



Windows Embedded Customer Solution Case Study



Overview

Country or Region: United States
Industry: Manufacturing, Electronics

Customer Profile

Hayton Systems provides high-quality data collection and asset management applications to industrial sector companies.

Business Situation

Systems integrator Hayton Systems was tapped by a national telecom operator to deliver 2D barcode data collection devices for tracking assets. The handhelds had to be rugged, powerful, and easy to manage.

Solution

Hand Held Products' Dolphin 7600 Mobile Computer, powered by Windows Embedded CE, provided Hayton Systems with an industrial-strength platform for developing multi-threaded, real-time applications.

Benefits

- Snappy user interface experience
- Faster and easier application development
- Long battery life for uninterrupted full-shift use
- Remote control and management
- Familiar user interface

Integrator Replaces Palm OS with Windows Embedded for Mobile Data Collection Device

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[Bruce R. Hayton, President, Hayton Systems](#)

Hayton Systems needed to replace a Palm OS-powered data collection device for a Dow 30 communications services provider that wanted to switch from 1D to 2D barcodes for tracking assets. In addition to being highly responsive, the handheld terminal had to have a familiar GUI, the ability to connect with local or remote PCs for control and troubleshooting, and a standardized application development environment. Hand Held Products provided a solution with the Dolphin® 7600 Mobile Computer powered by Windows Embedded CE 5.0. Using familiar Microsoft Visual Studio tools, Hayton quickly developed custom asset management applications for its customer. Multi-threaded OS performance helped speed up the user experience by allowing for background processing of real-time database lookups. The communications company has taken delivery of 1200 Dolphin 7600 units and anticipates placing orders for thousands more over the next five years.





Dolphin 7600 Mobile Computer

Situation

One of the largest communications services providers in the United States is currently migrating from 1D to 2D barcode labels on their equipment for more effective asset management. Key benefits of 2D barcodes include smaller label size requirements and increased data capacity, and these advantages are already resulting in immediately recognized productivity gains within specific end-user vertical segments such as telecommunications, transportation and logistics, retail, and healthcare.

In 2006, the communications services provider and Hayton Systems (Hayton), a leading provider of data collection and asset management applications to the industrial sector, agreed that it was time to migrate to a more powerful handheld platform. Hayton has provided data collection systems and other IT services to this client since 1991. The integrator developed their third generation turnkey data collection solution—a handheld terminal running customized asset management applications. The new device would replace 1D barcode readers running the Palm operating system.

For communications service providers, unique barcode labels are critical for tracking fixed assets like switches, network interface cards, battery banks, and computers. Because physical space is often restricted in central office facilities, this equipment is typically located in hard-to-reach racks. Additionally, network interface cards have very limited available surface area, and identification labels are often placed on card edges. 2D barcodes, which are easier to read from any angle, allow more manufacturer information and other data to fit into a smaller space, enabling easier tracking, diagnostics, and repair.

To satisfy its customer's requirements, Hayton needed a rugged data collection

hardware platform with integrated 2D image scanning technology and multi-threaded, real-time operating system to deliver the horsepower to provide instantaneous reading of complex 2D barcodes.

Bruce R. Hayton, President of Hayton Systems, recalls some of the other system requirements, "Our client wanted a way to troubleshoot and control the handheld terminal from a local or remote PC over the network. The device also needed to synchronize with back-end servers and perform real-time database lookups. To minimize the learning curve for workers, it had to have a large color display with a familiar user interface."

He continues: "Shifting perspective, as the systems integrators and application developers on this project, our firm was looking for a highly productive development environment with well-supported modern tools, as well as access to third-party tools for functions like database management. We also wanted the device to be long-lasting to maximize the investments of both ourselves and our client."

Solution

After a thorough evaluation of available solutions, Hayton selected the Dolphin 7600 Mobile Computer from Hand Held Products, a leader in the design and manufacture of image-based data collection solutions. The most compact mobile computer offered by Hand Held Products, the Dolphin 7600 runs on the Microsoft Windows Embedded CE operating system.

