

# Windows CE Positioning Paper



Produced by the ATM Industry Association

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# Table of Contents

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Foreword.....	4
Chapter 1. Introduction.....	5
Chapter 2. Windows CE – the Basics.....	6
2.1. BACKGROUND.....	6
2.2. WINDOWS CE IN THE ATM INDUSTRY.....	6
2.3. MINIMUM REQUIREMENTS: COMPARISON TO OTHER OPERATING SYSTEMS.....	7
2.4. WINDOWS CE EXPERIENCE IN THE ATM INDUSTRY.....	7
Chapter 3. Windows IoT Core versus Windows 10.....	8
3.1. DISPLAY AND HARDWARE REQUIREMENTS.....	8
3.2. DEVICE DRIVERS.....	8
3.3. CEN XFS.....	8
3.4. SECURITY.....	9
3.5. SOFTWARE CODE.....	9
Chapter 4. Conclusions and Recommendations.....	10
4.1. CURRENT WINDOWS CE USERS.....	10
4.2. CURRENT WINDOWS 7/XP USERS.....	11
4.3. FUTURE CLOUD-BASED ARCHITECTURE.....	11

# Foreword

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With between 10%-15% of the world's installed ATM base running on a Windows CE operating system, the Microsoft CE sunset, which will occur in October 2023, when support for CE 2013 finally ends, presents a future challenge.

Although seven years sounds like a long time away, planning cycles tend to take up to two years to complete, and besides, there are advantages to be gained by deployers from migrating well ahead of the deadline, especially when ATMs are being purchased or upgraded.

ATMIA is already working on developing an industry consensus on a Win CE 2023 roadmap, led by the author of this position paper, Eric de Putter, and myself. We invite all deployers and vendors to join us in planning the best migration path.

Our future is going to be dominated by the Internet of Things (IoT), and Microsoft obviously sees Windows 10 as the best operating system for the IoT future.

While Microsoft has recommended Windows 10 IoT Core as the logical successor to Win CE for ATMs, our industry itself is asking the question: isn't there a unique opportunity here for the ATM industry to build unheard-of economies of scale through standardizing a migration towards Windows 10 IoT Enterprise, rather than Core, uniting for the first time the independent retail ATM sector and the bank sector on a common platform? This unified technology platform would drive down costs, increase efficiencies and improve customer interfaces.

This is only one of the important questions to answer in the discussions leading us along the road to 2023. Become part of the conversation by reading Eric's detailed and informative paper, and by joining me ([mike@atmia.com](mailto:mike@atmia.com)) in our Win CE 2023 Committee!

Mike Lee, CEO ATMIA

June 2016

# Chapter 1. Introduction

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Windows XP is commonly used within the ATM industry; however, there has been much discussion around the 2014 end date for support and updates for XP.

Microsoft developed a specific operating system (OS) for personal devices and industrial components called Windows CE, and released eight different versions between 1995 and 2013.

Windows CE is used by a limited number of ATM suppliers. Triton is the largest manufacturer, with a large CE-installed base. Windows CE is estimated to be installed in 10 – 15% of ATMs worldwide.

This *CE Positioning Paper* provides background on Windows CE and Microsoft's chosen solution for small devices, Windows 10 IoT Core. It compares Windows 10 IoT Core to Windows 10 for those who are currently using Windows CE or Windows XP/7 and are assessing suitability of Windows 10 or Windows IoT Core.

# Chapter 2. Windows CE - the Basics

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## 2.1. Background

Windows CE is optimized for devices that have minimal memory; a Windows CE kernel can run with just one megabyte of memory. Devices are often configured without disk storage and may be configured as a closed system that does not allow end-user extension (for instance, it can be burned into ROM). Microsoft initially targeted Windows CE for handheld computers, but gradually focused on smart phones, gaming units and industrial devices.

A distinctive feature of Windows CE, as compared to other Microsoft OSs, is that Microsoft offers the source code for large parts of the system. Source code was first offered to vendors for hardware adaptation. However, a number of core components that do not need adapting to specific hardware environments (other than the CPU family) are still distributed in binary-only form.

Between 1995 and 2013, Microsoft distributed eight different releases of Windows CE. The last version, CE 2013, will not be supported after October 2023. With the IT industry focusing on the Internet-of-Things (IoT), Microsoft seems to have put all of its efforts into a Windows 10 subset rather than continuing with the CE line of products. With Microsoft placing limitations on Windows 7 support for certain processors, the ATM industry using Windows CE or Windows 7 may want to look for OS alternatives at its earliest convenience.

## 2.2. Windows CE in the ATM Industry

Only three vendors are known to provide Windows CE-based ATMs: Nautilus Hyosung, Triton and Genmega. These vendors selected the CE OS because patches and releases are easier and more straightforward to manage than other Windows OSs.

