the cash in the unit with the recorded activity. These units are normally not networked, operating locally only. However, collection and compilation of this data is time-consuming and error prone: to view or print audits, staff must connect to each individual device via serial cable to either view, print, or download the data to a laptop. The manual data collection, coupled with the manual compilation of the data for audit purposes requires significant time and effort, with no guarantee of accuracy.

Management limitations with offline card vending

To combat the challenges associated with coin box collections, some schools implemented payment card systems, allowing students to purchase a printing card that contains print credits. Funds are deducted from the card each time the student enters their card at a reader connected to an output device.

The initial challenge of charging for documents is met when output devices are equipped with offline card readers. However, this solution is incomplete, and many additional document output challenges continue to plague campuses.

While card reading devices prevent free access, there is no audit trail to determine who is using each machine, when the machine was used, and how the machine was used. Gathering data for analysis is cumbersome at best – often no useful data is retained by the readers – and must be done locally at each device. Individual or departmental use cannot be accurately measured, and there is very little pricing flexibility, so most users are being charged a standard rate, regardless of their status on campus. If some departments want to provide a number of free printed pages to their students every semester, there is no automatic or secure way to meet this need, and at best is offered through the use of multiple cards or “purses”. Additionally, these cards contain cash value and, for the most part, cannot be PIN protected. As a result, stolen or lost cards can be depleted by any user.

Aside from complex accounting issues, other problems lie in the management of the devices and their use. Which devices are the most heavily used? Are the fastest printers being used most efficiently? Are any of the devices repeatedly going offline? Traditional offline vending equipment simply cannot provide this information.

User printing behavior is perhaps the most difficult element to manage, and simple vending interfaces do not provide any tools to manage user behavior. Students are so accustomed to selecting the print command and retrieving their document, that they no longer think about the cost of this service. The output environment is so readily accessible that users have no motivation to seek out devices which are most suitable. Often, students may not be aware that it is more economical to print to a different device, or to select a duplex option. It is also very difficult to encourage users to create output during less congested time

periods. Students may choose to print during off hours if pricing adjustments for printing off-peak will cost less than during peak hours. Simple offline vending equipment cannot serve this need.

While offline equipment may address the single issue of preventing free access to printing and copying, it does not help to solve any of the administrative, support, and workflow issues with which most campuses still struggle.

Bringing campus document payments online

This section details the benefits to an online document vending implementation, like Equitrac Express, and highlights the technology that is essential in today's campus environment.

Tracking every user

The fundamental element of an online system is the user account. The use of an individual account for every user provides the greatest control and security. By ensuring every individual user has a single user account, the campus can build the foundation for a comprehensive audit trail.

To establish pricing and access control, an online system allows user account grouping and departmental permissions, easily overcoming the limitation of the offline system to identifying users and managing them accordingly.

There is often a perception that central account management is time-consuming and difficult, when, in fact, account management can be completely automated. Equitrac Express synchronizes with existing user databases, eliminating the need to manually create or modify user accounts. Through synchronization with an existing Active Directory or eDirectory (formerly NDS) database, user accounts will always be current with the native campus user database.

Managing each device

To accurately capture and measure the activity of all output devices, each device must be identifiable within the print management system. For environments that deploy hundreds of printers and MFPs, the system must provide tools to easily identify those devices and configure them as required. Logical sorting and grouping of devices will allow the Administrator to quickly locate devices and manage them accordingly.

Pricing and cost recovery

The ability to track usage data is a core element to device management, but support for cost structures, device rules and job routing are also necessary for efficient device deployment. Pricing must support page size and color use and also provide the flexibility to price other variables. Additional costs such as those for stapling, duplex, punching, paper tray, and media type should also be configurable.

Discounts and surcharges are also a requirement for many schools. To provide simple pricing modifications for certain groups of users, or for the use of devices during certain times of the day, discounts or surcharges should be flexible enough to ensure that user groups can be provided with very detailed pricing. Frequently a blanket discount is insufficient, because what the group actually requires is a no-charge or discounted charge for certain types of jobs, or job attributes. For example, Equitrac Express departmental price lists allow color output to be offered at a reduced rate to some department users, and at a premium to guest users.

