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# Engineers' Guide to Windows Embedded 2012

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# Welcome to the 2012 Engineers' Guide to Windows Embedded

Embedded devices are no longer islands of technology. In many cases, they are edge devices into the enterprise, and connectivity, user interface and application availability are becoming increasingly important. As the profile of the operating system has increased, so has with the number of choices available to developers. The Microsoft family of Windows Embedded OSes alone spans device classes from deeply embedded, resource-constrained applications to dedicated-function equipment that blurs the line with servers or desktops. With Windows, OEMS gain the advantage of an OS, run-time platform and tools that they're familiar with, and ready availability of experienced programmers.

In this issue of the Engineers' Guide to Windows Embedded, we bring you a full range of articles and product information to support your strategic OS decision. In "The Push to Intelligent Systems," Microsoft's Mukund Ghangurde, director of product management for the Windows Embedded product line, shares the company's vision of the newly defined 'intelligent systems' market that IDC research expects will double to nearly 4 billion units and over \$2 trillion in revenue by 2015.

We look at details of recent major OS releases, including Windows 8 in "Windows Reimagined" and "Windows Phone 7.5 (Mango)," and ICOP's Samuel Phung provides a tutorial of "Windows Embedded Compact 7 Advantages" to help developers create a new generation of smart, connected and service-oriented embedded devices.

In "Windows Embedded Offers Options at All Levels," Avnet Technology Solutions' Director of Microsoft solutions Steve Gereb discusses the opportunities available to embedded developers, from small handheld devices to large digital signage solutions. Speaking of which, Don Pierson of Flypaper Studio addresses this hot market directly in "What Windows 8 Means for the Future of Digital Signage (And Why That's Significant for Everyone)." Other articles address touch user-interface adoption and porting iOS applications to the Windows Phone platform.

And that's not all. Datasheets, white papers, event listings and more give you a comprehensive look at Windows Embedded resources to keep you moving in the right direction. Questions, comments, or insight? Send them to me at [info@extensionmedia.com](mailto:info@extensionmedia.com). I'd love to hear from you.



## Cheryl Berglund Coupé

Editor

P.S. To subscribe to our series of Engineers' Guides for embedded developers and engineers, visit:

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# Contents

## The Push to Intelligent Systems

*by Cheryl Coupé*..... 4

## Windows Embedded Offers Options at All Levels

*by Cheryl Coupé*..... 7

## Windows Embedded Compact 7 Advantages

*by Samuel Phung, ICOP Technology, Inc.* ..... 9

## Windows 8 Accelerates Touch User Interface Adoption

*by Robert Frizzell, Atmel Corporation*..... 12

## What Windows 8 Means for the Future of Digital Signage

*by Don Pierson, Flypaper Studio*..... 13

## Windows Reimagined

*by Linda Barney*..... 15

## Windows Phone 7.5 (Mango)

*by Linda Barney*..... 17

## Products and Services

### Hardware Products

---

#### CPU Boards

##### EMAC, Inc

PPC-E7+ ..... 21

##### Logic Supply

Extreme Environment PT110 Atom Fanless Barebone..... 22

#### AD INDEX

<i>Beckhoff Automation</i> .....	3
<i>CES</i> .....	<i>Inside Back Cover</i>
<i>ICOP Technology Inc</i> .....	<i>Inside Front Cover, 5, 20, Back Cover</i>

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# The Push to Intelligent Systems

## Microsoft's New Vision of the Embedded Market

by Cheryl Coupé

Microsoft has shared its vision of what it is now calling the 'intelligent systems' market – an evolution of what was historically described as the embedded market. Monikers aside, dramatic evolutions in network connectivity and data accessibility have certainly led to some fundamental changes in embedded/intelligent systems. Recent IDC research backs up this trend, identifying a rapidly developing market of over 1.8 billion units and over \$1 trillion in revenue today. Looking ahead, IDC expects the intelligent systems market will double by 2015 to nearly 4 billion units and over \$2 trillion in revenue.

By any name, those numbers smell pretty sweet.

IDC's definition of intelligent systems "centers on the integration of higher plane hardware and software technologies that allow for user reconfiguration, enable autonomous operation, and extend the usage model of the system," according to the IDC Market Analysis Report "Intelligent Systems – The Next Big Opportunity." Key attributes of these systems include a microprocessor or system-on-chip (SoC) core that supports at least a 32-bit architecture, support for one or more operating systems capable of executing native or cloud-based applications, and wired or wireless connectivity to a network and other systems.

Mukund Ghangurde, director of product management for the Windows Embedded product line at Microsoft – including Windows Embedded Automotive, Windows Embedded Standard 7 and Windows Embedded CE – gave EE Catalog an in-depth look at what all that means.

**EE Catalog:** Where do you expect to see some of the most exciting developments in meeting the goal of "Windows everywhere"?



**Mukund Ghangurde, Microsoft:** We see a major transformation underway in the industry – a transformation that is changing the way software and data are consumed and delivered. The rising demand for computing power to extend beyond desktops and servers, connectivity and the implementation of dynamic user experiences have fundamentally transformed the way embedded devices are built, the way we use them and the value they provide across our work and our personal lives.

We continued to be encouraged by the tremendous growth in the market. IDC reported earlier that unit shipments of IP-connected embedded systems (excluding mobile phones

and PCs) will grow from approximately 1.4 billion in 2010 to over 3.3 billion in 2015.

**EE Catalog:** What are new developments in user interfaces – including gesture – for Windows Embedded applications?

We have seen a shift emphasizing customizable, dynamic and intuitive user interfaces. Windows Embedded delivers the power and familiarity of Windows through endless possibilities with innovative Microsoft technologies that help OEMs build differentiated devices and embedded scenarios with compelling user experiences. For example, Windows Embedded Automotive 7 promotes an interactive user experience employing speech commands and touch input. Since Windows Embedded provides flexibility through a wide range of advanced features, developers can create integrated user experiences that leverage attractive multi-gesture touch interfaces and sensor-detected inputs.

Additionally, the specific features of Windows Embedded products are offering rich immersive user experiences. Windows Embedded Standard 7 supports 64-bit CPUs, Windows Aero user interface, Windows Presentation Foundation, Windows Touch (multi-gesture touch interfaces and context aware applications) and Windows Flip 3D navigation.

As the next-generation real-time Windows Embedded platform, Windows Embedded Compact 7 enables OEMs to deliver specialized devices that are easier to use in an enterprise environment, to quickly create attractive, intuitive user experiences and streamlined connectivity.

Another advancement comes in Silverlight for Windows Embedded, a development framework and native Windows Embedded Compact 7 runtime for quickly creating intuitive and attractive device and application user interfaces. With Silverlight for Windows Embedded, device developers can separate the user interface design from the development of core device or application functionality, accelerating device development by reducing application development time, allowing for simplified UI customization, and empowering designers and developers to focus on their core competencies. For end users, this translates into intuitive, attractive user experiences on the device.

**EE Catalog:** What are the advantages for developers of vertical-market versions of Windows Embedded operating systems such as point-of-service (POS) and automotive? Are other vertical versions – such as industrial or medical – on the horizon?





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**Ghangurde, Microsoft:** The main advantage of Windows Embedded vertical-market products (Windows Embedded Automotive 7 and Windows Embedded POSReady 7), is that they are industry-specific solutions that provide the core functionality to devices in these environments. This saves development time and cost by offering standard platform components for these devices. With these industry-specific products, developers do not have to select these features themselves from Windows Embedded general-purpose platforms, which offer a range features for a much broader set of devices.

Windows Embedded Automotive 7 is based on a vision to enrich the in-vehicle experience for drivers and passengers with an industry-leading platform that provides integrated services for communication, entertainment, navigation and information for the mass market. Microsoft gives car makers and suppliers the latest tools and technologies to deliver engaging in-vehicle experiences like speech commands, touch input, hands-free Bluetooth phone communications, advanced dashboard systems and rich UIs.

