

Mobile Ticketing—Choosing the Right Technology Platform is Critical to Your Program's Success.

Executive Summary

- A major trend in the evolution of ticketing is "mobile ticketing," where a bar-coded electronic ticket is sent to a buyer's mobile phone or PDA via short message service (SMS). That bar code is then scanned off of the device's display at the point of admission.
- Not all bar code symbologies or scanning technologies are equally suited for accurate and reliable readability in the mobile ticketing environment—specifically reading bar codes from an electronic display. This unique application presents challenges unlike those encountered when reading traditional printed bar codes and not all scanning technologies can meet these challenges.
- The combination of the right bar code and data collection technology will enable you to read the bar codes on today's preprinted and home-printed paper tickets, as well as give you the ability to read mobile tickets from electronic displays—protecting your investment for the future while improving customer service and maximizing your operation's efficiency.



Mobile Ticketing Evolution.

Ticketing has evolved from preprinted tickets, to tickets printed at a ticket window at the time of purchase, to Internet sales where customers print their own bar-coded tickets. The latter method is becoming increasingly popular, since it allows ticket buyers to avoid long lines and enables ticket sellers to eliminate printing and distribution costs—ultimately providing better service to their customers.

The next step in the evolution of ticketing will be to replace home-printed and preprinted paper tickets with an electronic ticket that can be sent to a mobile phone or PDA via short message service (SMS). This mobile ticket (m-ticket) consists of a bar code that can be quickly read and validated directly from the mobile device's display screen.

With entertainment venues, ticket suppliers and public transportation authorities facing fiercer competition every year, m-ticketing's ability to reduce costs, improve customer service and improve ticket validation efficiency will make it an increasingly attractive option for concerts, sporting events, movie theaters, theme parks, trains and other public transportation.

Addressing the Challenges of m-Ticketing.

Whatever method is used to create and distribute tickets, all of them need to be efficiently and reliably validated at the point of redemption to prevent fraud and slow-moving lines. Technology for reading paper bar codes is well established, but the advent of people printing their own tickets at home adds complexities because various papers, inks and printers result in bar codes of varying qualities. Reading bar codes from an electronic screen adds additional challenges due to variations in screen resolution, specular reflections coming from the displays, and backlighting. Mobile phones and PDA displays being brightest in the middle and dimmer at the edges is a specific challenge.

With these new and emerging variables, the choice of the right bar codes and the right bar code scanning technology is critical to developing a successful ticketing operation that will provide the best possible customer service plus reduce costs and fraud.



Choosing the Best Bar Code Symbology.

The type of bar code used is a major factor in the performance of the entire m-ticketing system. There are several symbologies you can choose from. Each has important attributes that need to be considered before being employed in an m-ticketing application. *Note that each bar code shown below contains the same amount of data and is shown in true size.*

Linear Bar Codes*

Linear bar codes are not ideal for m-ticketing applications for several



reasons. First, linear bar codes quickly grow large as you add data—considering the typically small display size of a mobile device, this severely limits the amount of information that can be included in the code. In addition, the start and stop areas of the bar code that indicate where the information is contained are located on the outer edges, leading to scanning problems since electronic displays are generally dimmer at the edges. Finally, the error correction of linear codes is far less than that of 2D codes, leading to greater potential for misreads or unreadable data.

PDF417*

Portable Data File 417 (PDF417) is a stacked linear bar code with built-in redundancy and error correction. The start and stop areas of this bar code are on the outer edges, as are the necessary white spaces surrounding the boundaries of the bar code—this can lead to potential problems when reading from digital displays because these are generally dimmer at the edges. In addition, the way PDF417 is built up makes it very difficult to display correctly on an electronic display.



Data Matrix*

Data Matrix is a 2D matrix symbology containing dark and light square data modules. It has a finder pattern of two solid lines and two alternating dark and light lines on its perimeter that indicates where the information in the bar code is located. This can make it difficult to decode on digital displays that are poorly illuminated at the edges. Data Matrix code needs a white space around the code to be able to read it.



QR Code*

QR (Quick Response) code provides high-speed, omnidirectional reading with error correction. But once again, the finder patterns are on the outer edges, which can lead to difficulties when reading from an electronic display. The QR code finder pattern also requires inefficient white space around the code before it can be read.



Aztec—Your Best Choice for All Mobile Ticketing Applications*

This high-density, two-dimensional symbology is built on a square grid with a bull's-eye pattern at its center. Scanning is orientation-independent and no white space is required beyond the boundaries. The finder pattern is in the middle and the most critical data can be placed near the middle—where display screens are brightest. Aztec code is then read layer by layer from the inside to the outside. That, plus sophisticated error correction, makes Aztec the best choice for m-ticketing. In addition, Aztec is an excellent choice for paper tickets because its built-in error correction also allows even wrinkled and stained tickets to be read.