In addition to configuring price lists for usage charges, the institution may also need to track its internal costs. The system may charge \$0.16 for two duplexed black-and-white pages created by a member of the Science department – but how much did that same job actually cost to produce? This cost will not only fluctuate per device, but also by the properties of the job. With the Dual Pricing capabilities in Equitrac Express, it is easy to track an internal cost along with the external charges. This will provide a more detailed cost analysis and allow for easy retrieval of revenue data.

Device status monitoring

The management of output devices is not limited to pricing jobs and recovering costs. The system must also provide the Administrator with the assurance that devices are running at full capacity and that output services are provided to users with as few interruptions as possible.

Offline systems are inherently unable to monitor output devices using SNMP; only an online server-based system can provide this capability. Equitrac Express monitors SNMP status changes and records this information to provide concrete information on the device's current status, whether it is offline, out of paper, out of toner, or any other change of state. The ability to track this information over time provides the ability to plan for preventative maintenance and proactively identify devices that require service.

Another important aspect to device status monitoring is the ability to identify when consumables are low. Equitrac Express recognizes in advance when consumables levels are low, then automatically notifies the appropriate staff. This allows the staff member to replace consumables before they are completely exhausted, reducing device downtime. These tools ensure that the output services are constant and dependable, and ultimately reduce administrative tasks.

Centralized System Management and Reporting

One of the primary benefits of moving to an online system is the central manageability of all aspects of the system, and the capacity to delegate specific administrative responsibilities. The capability to manage all users, devices and system settings from a central location greatly reduces the strain on the administrative function.

Managed distribution of system administration

Often, specific departments are required to manage their own members. Equitrac Express allows for distributed user management, providing account managers with simple tools that allow them to manage a specific group of user accounts. This distributed management policy provides departmental level control and further eliminates tasks for the global administrators of the system.

Data collection and reporting

As mentioned in the previous section, data collection with offline card readers is incomplete, cumbersome, and susceptible to error. By comparison, online collection of information related to documents, users, devices, and accounting data is instantaneous and the results are stored in an easily-accessible central database.

Equitrac Express provides reporting tools which allow administrators to generate activity, usage, or billing reports that can be distributed or exported to other accounting packages. Individual users have access to their own account statements to review recent account activity and check the current account balance.

Card Security

Value-on-card security risks

The stored-value card technology is relatively vulnerable to fraud because the system places inherent trust in the value that is read from the card without requiring additional verification from an online database.

Both smart card and magnetic stripe cards used with stored-value readers offer modest security and are susceptible to malicious users who may try to circumvent the payment system. For example, in March 2006, a large North American print and copy chain found itself in the headlines when a hardware security researcher demonstrated the ease of breaking the security in the chain's smart cards. The researcher simply purchased a card stored with the amount of \$1 and then hacked the card to modify the dollar amount and the serial number. With older-style magnetic stripe systems, simply duplicating valid cards provides hackers with an essentially unlimited source of funds.

On today's campuses, enterprising students could use this knowledge to run an underground venture in fraudulent card trade. Since the data collection from offline terminals takes time to collect and analyze, several semesters or even years may pass before the security hole in the system is discovered. And even once the fraud is discovered, there is typically no solution to the problem while the existing equipment and cards are in place.

Value-in-account security benefits

Using the central accounting server in Equitrac Express, all account information, including authentication, transactions and account balances is stored in the central database, and only authorized users can access these accounts. All account transactions stored in the database, including deposits and credits, include dates, times, amounts, and the credentials of the authorized user who adjusted the balance. This information provides a complete audit trail which can easily be pulled into a report.