Additionally, with Windows Embedded Automotive 7, car makers and suppliers also have access to a worldwide partner ecosystem to help quickly create in-vehicle experiences that are easier to use and more engaging for drivers and passengers, e.g., speech commands, touch input, hands-free Bluetooth phone communications, advanced dashboard systems for access to music, maps, third party apps and navigation, as well as streamlined connectivity with other devices.

Windows Embedded POSReady 7 is optimized for POS solutions and unleashes the power of the Windows 7 platform for in-store devices, evolving transaction processing in-store devices to cutting-edge, attractive POS devices for increased customer satisfaction, loyalty and staff productivity. The platform also helps to reduce in-store operational costs and enhances customer experience.

Windows Embedded POSReady 7 helps retailers transform their transaction processing, in-store devices to attractive point-of-service (POS) devices that enhance customer experience, drive customer loyalty and grow brand awareness. Through POSReady 7 features, such as Windows Presentation Foundation, Windows Touch and Internet Explorer (IE) 8 protected mode, users are given POS devices that interoperate with many common industry standards as well as with multiple Microsoft desktop and server technologies. Windows Embedded POSReady 7 is the smart choice for retail businesses looking to evolve their transaction processing in-store devices to cutting-edge attractive point-of-service devices enhancing the customer experience and increasing customer loyalty.

For other key Windows Embedded vertical industries (industrial automation and medical), Microsoft delivers end-to-end

solutions from specialized devices to the cloud and meet the evolving needs of original equipment manufacturers (OEMs) building devices and enterprises managing devices – this includes accessing data and consuming services, as well as exposing services that are used by other devices, applications and cloud services. OEMs are able to select only the components they need in order to tailor the platform to meet the unique requirements of their device. We really can't speak to any new vertical versions that may or may not exist in the future.

**EE Catalog:** How can developers capitalize on Windows Embedded as they continue to populate the "Internet of Things" with new smart devices?

**Ghangurde, Microsoft:** Windows Embedded delivers the power of Windows and the cloud to devices through connection to existing enterprise infrastructures, Windows PCs, servers and the comprehensive "world of Windows." Windows Embedded helps OEMs take advantage of the opportunity to develop devices that are built with the advantages of Windows and harness the extensive set of Microsoft technologies for inherent security and connectivity. This will empower users with access to apps and data at anytime, anywhere and on any device. For enterprises, it translates into the opportunity to more effectively manage devices as part of their IT infrastructures in the cloud or locally, with the ability to seamlessly extend existing investments in technology.

**EE Catalog:** What will developers need to know about implementing Windows on ARM processors?

**Ghangurde, Microsoft:** Windows Embedded has been able to run on ARM for years. Since the inception of the Windows Embedded business, Microsoft has worked closely with ARM to ensure that Windows Embedded has support for the latest ARM architecture. With more than 70 validated processors and millions of shipping devices based on the technology, ARM is a leading architecture for Windows Embedded CE and Windows Embedded Compact 7.

This partnership history with ARM demonstrates Microsoft's continued innovation and investment to provide a leading software platform for ARM-based devices. Microsoft's partnership with ARM creates opportunities for unique and industry-changing devices built on Windows Embedded platforms.

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*Cheryl Berglund Coupé is editor of EECatalog.com. Her articles have appeared in EE Times, Electronic Business, Microsoft Embedded Review and Windows Developer's Journal and she has developed presentations for the Embedded Systems Conference and ICSPAT. She has held a variety of production, technical marketing and writing positions within technology companies and agencies in the Northwest.*





# Windows Embedded Offers Options at All Levels

by Cheryl Coupé

New releases of Microsoft Windows – including Windows 8 and Windows Phone 7.5 (“Mango”) – promise to open up new worlds for developers. (See our articles on “Windows Reimagined” and “Windows Phone 7.5 (Mango)” in this issue.) In the meantime, the full product family of Windows Embedded operating systems offers a slew of options for the developer of the next killer app. Steve Gereb, director of Microsoft solutions at Avnet Technology Solutions, talks frankly about the opportunities available, from small handheld devices to large digital signage solutions.

**EE Catalog:** Machine-to-machine applications are impacting nearly every vertical market. What are the opportunities – and challenges – for Windows developers designing these types of devices?



**Steve Gereb, Avnet Technology Solutions:** There is a tremendous opportunity to develop machine-to-machine (m-to-m) embedded solutions for every vertical market that Avnet’s OEM and system integrator customers serve today. A confluence

of events is taking place where processors and other silicon devices continue to shrink in size, while also increasing their speed and consuming less power. The silicon available to today’s engineers is unprecedented.

The future of these solutions is really only limited by the imagination and creativity of the design engineers to think up the next killer app that can take advantage of new technology. The silicon, wireless and networking protocols, manufacturing practices, and the costs to source components and build the complete solutions really provides companies with a blank whiteboard where so much (virtually anything) is possible – the application now just needs to be invented. Furthermore, the ready-made, off-the-shelf single-board computers (SBCs) (with all of the latest silicon already included on the board) and Microsoft’s Windows Embedded operating systems also provide companies with an extremely fast time-to-market/time-to-revenue building block, so development time can be considerably reduced. As I said, the biggest challenge is simply writing the next killer app because the hardware and operating system is readily available and very affordable.

One growing challenge to watch for in this arena is maintaining security while systems become more and more connected. As we depend more on the cloud for the exchange

and storage of sensitive information, how we protect that data becomes a major issue. Microsoft has developed technologies such as BitLocker and Direct Access that have been integrated into Microsoft Embedded in order to maximize connectivity while maintaining security.

It really is an exciting time to be in the technology industry because we are in the midst of a true embedded revolution, limited only by our imaginations. However, at a more tactical level, the biggest challenge that developers will face is in who they partner with for engineering and design support as these new technological innovations become available.

**EE Catalog:** What do developers need to know about designing a Windows Embedded-based handheld or tablet device?

**Gereb, Avnet Technology Solutions:** From a handheld and tablet perspective, Microsoft already has several solutions that developers can work with. Windows Embedded Compact7 (which can run on both ARM and x86 architectures) is an excellent solution for handheld devices, while Windows Embedded Handheld is available for those customers that require a dialer. From a tablet perspective, Windows Embedded Standard (WES7) will deliver the best user experience and pairs very well with Intel’s line of Atom processors and AMD’s line of x86 embedded processors. All of these embedded operating systems offer excellent connectivity to Windows-based environments, and all will be available for many years to come (10+ years), which lend themselves very well to embedded applications where companies don’t want to have to reengineer their solutions every time there’s a software refresh or end-of-life situation. Of course, we’re very excited about the announcement of Windows 8, which I believe will be a complete game changer in the tablet arena. With respect to handheld devices, Microsoft will also be releasing Handheld 7 down the road which will help Microsoft Embedded-enabled handheld devices better compete as the “consumerization of IT” continues to proliferate.

**EE Catalog:** What are some of the implications for embedded developers who want to run Windows on ARM-based SoCs?

**Gereb, Avnet Technology Solutions:** Today, the two operating systems that Microsoft has to offer that run on ARM are the CE/Compact7 and Handheld products. These are tried and tested operating systems that provide developers with a faster time-to-market solution than building

out on Linux or other embedded operating systems. However, Windows 8 promises to be the big game-changer where developers will be able to provide the full-blown user experience of Windows on an ARM-based platform.

**EE Catalog:** What are some of the most exciting trends or application areas you're seeing in Windows Embedded development?

**Gereb, Avnet Technology Solutions:** Probably, the best part of this job is getting to work with the companies that are developing the next big, disruptive "thing" that dramatically improves upon or completely displaces older technology. One great example is in healthcare, where the smaller, more powerful, more energy-efficient components (combined with lower-power, higher resolution TFT displays) are resulting in extremely cool mobile devices; units that are improving the ability to diagnose, cure (via advanced microscopic surgical solutions as an example), and the overall patient/doctor experience. While the healthcare vertical is very active right now, Avnet is also seeing tremendous design activity in other traditional verticals as well, such as industrial automation, gaming, military/aerospace, etc.