*The dotted line surrounding the bar code represents the amount of white space required for readability of this bar code type.

Comparison of Bar Codes for m-Ticketing Applications

	Size vs. Data Capacity	Error Correction	Finder Pattern or Start/Stop Location	White Space Requirement
Linear	○	○	○	Yes
PDF417	○	◐	○	Yes
Data Matrix	◐	●	○	Yes
QR Code	◐	●	○	Yes
Aztec Code	●	●	●	No

Key: Best ● Good ◐ Poor ○

Choosing the Best Technology.

When deciding on a data collection technology for your ticketing operations, it's important to look for a solution that will allow you to be flexible and adapt to industry changes. Ten years ago, few imagined people would be using their mobile phones as tickets for admission to events and access to public transportation, but today it is approaching industry-standard levels in many parts of the world. The same is true of the bar codes used in ticketing applications—for many years, linear bar codes have sufficed, but as ticketing applications evolve, 2D bar codes are becoming the preferred type. As an example, Europe's International Union of Railways (UIC) has worked out a standard for home printed train tickets called IRTHP (International Rail Tickets for Home Printing). In this standard, special attention is focused on the usage of 2D Aztec coding.


Traditional laser bar code scanners are only able to read linear bar codes, so you're immediately limited to one type of symbology in your ticketing operations. Linear bar codes are not ideal for use on mobile phone displays because of the amount of space required for the code. In addition, laser scanners cannot read from the self-illuminated displays found on PDAs and mobile phones, making them unsuitable for mobile ticketing applications.

2D imagers provide a level of flexibility beyond that of any other bar code scanning technology because they allow you to read any linear or 2D bar code. Therefore, regardless of what bar code symbologies your ticketing process uses today, 2D imaging will work and enable you to adapt to changes in the future. In addition, 2D imaging technology lets you use one solution in mixed bar code environments—if your paper tickets utilize one type of bar code while your m-tickets use another, you can still rely on one solution for all of your needs.

There are also several other benefits to deploying 2D imaging-based solutions for m-ticketing applications:

- The ability to read bar codes in low-light conditions makes them ideal for reading from dim displays.
- Aggressive reading through advanced decoding algorithms provides fast performance.
- High tolerance to hand motion makes 2D imagers easy to use in high-traffic, scan-intensive environments.
- Unlike fragile laser scanners, Adaptus 2D imagers are 100 percent solid-state with no internal moving parts, providing unmatched durability.

Because of these attributes, solutions based on 2D imaging technology are easier to use and provide better performance in challenging real-world mobile ticketing applications.



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When Calculating Cost, Consider the Big Picture.

While reliable scanner performance in difficult environments is critical, there are other factors to consider when evaluating mobile ticketing solutions: How difficult is it to integrate into my existing IT environment? Will my investment be protected against obsolescence? Is it cost-effective?

With these questions in mind, it's important to choose a technology platform that enables you to adapt as your business requirements change. 2D imaging technology provides you with the functionality to handle all of your ticketing applications today and prepares you for emerging applications—like m-ticketing—with no requirement for new hardware. That protects your investment and provides you with a low total cost of ownership. In addition, as imaging-based solutions become the industry standard for data collection, their cost is now equal to traditional laser-based solutions—a technology that doesn't afford you the flexibility and functionality you'll get with a 2D imaging solution.

Cut Costs, Maximize Efficiency, Keep Customers Happy—and Make the Right Technology Investment.

M-ticketing is bringing new opportunities to reduce expenses, increase operating efficiencies, prevent fraud and set yourself apart from the competition. However, m-ticketing also brings the challenge of finding a system that meets your needs today while cost-effectively adapting when technology and transaction modes inevitably shift. The choices you make now—of bar code symbologies, scanner technology and the supplier that brings it all together as a true solution—can have a significant impact on your operation's future.

Hand Held Products has been developing and deploying image-based technology into real-world applications for more than 30 years. This experience has culminated in our fifth generation of imaging innovation—Adaptus™ Imaging Technology 5.0. The inherent flexibility of Adaptus Imaging 5.0 means your investment will be protected for years to come. You'll be able to easily read virtually all linear and 2D bar code symbologies—even damaged and specialty codes—from paper tickets and a wide range of displays. In addition, this technology enables digital image capture, opening the door for a host of other unique and innovative applications including electronic signature capture and more—all with one device. Adaptus Imaging 5.0 is available in a host of equipment solutions (mobile computers, handheld imagers, image kiosks, etc.) suitable for the m-ticketing market, built by various select manufacturers. By choosing Adaptus Imaging 5.0, you can be confident that you're investing in a solution that will evolve with your changing needs.

For more information on m-ticketing, check out the following websites:

m-ticketing.com
mobileticketing.com



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