Equitrac Express also provides the option to use a network card terminal. Users can continue to purchase their documents via a card system, but instead of storing a value on the card, the network card terminal reads only a user's credentials from the standard magnetic stripe on the card, authenticating the card against the user's credentials and balance in the accounting database. Duplicating a card would simply create a duplicate ID card that might access the funds in the same account – it does not duplicate the value in the account. And if the card is PIN protected, the account would not be accessible at all.

If a user loses their card, or suspects it has been stolen, a new card can be issued with new authentication credentials—rendering the original card useless. When the user reports the card missing, account activity can be reviewed to see if any recent transactions were made illegitimately, thereby allowing the account manager to make a precise account reimbursement, if necessary.

PIN protection

To further protect cards from misuse, users can be given an option to protect cards with PINs. When swiping the card at a network card terminal, the user may be prompted to enter their own PIN, which acts as a password to provide a second level of authentication. The PIN is not stored on the card. Instead, the PIN is associated with the user's profile in the accounting database. This additional protection will render the card useless if lost or stolen. The account holder can be issued a new card, to continue to use the funds in the account and will suffer no financial shortfall from the loss of the original card.

With Equitrac Express, user-based PIN management is also available to all account holders. If any account holder is concerned that their PIN has been compromised, using a web interface or the network terminal itself, account holders are able to securely login and change their PINs arbitrarily, without any administrative involvement.

Special considerations

Campus Card Systems

Online campus card systems are becoming more common on campuses everywhere. A campus card is a personal identification card used by students, staff and faculty. This single piece of identification offers the user access to facility and campus services, and links back to a single online account for which the user can pay for these services. Users swipe their card at online terminals located all across campus to pay for food, books, laundry services, parking, and other amenities.

Print management systems that work together with these campus card systems are able to provide an interface to the campus card accounting system, enabling real-time document payments straight from the campus card account.

Some systems are not advanced enough to handle payments for both prints and copies in the same manner. Most commonly, print release will be offered through a workstation-based application, requiring the use of a payment terminal for prints only, along with a dedicated workstation set up next to the MFP. To pay for copies, another terminal is attached to the copier itself.

To streamline both the process and the amount of equipment required, Equitrac Express provides a single access network card terminal at each MFP to be used for both copy and print payments. The card terminal, connected to the network and to the MFP, can communicate through the display, prompting the user through the release of their print jobs or through their request for copies. A single terminal (as opposed to a PC with keyboard, mouse and monitor and two card terminals), is less expensive, requires less maintenance, is easier to use, and provides a tidier, more professional environment.

Guests, visitors, and public patrons

It is often necessary to provide casual users with printing and copying privileges on campus. Alumni, visitors, or public users may be permitted access to output devices, and while each school has their own access policies, not all guest users will have unique network authentication. Some institutions perceive that online systems cannot accommodate users without network credentials; however, this is no longer the case.

Equitrac Express not only accommodates non-authenticated users, but also simplifies the management of these users and their output.

To administer a stored value card system, a large number of cards are normally set up identically, encoded with a set balance and then offered for sale at a service desk or from a self-serve card dispensing kiosk. The administration of Equitrac Express with account cards, can be administered in an identical fashion with very additional little administration, the only difference being that the user's balance is safely stored in an online account, rather than directly on the card.

Guest accounts

Guest users can be challenging to accommodate since most institutions do not wish to provide network authentication to casual users. Guest accounts do not

log into the network, and are essentially unknown to the system. Guests print from a public access workstation and pay for jobs with their payment card when releasing them at the MFP. Copier access is also open for any user with a payment card. When using an offline card system, guests can be offered the ability to purchase prints and copies, but their use is not accurately tracked, their output is not quantified, and their activity can not be automatically managed as a group.

Switching to Equitrac Express does not necessarily mean that guest users must authenticate against the database. Guest users can continue to use a card-based method for paying for documents, but through the use of online accounts.