We're also seeing a tremendous growth trend with digital signage solutions running on either WES7 or POSReady7. With Windows Embedded, digital signage has evolved from a static display to an interactive user experience where content is tailored to the audience. This is the stuff that used to be in the movies. Imagine an embedded system recognizing the age and gender of someone passing by and displaying content statistically pertinent to their demographic. The passing viewer can engage via touchscreen or

even a gesture to learn more and in the background the system gathers and learns more about what that particular type of person finds interesting. Taken further, the viewer can save the info via smartphone, send it via social media or make a spur-of-the-moment purchase without opening their purse or wallet.

Obviously, digital signage is very popular within the retail and hospitality verticals, but other verticals like healthcare and gaming are also actively looking to adopt digital signage as well. One of the application areas that I am most excited about is the combination of the Windows Embedded operating systems and Microsoft's Kinect technology. Although clearly at the early stages (the resolution will continue to improve in future iterations), I believe that Kinect has tremendous implications for embedded solutions. Just think of all of the applications that could take advantage of gestures versus having to actually touch a control panel, screen or other physical device. As mentioned above, the biggest obstacle for developers is actually inventing the application that can take advantage of this new technology.

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# Windows Embedded Compact 7 Advantages

## Modular, Scalable and Optimized for Embedded Devices

by Samuel Phung, ICOP Technology, Inc.

Whether you are a professional software developer, plumber, carpenter or skilled surgeon, you need proper tools and work environment to perform your professional functions effectively. In the embedded-device domain, Windows Embedded Compact 7 (Compact 7) provides effective tools and an efficient environment to help developers rapidly create a new generation of smart, connected and service-oriented embedded devices.

### Small-Footprint, Modular, Scalable and Optimized for Embedded Device

Compact 7 is a small-footprint, highly customizable, 32-bit operating system (OS) with hard real-time capability, designed to support multiple processor families including ARM, MIPS and x86. It's a multi-threaded, multi-tasking and preemptive OS, able to handle up to 32,000 concurrent processes and able to access up to 2 GB of virtual memory within each process.

Compact 7 is optimized for devices built with minimal memory, storage and processing resources. Its modular and scalable architecture provides flexibility for developers to build and configure the OS image with just the needed components to support the target device's intended functions and features.

### Platform Builder: Efficient Tool to Develop Custom OS Image

Developing a custom OS image for an embedded device involves hundreds of components and complex system configurations, which requires development resources, financial investment and time to accomplish.

In today's business environment, developing and maintaining an OS internally to support product development is high-risk, costly and not a practical choice for most companies.

Prior to Windows Embedded Compact 7, taking on the tasks to build and configure a custom OS image as part of the efforts to develop a device was not a common consideration to most companies. The Platform Builder for Compact 7, with more than 15 years of continuous improvement, provides an efficient and effective environment to build and configure custom OS run-time images for the target device.

The Platform Builder development environment includes wizards, templates and OS components to simplify the task to develop, configure and build a customized OS run-time image, with just the required components and features to support a target device.

### Visual Studio: Efficient Environment to Develop Embedded Application

Application development for Compact 7 is done within the Visual Studio 2008 integrated development environment (VS2008 IDE), using C++, C# and Visual Basic programming languages. The VS2008 IDE provides the facility to establish connectivity to the Compact 7 device to deploy the application onto the device for testing and debug. With proper setup, the developer is able to debug the application and step through the code as the application executes on the device, one line at a time.

Programming libraries and sample applications with source code included as part of the Compact 7 software help developers jump-start their application development. The .NET Compact Framework provides the support to help developers rapidly develop Windows form and headless managed-code applications, using C# or Visual Basic.

### Silverlight for Windows Embedded: Enables Designer and Developer to Jointly Develop Compact 7 Application

Initially introduced as part of the Windows Embedded CE 6.0 R3 release, Silverlight for Windows Embedded (SWE) provides an environment that enables designer and developer to work in parallel, doing what they do best, to deliver a high-performance, embedded application with a visually compelling user interface (UI).

SWE is a UI development framework. For Compact 7, SWE is based on Silverlight 3. While Silverlight code behind the Windows desktop and Windows Phone 7 are based on managed code, SWE code behind Compact 7 is based on native code, making it possible to generate a small footprint and efficient application executable to support an embedded device built with limited memory, storage and processing resources.

With an agreed-upon design specification between the designer and developer, the designer creates the UI for the



SWE application in XAML code using Expression Blend 3—without the need to understand the application’s complex programming logic. Compact 7 includes the tools to convert XAML code project into a native code project for Compact 7. The designer can continue to modify the application UI and provide updates to the developer without impacting the developer’s code and logic for the application.

With SWE, the developer can focus on writing code without being hindered by graphic design and related tasks.

### Compact 7 Advantage: The Development Environment

In the fast-paced and unforgiving technology market, the key to success is the ability to rapidly develop and deliver innovative, reliable and cost-efficient products to the market, with up-to-date technology and visually compelling UI. An effective and efficient development environment is one of the keys to enable the development team to create a successful product.

To fully realize the Compact 7 development environment’s advantage, you need to take a closer look and evaluate the development tools. Microsoft provides a full-function evaluation version of Compact 7 without cost and obligation, available for download from the following URL:

[http://www.microsoft.com/windows\\_embedded/en-us/downloads/download-windows-embedded-compact-ce.aspx](http://www.microsoft.com/windows_embedded/en-us/downloads/download-windows-embedded-compact-ce.aspx)

There are three separate development environments for Compact 7, as follow:

- **Platform Builder** – This is the environment to develop a custom OS run-time image, device drivers and hardware adaptation code. Platform Builder for Compact 7, a plug-in to the VS2008 IDE, provides a development environment that includes OS design templates, device drivers and OS components to simplify the tasks needed to develop custom OS run-time image for a target device.
- **Visual Studio 2008** – This is the environment to develop native and managed code application for Compact 7. With proper setup, you can establish connectivity between the VS2008 IDE and the target device to deploy the application onto the device for testing and debug, which enables you to halt the application and step through the code as the application runs on the target device, one line at a time.
- **Silverlight for Windows Embedded** – SWE is a UI development framework that enables designer and developer to work together, doing what they do best. With an agreed-upon contract (design/development specification), the designer is able to use his or her artistic skill to create a visually compelling UI for the application using Expression Blend 3, without the need to understand the application’s complex programming logic. The developer can focus on writing code for the application without being hindered by the graphic design and related tasks.

In addition to the above development environment, Compact 7 also provides an effective and efficient testing environment, the Windows Embedded Compact Test Kit (CTK).The CTK provides a developer-friendly, easy-to-use and effective environment to test the functionality and performance of device drivers, hardware adaptation code and software component for a Compact 7 device.

In the remainder of this article, we will take a look at the Compact 7 development environment and point out some of the key advantages.

### Develop Compact 7 OS Run-time Image

Using Platform Builder and a quality board-support package (BSP), developing a custom OS run-time image for a target device is a straight-forward process.

Platform Builder for Compact 7 is a plug-in to the VS2008 IDE and leverages the VS2008 IDE’s developer-friendly features. Here are the general steps to develop a Compact 7 OS design (an OS design is a project workspace to develop and build a custom OS run-time image):

- Create a new OS design – With help from the OS Design Wizard, provided as part of the Platform Builder, this is a simple and straight-forward process. One of the OS Design Wizard screens is shown in Figure 1.

