



White
Paper

**T H E P R I C E O F P R O G R E S S :
A S S E S S I N G T H E N E E D F O R A
M O B I L E C O M P U T I N G M I G R A T I O N**

Birds fly south every winter because instinct tells them their biological systems can't withstand changing weather conditions. For birds, the choice is simple: migration or extinction. The migration decision for enterprise mobile computer owners is not so clear. The benefits to migrating to new mobile computing technology and risks from maintaining aging systems are sometimes hard to measure. Eventually there is an end of life for every enterprise mobile computer. Planning is the difference between a successful migration and being left out in the cold. This white paper will help you prepare for a mobile computing migration by:

- Discussing performance issues and hidden costs you may be experiencing today that suggest mobile computing equipment is nearing the end of its useful life;
- Explaining factors to consider when deciding whether or not to upgrade;
- Highlighting the combination of features in current and next-generation mobile computers that will enhance productivity and provide total cost of ownership (TCO) benefits, all with the best investment protection;
- Providing guidelines for managing a successful migration that safeguard against selecting next-generation equipment that will become prematurely obsolete.

Signs of age and what it costs

Equipment should not be considered obsolete just because new mobile computers and networks are faster. Obsolescence is somewhat subjective, because devices rarely stop working never to be rebooted again, but usually face a gradual degradation of performance over time. Because performance changes may be imperceptible to users and system administrators, the need for an upgrade can be obscured. However, slight drop-offs can be very costly, especially when multiplied over dozens of users performing thousands of daily transactions.

Another sign of aging equipment is the degradation of battery performance over time, especially in mobile devices with older battery technology. Aging batteries may take longer to fully recharge, provide less illumination for the computer screen, perform fewer bar code scans or wireless transmissions per charge, or generally run applications slower. Of course, recharging the battery during a shift or replacing the battery more often can overcome these shortcomings. But these simple fixes hide a larger problem. Forcing workers to take time during a shift to recharge batteries, or to pick up fresh spares from a central location within a distribution center or factory, reduces productivity. Repeatedly swapping out old batteries for fresh ones, also adds the expense of purchasing and maintaining a separate set of batteries. Users usually only consider the operating cost of batteries if they suffer the most severe result of battery failure – loss of data that requires items to be reprocessed – and fail to realize the mounting, ongoing expenses that consistent poor performance creates.

Small slowdowns in overall performance also can measurably reduce productivity when they are multiplied across the entire mobile workforce. Many mobile applications were originally implemented to automate repetitive tasks. Seconds count in high-volume operations. By saving a few seconds recording each transaction, businesses create value by producing significant time and labor savings that lower their overall cost structure. When operators spend extra seconds re-scanning bar codes that fail to read, or waiting for the mobile computer to process application data and display the appropriate prompt, many of the time- and labor-saving productivity benefits of automation are lost.

Older computers are especially prone to these delays when applications are modified. If new lines of code or customer records strain the mobile computer's memory, processing time and responsiveness will suffer. In addition, many older mobile computers feature proprietary operating systems, which may require scarce and expensive programming skills to maintain and modify applications.

Few managers are happily and productively working on seven-year-old laptops, and fewer still would expect to get three more years from the devices. But many managers have consigned their warehouse, factory and route workers to use the same handheld computers for that long. Squeezing extra years from the mobile computers may make the return on the original investment sparkle, but the resulting productivity losses and increased TCO remove some of the luster.

To Mitigate or Migrate

When users begin to experience the effects of aging equipment, or undergo a noticeable increase in equipment repairs or replacement, they must begin planning changes to how their mobile systems will be managed. The choice is to plan a migration to next-generation equipment, or commit more budget and support time to maintain the current devices. Legacy systems can be kept functional many years if users are willing to make a significant commitment to ensure that service, spare parts, devices and programming knowledge will be available. Many companies are still using 900 MHz wireless LAN technology that predates the 802.11 standard series as well as industrial mobile computers running DOS or a proprietary operating system. But these companies face a trade off, as these systems are extremely difficult to expand or replicate in new facilities, which could limit future growth. Businesses with aging mobile equipment, who face potential changes in their business processes and applications, or the location or number of their facilities, must give serious consideration to a technology migration.

Another thing to consider is how to measure the cost and benefit of a technology upgrade. It's not easy, as new systems often cannot be readily compared to the ones they are replacing. Of course, next-generation systems will generally perform faster and more reliably than their predecessors, but direct comparisons do not tell the whole story because new functionality can deliver unanticipated benefits for which there may not have been any prior metrics.

For example, current generation mobile computers and wireless LANs have the processing power and bandwidth to support Voice over Internet Protocol (VoIP) telephony. Retail associates could use such a device for their regular inventory management responsibilities, and use the voice communications capabilities to take calls from managers, or even call other stores to help customers locate a specific piece of merchandise. While, the dollar savings from the elimination of pagers or in-store cell phones can be measured fairly accurately, the benefits from improved customer satisfaction can be more challenging to quantify.

This is not to imply that it is difficult to measure the benefits of all recent features of newer mobile computing devices. Using a lightweight, integrated Bluetooth™ radio to manage communications with printers and other peripheral devices improves ergonomics and eliminates a common failure point in mobile applications: the cable connectors that plug into the computer and peripheral. Savings from cable replacement costs and productivity slowdowns are easy to measure and can more than offset the price of the Bluetooth radio. Additionally, the Bluetooth radio can also be used to communicate with other peripheral and remote devices without taking up an interface port on the mobile computer.