Equitrac Express allows an Administrator to easily manage specific groups of users. A designated number of guest user accounts, with a standard balance value, may be preconfigured in the accounting database. An online system should also provide the ability to tag each account with a unique identification code. This code corresponds to the identification code on the card. When setting up a large site this task can be performed automatically, with an option to create hundreds or thousands of sequentially numbered accounts, assigned to a designated department or group.

When guest accounts are allocated to a single department, it is then easy to apply special permissions or rules to only that user group. Pricing, device access, and even color access can be restrictive or flexible to meet the needs of each specific group, without impacting any of the usage policies of the other user groups, such as students or faculty.

After the initial accounts are created, the only staff involvement is to make the cards available for purchase. No account management is necessary.

Card purchase

Once Equitrac Express user accounts have been created with corresponding card IDs, those cards can be purchased and used. Some smaller environments may wish to provide cards for purchase from a cashier or other staff member. For those opting for self-serve card dispensing units, stacks of cards are placed in the unit and dispensed for a pre-configured cash value. Depending on whether the guest accounts were created with an opening cash balance, the user may use the card immediately to make purchases, or may have to first load a cash balance into the account.

Account deposits

As with card purchase, loading accounts with funds can occur through either a cashier or through a self-serve kiosk with. Equitrac Express provides a simple Cashier software application for cash operators, allowing authorized operators to deposit funds into a user account through a cashier-style interface. Account holders present their account card to be swiped at the cashier workstation, identifying the account for adjustments.

Equitrac Express also interfaces with online deposit kiosks. A card swipe interface at the kiosk will allow the user to access their account, and then deposit a cash amount into the unit. The deposit transaction is then sent via TCP/IP to the user account. All deposit transactions are stored in the accounting database, and every transaction is recorded with the operator identification, kiosk name, date, time, and deposit amount. User account statements display the deposit information and all debit transactions. For reconciliation, Equitrac Express offers canned reports which allow you to analyze the activity at the kiosks versus those performed by cashier operators.

For schools that have already deployed a stored-value card system, the task of moving to an accounts-based system may seem daunting due to potential tens of

thousands of value cards in circulation, and the potential that discontinuation of those cards will cause great distress for students who have an existing balance on their value cards. Equitrac Express offers the means to easily transfer stored-value card balances to an online account. The Deposit Station software application, used in conjunction with an existing offline card reader, allows students to easily transfer any balance remaining on their value card into their new online account, ensuring that no student suffers any losses when transitioning to Equitrac Express.

Making copies

With Equitrac Express, guest users are able to access copying services, just as authenticated users do. There is no need to provide any network authentication. By swiping an account card at a network terminal attached to the copier, the user is authenticated against the accounting database. The copier is then activated for the user. If the user attempts to create copies which exceed their account balance, the copier will be instantly disabled by system controls, preventing that user from creating any additional documents until they deposit sufficient funds into their account.

Printing documents

Students or staff logging onto a workstation to print are authenticated users, so every job they create is tracked against their network or account ID. Guest users normally do not require network authentication, resulting in the need for the online system to prompt guest users to enter a unique identifier at a workstation prior to producing documents. With Equitrac Express, at the time the print request is made at the workstation, the guest is able to create a Release Key. A Release Key is any arbitrary identifier which they will be able to remember. The unique identifier ensures that all guest users will have all their jobs held in a secure queue, until they are ready to retrieve them at the printer, by entering that same Release Key at the release location.

By using a Release Key at the release location, guest users are able to view a list of only their own jobs and select those they wish to print. When the user releases the jobs to the printer, the debit transaction is posted to their account. If the user's balance is insufficient, they should receive an appropriate message through the release, and the jobs will not be released to the printer.

Advanced services and workflow enhancements

While the primary benefits of moving towards an online payment system may be comparable among many solution providers, the Equitrac Express solution stands out by offering much more advanced functionality, which is difficult to find collectively in any single solution.