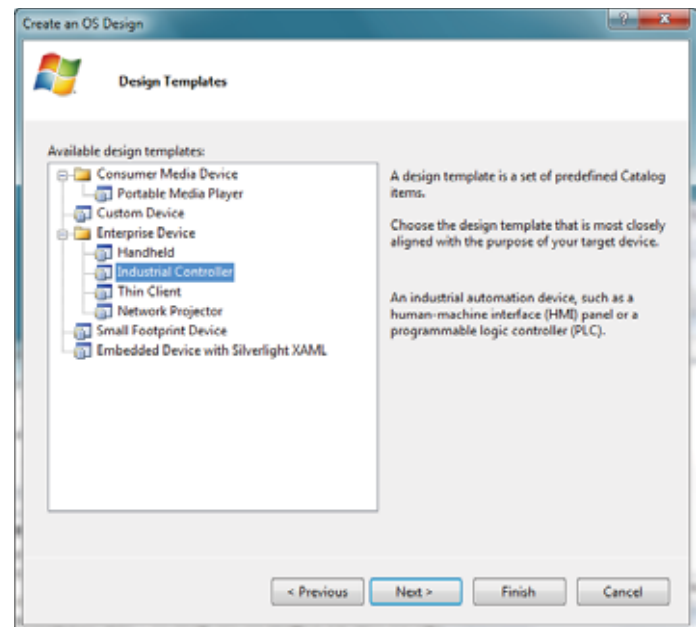


Figure 1 – OS Design Wizard

- Configure the OS design – The VS2008 IDE provides a graphical user interface for you to add or remove device driver, OS and application components to the OS design. The Catalog Items tab on the VS2008 IDE provides a developer-friendly, visual interface to select components for the OS design, as shown in Figure 2.
- Generate OS run-time image – With the required compo-

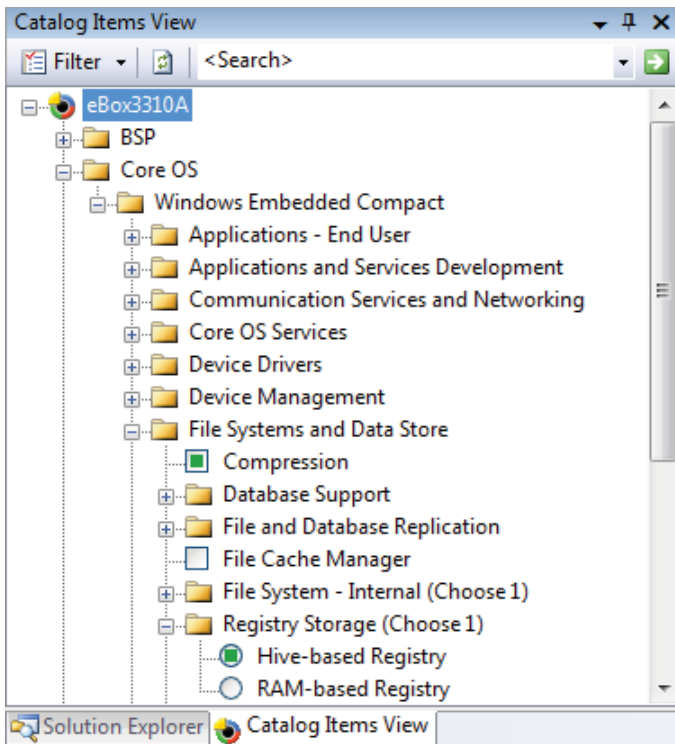


Figure 2 – Catalog Items View

nents included in the OS design, you can select a command from the VS2008 IDE to build the OS design and generate an OS run-time image for the target device.

Using Platform Builder with a quality board-support-package (BSP), you can easily create and configure an OS design and generate a customized OS run-time image for a Compact 7 device with minimal knowledge about Compact 7 and Platform Builder.

## Develop Silverlight for Windows Embedded Application

SWE provides an efficient environment that enables designer and developer to work on the sample application in parallel, as follows:

- A development contract (application design specification) needs to be established between the designer and developer.
- Using Expression Blend 3, the designer creates a XAML code project, using the Silverlight for Windows Embedded Application template, to develop the UI for the SWE application.
- From the VS2008 IDE, the developer converts the XAML code project, using the Windows Embedded Silverlight Tool, to a native code SWE application project and adds the project as a sub-project to the OS design.

After going through the above steps at least once, the designer and developer can work separately, in parallel, to continue to improve their project, without impacting the other's work and progress.

When the designer makes changes to an existing XAML code project for the SWE application project, the developer can use the Windows Embedded Silverlight tool to update the previously converted application subproject for the OS design, without affecting the application's code and programming logic.

The Compact 7 and SWE development environment enable the product development team to create a visually compelling UI for the Compact 7 device that differentiates the product from the competition, with minimal effort and investment. Figure 3 shows a Compact 7 device's home screen built with SWE.

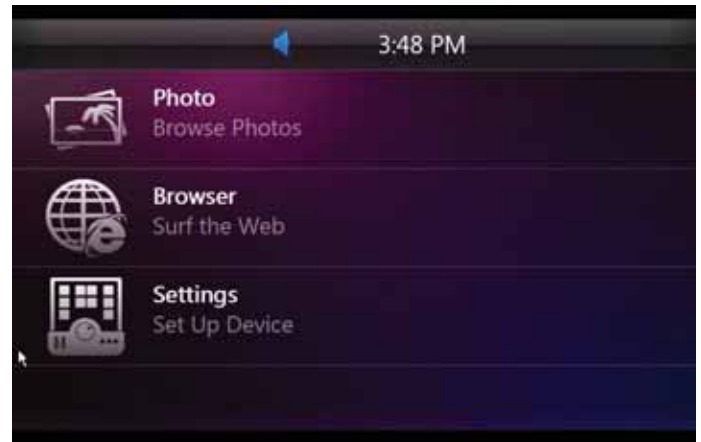


Figure 3 – Compact 7 device screen with Silverlight for Windows Embedded

**Note:** To see the detailed steps to develop a Compact 7 OS design, SWE application and other examples, check out the Embedded101 community site at the following URL:

<http://www.embedded101.com/Compact7JumpStart/>

Although the development environment is not able to increase the developer's IQ and coding skill, an efficient and effective development environment can help an average developer deliver a good product and help an innovative developer deliver an extraordinary product. With 15+ years of continuous improvement and countless successful track records that span across multiple industries, Compact 7 provides amazing technologies and development platform to help you develop a new generation of embedded devices.

Currently holding the VP sales and marketing position at ICOP Technology Inc., Samuel Phung has worked with Windows Embedded since 1998, actively engaged in the academic and hobbyist communities and earned the Windows Embedded MVP recognition from Microsoft in 2005. Samuel published a CE 6.0 book in 2008, "Professional Microsoft Windows Embedded CE 6.0", and co-authored the "Professional Windows Embedded Compact 7" book in 2011. His blog can be found at <http://www.embedded101.com/Blogs/SamuelPhung.aspx>.



# Windows 8 Accelerates Touch User Interface Adoption

by Robert Frizzell, Atmel Corporation

Over the last four years a revolution in human interface for electronic devices has occurred. With the advent of the original iPhone® in 2007, capacitive-touch interfaces have become an integral piece of the smartphone and how we use and control these devices. In part due to the touch user interface (UI), smartphones have become the fastest-growing segment of the cellular-phone market. Tablets, introduced in 2010, followed with a touch-centric UI. As these devices become more pervasive, consumers' usage patterns and expectations will require touch-based UI. The recently announced touch-centric Windows® 8 will only accelerate this into the notebook, monitor and all-in-one markets.

The advantage a touch UI provides the consumer is a more natural manner to interact with a device. Our hands have always been the primary way we make and reshape our world. It's natural for us to pick up an item with our hands and move it from one place to another or turn it around to see it in a different light. For electronic devices such as the PC, innovative human interfaces were developed to make controlling the PC easier. Starting in the 1980s, we moved from the purely textual interface on PCs to the mouse and Windows-based UI. Cell phones came on the market but carried forward the traditional keypad of the land-line phone. These UIs have been our primary electronic device interface for the last 30 years.