According to Paul Weslake, Product Manager for the Dolphin 7600 at Hand Held Products, development of the Dolphin 7600 was a collaborative effort that included two Windows Embedded Partners: "We sourced the hardware from an Original Design Manufacturer (ODM). The ODM fabricated the

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Duane Sessions, Lead Programmer, Hayton Systems

device to our exact design specifications, including the contoured, narrow body with an integrated finger saddle and angled image engine for comfortable one-handed use. For post-development testing, we utilized the engineering services of BSQUARE. Having an independent testing service gave us a huge amount of confidence that the product will operate flawlessly under virtually any circumstance.”

Hand Held Products was responsible for customizing the Windows Embedded CE kernel; integrating the operating system with the hardware platform; building a Software Development Kit (SDK) with device specific Application Programming Interfaces (APIs); and developing a standard set of “ready-to-go” utilities, tools, and applications.

“Our choice of Windows Embedded CE was driven by the need for a real-time operating system with a large set of optional kernel components,” says Weslake. “The flexibility of the OS enabled us to select what components we included, versus what we were able to leave out to enhance the performance of our solution’s key functionalities. As a result, we were able to optimize the size of the OS footprint, and customers could lock down the system to prevent tampering by end users.”

“The Windows Embedded tools gave us an integrated development environment that definitely compressed our time to market,” he notes. “Having command line access to Platform Builder and other tools, for instance, allowed us to automate kernel builds and testing, which not only boosted the productivity of our development team, but also improved product quality.”

The availability of third-party drivers and network adapters was also important to shortening the product development cycle. Weslake reports that they leveraged pre-

tested Windows Embedded CE drivers for 801.11b/g WiFi, Bluetooth, USB, IrDA and serial, and SD/MMC flash memory cards used for mass storage. “These mobile computers need to operate in an enterprise environment where customers expect lots of connectivity and wireless networking options,” explains Weslake. “With so many available drivers and adapters to choose from Windows offers an easily extensible platform. Other operating systems would have given us far fewer options.”

Microsoft technical support played a critical role during one phase of the development. A third-party software program and Windows Zero Configuration (WZC) were having a conflict over a network adapter. The development team hit a significant roadblock and was unable to solve the problem. Valuable resources were being wasted on it. “We communicated the problem to our Microsoft Technical Account Manager, and he gave us access to portions of source code that allowed us to build a workaround in less than 30 minutes,” notes Weslake. “We were very impressed with how open and responsive they were to us.”

The Dolphin 7600 Mobile Computer combines the data collection and communication attributes of an industrial-grade portable data terminal with the compact, lightweight design of a PDA. Featuring Adaptus® Imaging Technology 5.0 for reading linear and 2D barcodes, and wireless LAN and PAN communication, the 7600 gives users the ability to collect, manage, and communicate data effectively and efficiently. Advanced power management ensures that the device is up and running for the entire duration of a work shift. A vibrant color touch-screen display and the intuitive, familiar Microsoft® Windows interface enhance worker productivity and reduce operator training.

“The available hardware, all running on Windows Embedded CE, gives us confidence our hard work will be long lasting as new options appear on the horizon.”

Geoff Shepherd, Chief Software Architect,
Hayton Systems

Benefits

The Windows Embedded CE OS delivered several important benefits to Hayton Systems and its telecom customer, including:

Faster, Easier Development of Powerful Applications

The Dolphin 7600 includes a robust development environment, featuring an SDK for C/C++, C#, and Visual Basic developers for Windows Embedded CE. This enables developers to use Visual Studio 2005 Professional Edition to build high-performance, multi-tier applications for the Dolphin 7600. “Compared with the Palm operating systems, we found that Windows offers a much more comprehensive and high productivity professional development environment,” says Hayton. “This allowed my team to build sophisticated asset management applications for our customer very quickly and at a lower cost in terms of man hours.”