Embedded Technologies

MFP manufacturers are designing smarter devices which provide more online capabilities and open architectures. Equitrac works closely with leading device manufacturers and are able to provide superior user authentication and secure release controls, directly from the MFP touch panel. When moving from a value card system to an online system, the requirements for control terminals at every device is greatly diminished, or completely eliminated. Using embedded technologies, users can be authenticated through the MFP panel and continue to use the panel to commence printing or copying and complete their job transactions. By reducing the reliance on additional proprietary equipment, the campus IT Administrator reduces the amount of equipment to purchase, the amount of resources needed to maintain the equipment, and increases the ROI of the entire print management system.

Follow-You printing™

The implementation of Follow-You printing in Equitrac Express adds both convenience and security to a printer deployment. Follow-You printing provides roaming capability, allowing any user to authenticate and retrieve documents at the output device of their choice. This added functionality is received favorably by users, who will be able to retrieve their documents at any device, regardless of the printer they originally targeted to print their documents. If a printer is busy or offline, the user can simply walk to the next device, and release the job there.

Send To printing

In this age of electronic documents and online collaboration, documents are distributed more often in digital form as opposed to hard copy. To make hard copy document distribution easier, the Send To printing utility in Equitrac Express enables one user to send a print job for pickup at the printer by another user, or group of users. Sent documents wait in a secure print queue until the recipient releases them at the printer. Using their ID card or user login, the user authenticates at the printer and is able to retrieve only the documents sent for his or her receipt.

In conjunction with Follow-You printing, Send To offers a secure and convenient method to distribute documents such as course materials or assignments. Additionally, the option for a sender to override or accept the document costs is provided, preventing recipients from incurring additional charges. This utility will spare instructors from having to print numerous copies of documents prior to class, and then taking class time to physically distribute documents. Overall, Send To provides improved services and reduced costs to students.

Advanced color management

The ability to enforce responsible color printing is a growing need, as color-enabled devices are implemented on campuses more frequently than ever before. Issues regarding access to color continue to grow, along with the expense of providing color output. Charging a premium for color pages is a step in the right direction, but it is only part of the total solution.

Some schools may provide all students with a 100 page allocation at the beginning of each month that must cover all black and white and color output. But how can an organization ensure that students don't abuse that allocation in color pages? Staff and faculty may require unrestricted access to color, and some students may have a necessity for color output as a result of their areas of study, while other students would seldom have any course-related color output requirements. Due to the different user groups across campus, flexible management tools are needed to continue providing fair document output policies.

Equitrac Express provides broad-reaching color controls, including not only separate pricing policies for color jobs, but should also preventing access to color at any device, and providing color print rules which can deny color access based on the size of print job, filename, or even the user of the job. In addition to these tools, separate color quota allocations that can be assigned individual users provide the ultimate color control. This allows account administrators to determine exactly how many color pages a user may produce in a given period of time. These precise management tools allow color-enabled devices to be deployed without the worry of excessive use or added expense.

Conclusion

Investments in software, hardware, and a campus-wide card deployment will quickly commit a school to their implemented solution, not only for financial reasons, but also for quality of service, and usability. While most schools have already taken measures to control their document output, careful consideration must be taken when implementing a new print management system, or upgrading an existing one.

More schools are relying on networks for centralized management of computing services, and with campus-wide print management becoming a growing requirement a networked solution is the most practical choice for the future.

Centralizing the management of users and devices with a networked print management system reduces and provides automation of many tasks, allowing administrative and IT staff to focus on other campus issues. Centralized data collection provides the most detailed and complete information, available on demand for reporting and analysis of output and costs.

The capability to protect the school and users from fraud is much greater with a networked system that provides not only greater security through user authentication and PIN protection, but also detailed audit trails which can be reviewed when malicious use is suspected.

As schools continue adopting one-card systems for identification, building access, and payment for goods and services, it's imperative to ensure the system you implement can grow with you across campus and utilize the cards and systems you have in place. Having an online solution allows for integration and future growth with other networked systems.

More schools are choosing a software providers like Equitrac, who with a mature history of providing network printing solutions, and a proven record of product advancement with emerging technologies in education.