As mobile devices got more powerful and the web became pervasive, a new UI was needed. Phones were adding new capabilities such as web access and running games. The traditional keypad had to change and capacitive touch screens helped provide the solution. With a touch UI, the user gets the same functionality of the mouse on a PC and more. Additional operations such as swiping or pinching could be enabled. This made performing some functions simpler and easier.

These benefits to consumers can be seen in the growth of the smartphone market, now the fastest-growing segment of the cellular phone market. Despite costing upwards of \$200 or more, smartphones are now 30% of the total cellular phone market and that share will continue to grow.

As the touch UI has become ubiquitous on smartphones and tablets, consumers have started to expect that capability on all displays they interact with. It's not uncommon to see younger people try to touch the video display on the back of an airplane seat or even their own TV, expecting these displays to have a touch UI. Users now expect a touch UI on all their electronic devices.

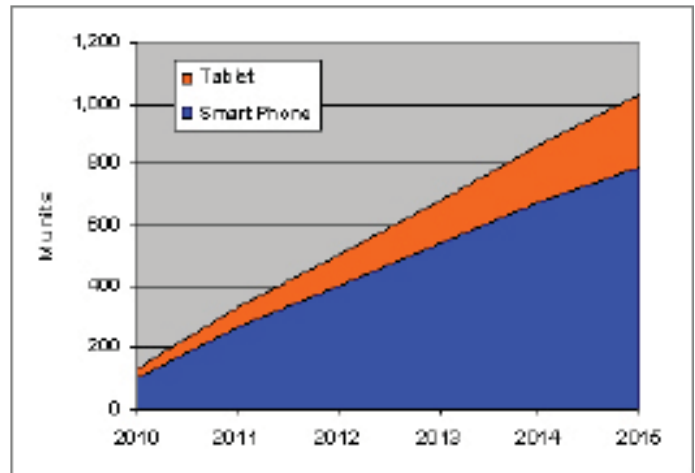


Figure 1: Smart Phone and Tablet Market Size (Display Search 2011)

Windows 8, Microsoft's new touch-centric operating system, is going to accelerate adoption of touch UI into other products. While heavily focused on supporting tablets, Windows 8 will bring the touch UI to the notebook PC, all-in-one (AIO) PCs and monitors. Consumers will see further benefits from being able to swipe windows from the sides or snap them to the edge of the display. No longer will you have to carefully resize a picture added to a PowerPoint slide with your mouse – you'll just give it a quick finger pinch to get it to the right size.

Overall, the touch UI is becoming the new, simpler means for interfacing to electronics devices besides the smartphone. Consumers have already picked up and accepted the touch UI as the means to interact with electronics and they expect this in all equipment. Windows 8 will accelerate this push into many more devices enhancing the consumer experience. There are currently a number of hardware suppliers, such as Atmel®, that are working with consumer manufacturers to enable Microsoft's Windows 8 a reality in notebook PCs and all-in-one PCs

Rob Frizzell is the director of touch field marketing and ecosystem at Atmel. He has over 20 years' experience in semiconductors working with various products including RF (60GHz), communication (HDMI), power and memory.





# What Windows 8 Means for the Future of Digital Signage

## (And Why That's Significant for Everyone)

by Don Pierson, Flypaper Studio

The fact that Microsoft's operating systems shape the way people work with computers isn't particularly newsworthy. Given their worldwide dominance, this isn't surprising to hear. But there's a very significant shift underway in how people interact with devices of all types and Windows 8 shows that Microsoft gets it.

My company works heavily in the digital signage market. Digital signage is a huge consumer of digital content of all types and, significantly, it interacts with people across a nearly infinite spectrum. The industry itself is growing very rapidly and nearly anyone can be exposed to digital signage just about anywhere they go – restaurants, stores, airports, etc. To that end, consumers are starting to interact with signs more than ever before, and this is increasing. The realization is that operating systems need to address not only how people engage with their computers, but how they engage with their mobile devices, and beyond that, with these digital screens they come in contact with everywhere.

Not so long ago, consumption of digital signage content was one way. Like television, digital signage content was broadcast or narrowcast, but it mostly felt like an advertisement, a television show or a CNN-type newscast. But within the last couple of years, there's been rapid movement toward interactive signage. One reason is that it's far more effective than one-way, passive communications. Another is that it's become much more affordable. And of course, the technology is now there to enable this new level of engagement.

But the most significant reason that interactive digital signage is growing so rapidly is this: because people are coming to expect it. They expect to choose their own adventure and experience with the swipe of a finger. They expect to drive to their own goal. They expect to have

uber-personalized content, no matter what screen they are viewing.

Still, up until now, interactive signage implementation has been built around how people use personal computers and online content. We've simply been providing another screen, another way to market, inform and engage. And up until now, the operating systems for personal computers were designed to support using a mouse and a browser to find information. Windows 8 is brilliantly designed to do this, faster and more organized. But the real significance is in the alternate Metro-style interface. That's because it's designed around the touch screen. The touch screen is a relatively new frame of reference for the personal computer experience. And it's on the verge of becoming the norm.

***Applications will need to be designed with touch in mind. The good news is, with Windows 8 and other Microsoft technologies, we don't have to choose.***

Why is this? It's simple—tablets. Metro is made for direct manipulation of objects on a screen, removing the mouse or other pointing device from the picture. Finally, the finger is the pointing device. What a concept!

The popularity of smartphones and tablets has driven this behavioral change. While many people have quickly become accustomed to swiping and swishing on their smartphones and tablets, this kind of experience is completely different from the way we have worked on computers for...well, decades. But people are decidedly drawn to this tablet way of working and it's a significant shift that obviously can't be ignored. And this is critical for digital signage. Now, consumers will walk up to digital screens and find what they want through their own manipulation.

At the same time, the old familiar way of working has its advantages. There's familiarity and experience, of course, but there's also precision and screen real estate to be considered. Touching a screen is like pointing with

a blunt object. With a mouse we can point with precision down to the pixel and many times that type of precision is necessary. And because there's a significant inherent imprecision in touch, objects to be manipulated in that way must necessarily be very large. Hence, they consume a great deal of real estate.

That's why touch-screen applications tend to be consumer-oriented rather than "production"-oriented. It's easy to select a photograph and drop it on a printer icon to print it. But an artist who wants to crop a picture "just so" would be very frustrated trying to do it exclusively via touch screen. At least for now.

I think Microsoft was brilliant to recognize this dichotomy and build support for both approaches in the Windows 8 operating system.

But what about those who are designing applications? It may not be as simple as deciding to support one approach

exclusively. Application developers need to have an option that adequately addresses both sides of an equation. With Windows 8 they have it.

My conclusion is this: even "production" applications will need to be designed with touch in mind. Perhaps, like Windows 8, they'll need to have "production" mode, and "touch" mode, depending on what the goal is. The good news is, with Windows 8 and other Microsoft technologies, we don't have to choose. The tools we need are there from the foundation on up.

*Don Pierson is the founder and president at Flypaper Studio, a wholly owned subsidiary of Trivantis Corp., where he is responsible for leading company operations. Flypaper Studio's flagship product Flypaper is the leading content creation solution for Digital Signage.*



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# Windows Reimagined

## New Touch-Centric Operating System Designed for the Mobile World

by Linda Barney

Microsoft previewed the next major release of Windows, code-named “Windows 8,” at the recent developer-focused BUILD conference. “We reimagined Windows,” said Steven Sinofsky, president of the Windows and Windows Live Division at Microsoft, in his keynote address to the thousands of developers in attendance. “From the chipset to the user experience, Windows 8 brings a new range of capabilities without compromise.”