He continues: “The processing horsepower, storage, and connectivity options of these new Windows Embedded CE devices opens many doors to powerful real-time database lookups, live data backup, and much faster synchronization to the back end servers.”

Satisfies Real-time Performance Requirements

Windows Embedded CE is a hard real-time operating system that satisfies RTOS requirements. For Hayton’s telecom customer, this means faster performance in the hands of workers. “When an end user pushes the button to scan a barcode, they expect an instantaneous response,” explains Weslake. “But processing the digital image captured by a 2D imager requires complex algorithms and significant CPU utilization. CE delivers the real-time response times that our application requires.”

“Having access to threads has been a real eye-opener,” adds Geoff Shepherd, Hayton’s Chief Software Architect. “We’re now able to push some of the database updates into a background process so users don’t have to wait. This enables a much snappier interface experience.”

Remote Management and Control

The Dolphin 7600 Mobile Computer can be directly controlled from a local or remote Windows personal computer thanks to ActiveSync RAPI API. “Our client wanted to troubleshoot and control the handheld terminal from a local or remote PC over the network,” says Shepherd. “Windows Embedded CE enabled this for us, and it is a big win for our client’s help desks.”

Short Learning Curve

Getting workers up to speed on a new device takes time and costs money. Having a familiar, friendly user interface helps pave the way to higher worker productivity. “I think the Windows XP-style desktop metaphor is a stronger one for our users,” says Duane Sessions, Hayton’s lead programmer on this project. “They are familiar with Windows and immediately feel right at home with the Start menu and other user interface elements.”

Full-Shift Power Management

The Dolphin 7600 powers an entire work shift of use, delivering uninterrupted data processing for enhanced worker productivity and reduced battery replacement costs. To achieve a high level of power efficiency, Hand Held Products leveraged the Windows Embedded CE power management framework, which enables features like suspend mode, CPU power off, and the ability to put selective components into sleep mode.

“Windows Embedded CE gave us a strong framework for developing power-efficient applications,” says Weslake. “In fact, battery life is a major competitive advantage for this

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For more information about Hand Held Products, Inc. products and services, call +1 (800) 582-4263 or visit the Web site at: www.handheld.com

For more information about BSQUARE Corp. products and services, call (888) 820-4500 or visit the Web site at: www.bsquare.com

For more information about Hayton Systems, Inc. products and services, call (888) 270-3582 or visit the Web site at: www.haytonsystems.com

product over other mobile data collection devices. Our customers have found that it has a significant and financially recognizable impact on productivity and operational expenses when you can prevent someone from having to stop what they're doing to go change batteries."

Long Life Expectancy

With large investments required to bring an embedded device to market, OEMs and systems integrators want to make sure that their products have long lifecycles. Windows Embedded provides the assurance of a 10-year Product Support Lifecycle and lifetime IP indemnification for device manufacturers.

Additionally, industry-wide support for Windows technology means that a Windows platform will keep up with a changing technology landscape. "The available hardware, all running on Windows Embedded CE, gives us confidence our hard work will be long lasting as new options appear on the horizon," concludes Shepherd.

Windows Embedded

The Windows Embedded family of products helps you turn your vision and ingenuity into superior business results. Windows Embedded consists of Windows Embedded CE, Windows XP Embedded and Windows Embedded for Point of Service. These operating system technologies combine with the best set of tools and support to provide you the control to build what you want, accelerated time to market, and industry-leading support.

For more information about Windows Embedded, please visit: www.microsoft.com/windowseembedded

Software and Services

- Windows Embedded CE
- Platform Builder for Windows CE
- CE Test Kit
- Embedded Visual C++

Hardware

- Samsung 2440 400-MHz CPU
- 2.8 in. ¼ VGA TFT Color Display
- 64/128 MB RAM

Partners

- Windows Embedded CE
- Taiwanese ODM
- BSQUARE Corporation