By integrating an imager directly into the mobile computer, bar code scanning, signature capture and digital imaging tasks can all be handled without the added expense of a peripheral scanner. Digital imaging capability is especially important to delivery and field service companies as they can use a single wireless device to scan bar codes, record the customer signature and take a picture for proof of delivery, providing real-time documentation that never has to be read by a clerk and entered into the computer system.

Making the Right Choices

A choice of new mobile computing hardware can often have a significant impact on existing software applications and business processes. Perhaps the disruption of a complete overhaul of software and hardware, along with the associated business processes, is more change than a business can bear. Having the prerogative to phase in change on the timetable of your business versus the "rip and replace" timetable of technology is difficult to achieve. Look for new computers that support terminal emulation so that you can fully leverage your existing legacy software applications and migrate them to the new platform according to your own timetable. Some computers feature powerful mobile Windows operating systems and also support terminal emulation, which provides backwards and forwards compatibility with legacy applications and

future mobile computing advances. The PocketPC and Windows CE .NET operating systems give users access to an unparalleled developer community, a familiar programming environment for supporting and developing their own applications, a migration path to deploy mobile versions of enterprise systems, and the ability to remotely access Web services, whose role and importance in enterprise IT architectures is predicted to grow significantly. Mobile Linux and Java computers may lack the drivers necessary to use bar code readers, mobile printers and other peripherals with the device.

Larger screen sizes, with optional color, found on newer mobile computers improve productivity by minimizing time-consuming scrolling and reducing user training time.

Because the standards for both wireless data throughput and security protocols are continually evolving, users should select devices that can be conveniently enhanced and upgraded with the latest technology, and won't become obsolete when networks with faster data rates or different security options become available. For example, 802.11b is the dominant wireless network standard in use today. It uses the 2.4GHz frequency band and provides data communications speed up to 11 megabits per second (Mbps). A more recent standard, 802.11g, is backward-compatible with 802.11b equipment but offers 54Mbps throughput. By selecting mobile computers that support 802.11g, users could leverage investments in their 802.11b access points and prepare themselves for five times faster throughput when the AP infrastructure is eventually replaced.

Similar changes in wireless security protocols and standards make it very wise to select equipment that complies with 802.11 standards. Standards-based security protocols add protection while ensuring that the user's equipment will remain functional and interoperable. By using 802.11-standard wireless technology, users can take also advantage of the many standards and third-party security products that are available. 802.11-based equipment also has unmatched support in commercial network management tools and other products that simplify wireless network deployment and maintenance.

While calculating return on investment may be challenging, there is no dispute that the improved functionality of newer mobile computing devices create opportunities to develop new business processes that can significantly improve productivity, efficiency and customer service.

Plan to Succeed

To fully benefit from these advanced capabilities, users need to plan new business processes to take advantage of them. That is one of the most significant steps in the technology migration process. Here are other tips and points to consider when planning a technology migration:

- Project the end-of-life time frame for legacy systems.
- Thoroughly review business processes, especially time- or labor-intensive bottlenecks. Investigate if these operations could be improved with features from new devices, such as automatically generating invoices on site with a mobile computer and printer; recording fixed assets with RFID to overcome orientation or reading difficulties; etc. Potential time savings or asset utilization improvements can be included in the ROI calculation
- Do not plan tomorrow's system to meet today's needs. Analyze potential changes to the business, including the number of facilities, amount of workers, types of transactions to be processed, new customer demands and new services offerings. This analysis will provide guidance on the functionality, processing power, memory and network bandwidth the new system will need to provide.
- Try to take advantage of standards to help future-proof your next investment.
- Determine how changes in mobile operations will impact workflow at the central facility. Manual data entry requirements may be eliminated. Warehouse shifts may be eliminated or work hours shifted if data for the next-day's orders is transmitted in real time.
- Seek devices with expandable memory so applications can be expanded or additional data can be carried in the device in the future.
- Look for devices that allow you to make changes to your system on your timetable.

- Ensure that the use of one radio technology in a device does not preclude the use of others. Dual-mode applications currently exist and will become more commonplace as local- and wide-area network coverage expands.
- Similarly, RFID will increasingly complement bar code in distribution and other applications. Even if RFID is not in your immediate plans, check to see if reading capability can easily be added to your next mobile computing device.
- Align the mobile device with your enterprise IT architecture and strategy. This can be accomplished by choosing an operating system that provides consistency across mobile and desktop platforms, choosing a mobile computer supported by software that allows data to be exchanged with ERP and database applications without extensive custom programming, and selecting networking equipment that is compatible with enterprise security and device management techniques.
- Don't skimp on testing and training with the user population. The volume and tone of the beep that indicates a good bar code read or placement of keys and scanning buttons all significantly impact productivity. Potential problems can only be uncovered through testing.
- If you simply don't have the staff to adequately plan and implement a new project while maintaining existing operations, engage the mobile device vendor's professional services team.
- There is a difference between leading-edge technology and bleeding-edge technology. Look for devices that have proven their ability to perform in your industry and usage conditions and that are compatible with a wide range of peripherals.
- It is important to select a vendor with an established reputation, who supports open standards and who services their own products.
- More comprehensive information about planning a mobile computing deployment is presented in the Intermec white paper: [Eight Steps to Going Mobile](#).

Birds return to their native environment to nest and grow. Enterprise mobile computing users can also thrive for years in their own environment by planning their own migration and carefully selecting the equipment to make it successful.

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