### Introducing the Metro User Interface

The most obvious change in Windows 8 is the new touch-optimized interface called “Metro.” The new Start screen consists of a series of rectangle tiles that link to applications as shown in Figure 1. The tiles are touch-sensitive, allowing users to access content without pulling down menus and will be familiar to users of Windows Phone 7. The Metro interface lets users personalize the Start screen and group content to meet their needs and tile content can be updated dynamically. In the preview release of Windows 8, the Metro Start screen displays by default.

Applications written for earlier versions of Windows require the use of a keyboard and mouse and can’t be launched by touching the screen. In the preview version of Windows 8, a tile on the Start screen launches a second desktop interface that is similar to what displays in Windows 7.

The developer’s preview includes a Metro-style version of the Internet Explorer 10 browser. The touch-screen optimization in Windows 8 and changes in Internet Explorer 10 will provide developers the opportunity to write a wide range of applications that will run on the Metro-style interface.

### Running Windows 8 on Multiple Processors

Microsoft is making a major change in allowing Windows 8 to run on multiple processors. Traditionally, Windows ran only on x86 processors. Windows 8 is also targeted to run on processors from ARM Holdings PLC (ARM) used on mobile devices such as tablets and smartphones. ARM-based chipsets potentially provide a longer battery life, generate less heat and use less power. Microsoft indicates that “Windows 8

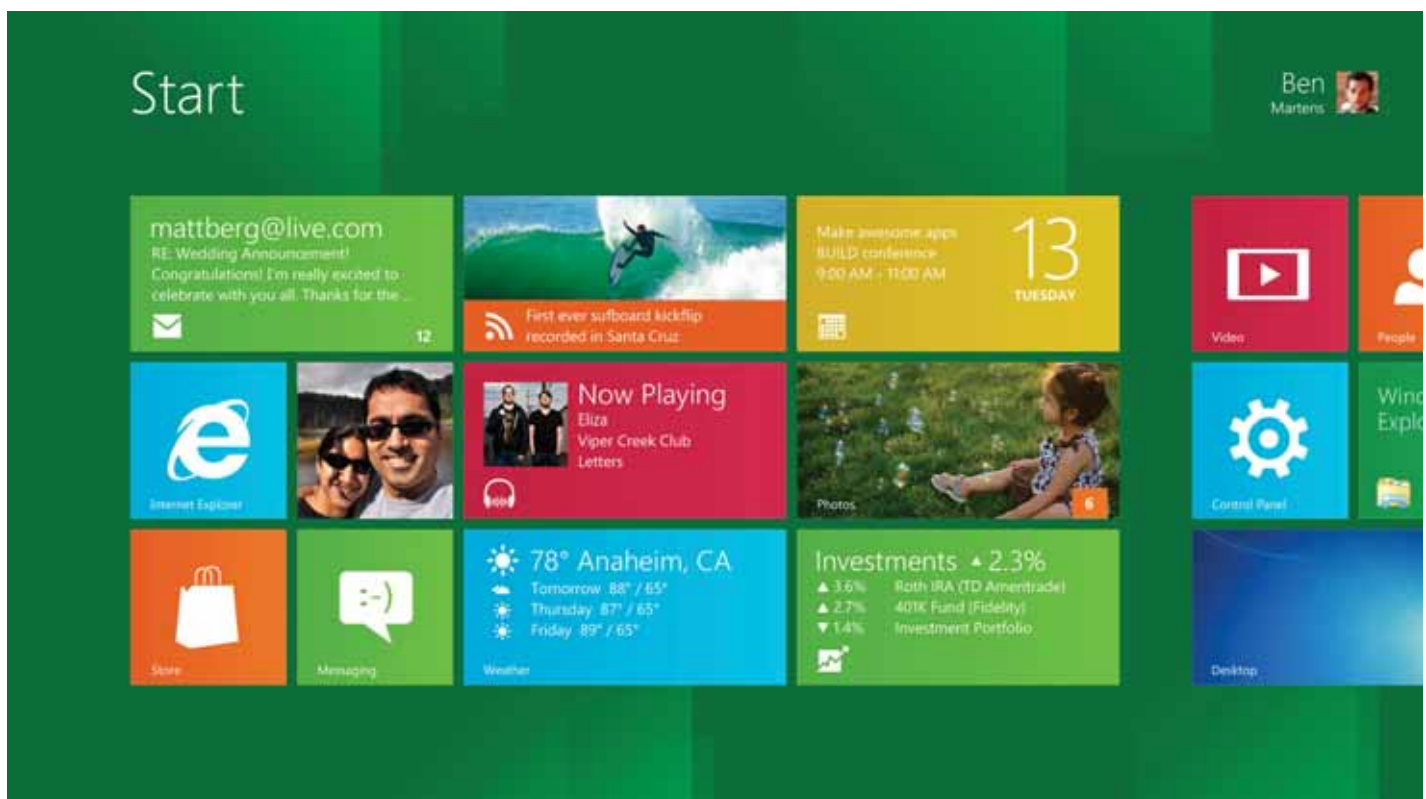


Figure 1: The Windows 7.5 Start screen displays tiles of information that makes it easy to obtain information



runs on ARM devices as well as x86 and x64-based systems. Depending on the technology you use, write your Metro style apps once and they can run on any supported architecture.”

### Selling Applications on the Windows 8 Store

A new Windows 8 Store will feature a wide variety of applications from new games to business productivity tools. This store will allow developers to post and sell their Metro-based applications and will allow end users to browse and compare applications – tools will show frequently downloaded applications and how other users have rated an application. The applications in the store will be screened and checked for viruses. Users can install purchased applications on up to five Windows 8 PCs. Discussions on the Microsoft site and in blogs indicate that Windows 8 Desktop traditional applications will not be licensable or downloadable from the store but that there might be links to them from the Store.

### Developing Applications in Windows 8

Developers can leverage their existing skills and code assets using the Windows Runtime (WinRT) APIs to build Metro-style applications. Web developers can use their HTML5, CSS3 and JavaScript skills to build native applications for Windows. Developers using .NET can use XAML, C# and Visual Basic. Game developers can build Metro-style games using C++ and DirectX 11.1 to take full advantage of graphics hardware, or build casual games using HTML5 or XAML. Driver developers can use the new, integrated Microsoft Visual Studio development environment to increase productivity.

The new Windows 8 application models feature native extensibility, which developers can use to build reusable component libraries. New Windows 8 features include the app bar, edge, live tiles and contracts with other applications which aids in developing Metro-style touch applications. The Windows 8 controls are designed for both touch devices and for mouse and keyboard to maintain control and layout data.

On the graphics front, Windows 8 contains tools to help with animation, 3D transformations, changes in orientation, various display options and different display capabilities using CSS3. The new Windows 8 graphics stack is better integrated, making Direct2D, Direct3D and DirectCompute components easier to use to create immersive games.

***Depending on the technology you use, write your Metro-style applications once and they can run on any supported architecture.***

### Building for the Tailored Web

Developers can use Windows 8 to build attractive, fast and secure websites. Web services enhance the user experience and can take advantage of functionality provided by SkyDrive, Hotmail and Windows Live Messenger.

Internet Explorer 10 provides a standards-based web platform that allows developers to write the same HTML5 markup for both desktop and Metro applications. The IE10 platform also includes support for local storage including IndexedDB, Application Cache, Async scripts, Web Workers, ES5 Strict mode support, Web Sockets, HTML5 file APIs, drag-drop, history and sandboxing.

Microsoft’s commitment to HTML5 now extends beyond the browser to Windows. Metro-style applications using JavaScript let web developers that build JavaScript and HTML5 sites turn those into even richer applications that take full advantage of the underlying capabilities of Windows.

### Taking Windows 8 Tools for a Test Drive

With Windows 8, Microsoft is making a strong push into the touch-optimized device market with an interface that supports smartphone-type applications but still runs typical desktop applications. Windows 8 will run on x86, x64 and now on ARM-based devices. This will allow users to interact with Windows 8 on devices such as laptops, netbooks, notebooks, tablets and slates. Developers will be able to create a new range of Metro-based applications using Windows 8 tools and will be able to sell their Metro applications on the new Windows 8 Store.

Developers can access the Windows 8 SDK at the Windows Development Center to take Windows 8 for a test drive. The Windows 8 SDK includes free versions of Microsoft Visual Studio 2011 Express and Microsoft Expression Blend, as well as the latest tools, APIs, compilers, debuggers, sample applications, documentation, templates, tutorials and guidance from the experts. All developers are encouraged to download the Windows 8 SDK, test it, ask questions and provide feedback.

*Linda Barney has written articles for a variety of technology clients and has published articles in the Software Quality News, CircuitTree, inside HPC and HPCWire ezines. She owns Barney and Associates, a technical, marketing writing, training and web firm.*



# Windows Phone 7.5 (Mango)

## New Release Expands Device Markets and Opportunities for Developers

by Linda Barney

In late September, Microsoft launched the new release of Windows Phone 7.5 code-named “Mango.” In addition to changes in the Windows Phone software, the Mango release will be available on more devices through ATT and Nokia. The Windows Phone 7.5 Mango release offers some cool new features for users but also includes a number of developer requests. In addition, Microsoft added new features and tools that make it easier for developers to monetize their applications and games created for Windows Phone devices. They also added features to help users more easily find this content and download it directly onto their Windows Phone 7.5 phones.

Microsoft introduced the Windows Phone 7.5 Mango version in April at the MIX11 conference and released two betas and a refresh release prior to final roll-out. They encouraged developers to download the beta versions, try developing applications and give them feedback. Let’s look at some of the Windows Phone 7.5 Mango features and opportunities for developers.

***The new Internet-connection sharing lets users turn their Windows Phone 7.5 device into a mobile Wi-Fi hotspot...***

### Communication Made Easy—Windows Phone 7.5 Mango Features

New communications features make it easier for users to communicate and find information on their Windows Phone 7.5 device. When users turn on their Windows Phone 7.5 device for the first time, a tile displays on the screen called the People Hub. If the tile is activated, multiple tiles display showing images of contacts from various places such as Facebook, Outlook, Windows Live and now also including Twitter and LinkedIn. Users can now take Contact Groups and make them a tile on the Start screen as shown in Figure 1. Messaging has been expanded with



Figure 1: Example of a Group tile on a Windows Phone 7.5 device

speech-to-text and text-to-speech options. A threading feature lets users start with a text and finish in Facebook or Messenger chat and the whole conversation stays in one thread – all it takes to switch back and forth is a tap. Linked inboxes allow messages from multiple accounts to display in one place. In this release, customers can create custom ringtones using MP3 or WMA files. Voice mails display in a list, making them easy to access.



Figure 2: The new Windows Phone Marketplace makes it easy to locate and purchase applications

Working with applications is also easier on a Windows Phone 7.5 Mango device. In this version of the operating system, applications can run in the background; users hold down a dedicated BACK button to flip back and forth between windows. Dynamic Live Tiles can now retrieve information and update themselves without the user having to open the underlying application. An application called “My Windows Phone” is a free online service that lets users find, lock and erase a lost phone from the Web as well as giving them easy access to applications, photos and documents. Internet browsing uses the latest Microsoft browser, Internet Explorer 9, complete with hardware acceleration and HTML5. Also included are updated versions of all Microsoft Office tools.

A new application called Local Scout instantly gives highlights for businesses around the user’s GPS location, including suggestions on shops, activities and restaurants. The Search function has been expanded with the addition of Bing Vision (for scanning products, bar codes or QR codes) as well as music and voice search that lets users search the Internet using voice commands.

Using Sync with SkyDrive allows users to sync Microsoft Office docs between SkyDrive and their phone, so the documents can be edited on the phone and then edited more on a computer later. The new Internet connection sharing lets users turn their Windows Phone 7.5 device into a mobile Wi-Fi hotspot by sharing the Internet-connection with a laptop and other devices.

### Monetize your Applications and Games on the Windows Phone Marketplace

Microsoft encourages developers to create Windows Phone applications and games. An online web Windows Phone Marketplace, shown in Figure 2, is where developers can sell or give away their application or game creations to the global audience of Windows Phone owners. Customers can now purchase an application from the Marketplace and it can be downloaded directly to their Windows Phone 7.5 device. The Marketplace site contains a developer dashboard to let developers manage all aspects of how an application or

game appears in the Marketplace, monitor downloads and track how much money they’ve earned. To make it easier for users to locate games or applications, Microsoft created App Connect so that games and applications show up in the search results when a user enters a Bing search.

Developers can also make money from applications or games by including Microsoft ads on their content. The Microsoft Advertising SDK for Windows Phone is now fully integrated into the Windows Phone SDK 7.1. Microsoft indicated that international expansion for the Microsoft Advertising solution was a top developer request and eleven more countries have been added.

To submit apps or games to the Windows Phone Marketplace, developers need to register for an App Hub account first. In the past, developers were required to submit tax-withholding information to set up an App Hub account so that they could submit applications or games. A number

***The Windows Phone Marketplace lets developers sell or give away their application or game creations to the global audience of Windows Phone owners.***



of developers complained about the complexity and hassle and Microsoft has removed the need to submit an ITIN or W-8 to get set up on the App Hub.

**Download the Windows Phone 7.1 SDK**

The latest toolkit used by developers to create Windows Phone 7.5 applications or games is the Windows Phone 7.1 SDK. This SDK can be downloaded from the Microsoft site and includes Visual Studio 2010 Express for Windows Phone, Windows Phone Emulator, XNA Game Studio, Expression Blend for Windows Phone, samples and documentation. If Visual Studio 2010 Professional or higher is already installed on a development computer, an add-in for Visual Studio 2010 Professional is automatically installed as well. Windows Phone OS 7.1 now includes Silverlight 4. There are a number of new or updated features for developers in this SDK in the areas of multitasking, execution and fast application switching, alarms and reminders, background agents, media, sensors, background file transfers, background audio, socket support, network

information, push notifications, live tiles, application performance analysis, Web Browser control, device status, camera and local database. With the new Silverlight and XNA integration, developers can now use both Silverlight and the XNA Framework in a single application or game. Windows Phone OS 7.1 provides the ability for developers to profile applications and games to measure the use of system resources such as CPU and memory over time, and navigate directly from the results to the code. In addition, there is also an active Windows Phone development forum where developers get their questions answered by the world-wide community of Windows Phone developers.

*Linda Barney has written articles for a variety of technology clients and has published articles in the Software Quality News, CircuiTree, inside HPC and HPCWire ezines. She owns Barney and Associates, a technical, marketing writing, training and web firm.*



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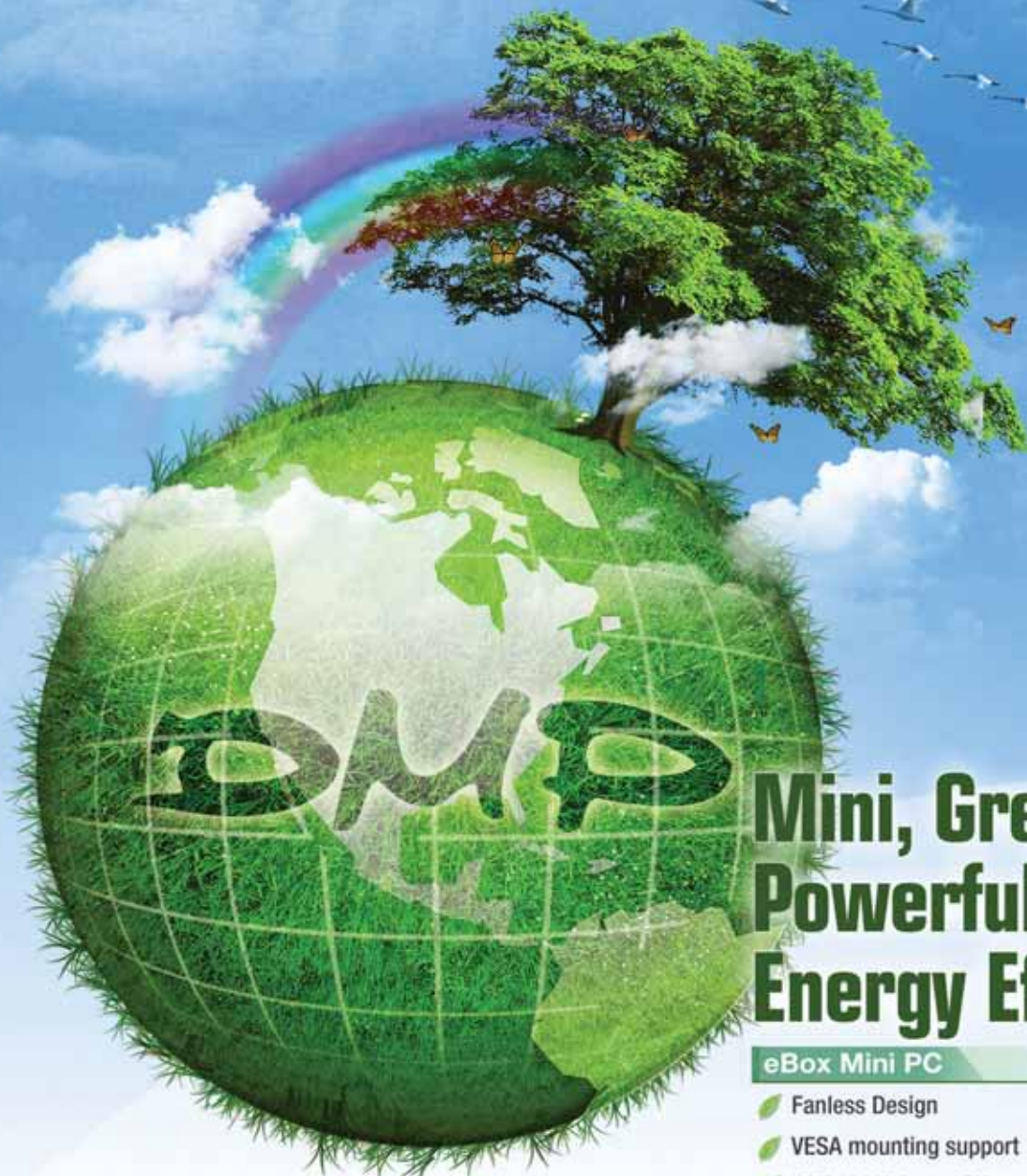
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## PPC-E7+

The PPC-E7+ is a compact Panel PC with a 7 inch WVGA (800 x 480) TFT color LCD and a resistive touch screen. Unlike other compact Panel PCs, the PPC-E7+ comes with Windows CE 6.0 fully configured and installed on flash disk allowing the software engineer to concentrate on writing applications and not have to worry about configuration and setup. Just apply power and watch the Windows CE User Interface appear on the vivid color LCD touchscreen.

The PPC-E7+ has an embedded ARM9, 400 MHz Fanless Low Power Processor with MMU. This Panel PC supports up to 256MB of external DDR2 / SDRAM, 1GB of NAND Flash, and 4MB of serial data flash. Also two MMC/SD card sockets are provided for additional Flash storage.

The PPC-E7+ offers: four serial ports, two high speed USB 2.0 host ports, 10/100 Base-T Ethernet with onboard RJ-45 connector, an I2S Audio port with Line In/Out and a battery backed real time clock. The PPC-E7+ can use power from +12 Vdc. to +26 Vdc. wide input voltage range.

For Windows CE application development, Windows Visual Studio provides everything the user needs for developing PPC-E7+ applications. All the compiling, converting, downloading, and debugging inherent to software development can be done from one easy to use high level interface. EMAC provides a WinCE SDK for the PPC-E7+, which contains source examples and drivers.

The PPC-E7+ starts at \$495.00 USD per unit.

For more information on the PPC-E7+ go to our website:  
[http://www.emacinc.com/panel\\_pc/ppc\\_e7+.htm](http://www.emacinc.com/panel_pc/ppc_e7+.htm)



### FEATURES & BENEFITS

- ◆ ARM9 400 MHz Fanless Low Power Processor
- ◆ Line Level Audio In & Out
- ◆ Graphic LCD Interface with Touchscreen
- ◆ Wide input Operating Voltage from 12 to 26 Vdc
- ◆ High Speed USB Host & OTG Ports

### TECHNICAL SPECS

- ◆ 3 Serial RS232 ports & 1 RS232/422/485 port
- ◆ 10/100Base-T Ethernet with on-board RJ-45 port
- ◆ Up to 256 MB RAM and 1 GB NAND Flash
- ◆ 2 SD/MMC Flash Card Sockets
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### AVAILABILITY

September 2011

#### CONTACT INFORMATION

**EMAC, inc.**  
EQUIPMENT MONITOR AND CONTROL

EMAC, Inc  
2390 EMAC Way  
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USA  
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# Logic Supply

## Extreme Environment PT110 Atom Fanless Barebone

Logic Supply introduces the Extreme Environment PT110, an ultra-slim, fanless Intel® Atom™ platform featuring a Windows Embedded Standard (WES) image that can be customized to meet project requirements. Housed in a ruggedized, small-footprint enclosure, the PT110 is designed for seamless deployment in industrial environments, public access areas, or medical facilities.

The PT110 features an Intel® Atom™ N270 CPU paired with the Intel® 945GSE embedded chipset. The internal components are contained in an extruded aluminum alloy chassis that is designed to protect the system from shock and vibration. The exterior has a matte silver finish and is less than 1.5" thick, making it very easy to disguise from view in high-traffic areas.

With a WES image designed to mimic XP Pro, but with a scaled down footprint, the entire OS can be installed on a CF card, saving cost and extending the platform's lifespan. The image can be configured to boot directly to a custom shell for improved user experience and security. This is ideal for multi-user, interactive devices because it limits the types of programs people have access to while making it easy to locate the programs they need.

The platform is designed for reliability and maintains silent, uninterrupted operation over time. And, with an extended temperature range of -40°C–70°C, wide input DC power, legacy I/O, and Wi-fi options, the PT110 is excellent for use in manufacturing, construction, kiosks, and other demanding applications.

### FEATURES & BENEFITS

- ◆ PT110 packs in the I/O options, utilizing RJ45 connectors for serial output; it can easily drive multiple devices while taking up minimal space and drawing very little electricity
- ◆ Utilizes off-the-shelf hardware so driver support and integration with other systems and components are straightforward and simple
- ◆ Comes fully assembled and tested by Logic Supply's expert computer technicians so it arrives ready for plug-and-play operation
- ◆ Features a terminal block power connector with wide input (10–28 V) DC power providing a secure, reliable power source for industrial devices
- ◆ If opting for WES 2009, customers who have standardized on Windows XP get the features they're familiar with but in a smaller, more customizable package



### TECHNICAL SPECS

- ◆ Features a 1.6 GHz Intel® Atom™ N270 processor with the 945GSE embedded chipset
- ◆ Offers VGA, DVI-D, 6 USB 2.0 ports, 3 RS-232 COM ports (via RJ45 connectors), audio, and dual Gb LAN
- ◆ Shock: Operating 20 G (11 ms), Non-operating 60 G (standard HDD); Operating 40 G (11 ms), Non-operating 80 G (with SSD)
- ◆ Comes standard with 1 GB wide temperature RAM; configuration options include HDD or SSD, RJ45 to serial port cables, operating system, and assembly services
- ◆ Dimensions are: 252 x 33 x 199 mm (9.9" x 1.3" x 7.8")

### AVAILABILITY

Now

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