An estimated 10% - 15% of the global ATM estate uses a Windows CE OS. Most of these Windows CE ATMs are deployed by independent deployers on off-site locations, typically within a retail environment.

## 2.3. Minimum Requirements: Comparison to Other Operating Systems

The following table indicates that Windows CE and the chosen successor, Windows 10 IoT Core, require dramatically fewer resources and less computing power than Windows 7 and Windows 10, which are more appropriate alternatives for full desk-top solutions. Features such as Physical Address Extension (PAE), NX processor bit (NX) and Streaming SIMD Extensions 2 (SSE2) have been industry standard for quite some time, and are expected to be included in currently-delivered PCs.

	CE 2013	WINDOWS 7	WINDOWS 10	W10 IOT CORE
<b>RELEASE DATA</b>	June 2013	July 2009	July 2015	August 2015
<b>INTERNAL MEMORY</b>	No minimum, typically 8 MB	1 GB RAM	2GB RAM	512 MB (resolution dependent)
<b>STORAGE/DISC</b>	No minimum, depends on chosen components < 2GB	20 GB	60 GB	2GB
<b>CLOCK FREQUENCY</b>	No minimum	1GHz	2 GHz	400 MHz
<b>OTHER</b>			PAE, NX, SSE2	PAE, NX, SSE2

## 2.4. Windows CE Experience in the ATM Industry

ATM manufacturer Triton was an early adopter of Microsoft CE, and has provided insight into its practical use based upon its own experience.

Most ATM deployers are familiar with Windows service packs and upgrades, most of which are related to security patches. Like other hardware manufacturers who have developed security solutions based upon Windows XP, 7 and 10, Triton has developed proprietary security solutions for its CE-based products, and will continue to maintain those after the Microsoft CE sunset.

# Chapter 3. Windows IoT Core versus Windows 10

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## 3.1. Display and Hardware Requirements

A display capability is optional for Windows IoT Core; therefore, display solutions require additional custom development by ATM manufacturers. This could be a positive point for Windows XP deployers. Windows 10 requires an advanced graphics card, and therefore, screen replacement. If Windows 10 IoT Core is available soon, deployers could potentially avoid hardware upgrades to existing ATMs.

## 3.2. Device Drivers

A limitation of Windows CE is that it only supports very small devices. ATMs need a limited set of peripherals. Microsoft commented that from an architectural perspective, it seems logical to expect that Windows 10 drivers will continue to work. However, because ATM vendors are at liberty to include and exclude certain options and features, it is suggested that deployers work with their manufacturers to determine if the Windows 10 IoT Core will work well with these additional options and features.

## 3.3. CEN XFS

Extensions for Financial Services (CEN XFS) is a standard Windows feature that allows ATM operators to use multi-vendor software. CEN XFS allows deployers to use a single software stack for their ATM estate, regardless of the hardware manufacturer. Unfortunately, malware developers have started taking advantage of this as well; therefore, ATM deployers moving to Windows 10 may want to review the appropriate level of security to avoid becoming a target.

Windows 10 IoT Core does not support the CEN XFS standard, making it impossible for ATM deployers to continue to use existing software stacks.

## 3.4. Security

Windows 10 IoT Core supports the same security features as Windows 10, such as DeviceGuard. ATM operators can also lock down their ATMs completely, allowing only Microsoft applications in addition to their own applications.

There is no public information to suggest that anti-malware solutions from vendors such as McAfee, Norton and Kaspersky Lab can run on Windows IoT Core.

## 3.5. Software Code

Most PC software applications are written in C or C++, requiring a Win32 Application Programming Interface (API). This API is part of Windows 7 and XP, but absent from Windows 10 IoT Core. While porting tools may be available, the absence of the Win32 API is a significant limitation for the ATM industry.

# Chapter 4. Conclusions and Recommendations

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## 4.1. Current Windows CE Users

ATM deployers using Windows CE may ask themselves a range of strategic and tactical questions:

- ATM channel expectations  
What do I expect from my ATM channel in 2023? If ATM deployers envision a wealth of features, they need to assess whether CEN XFS is a logical requirement, which may drive the choice of OS.
- Compliance  
What are my compliance requirements? Do I need full PCI DSS compliance, including support for the OS? Does this mean I have some leeway if I can't upgrade my ATMs before the 2023 CE sunset?
- Security  
What are the security implications around the alternatives? Windows 10 and Windows 10 IoT Core come with a range of standard security features. This will require an impact assessment in situations where deployers have a choice between proprietary, Microsoft and non-Microsoft (Android, Linux) solutions.
- Hardware features  
What are the hardware features of my existing estate? Do newly-installed ATMs meet the minimum Windows 10 core specifications, avoiding hardware upgrades for OS migration projects? Does the existing estate meet the increased requirements for Windows 10 IoT Core or Windows 10?

There is no “do nothing” option. At a minimum, financial institutions should assess whether newly-deployed ATMs meet the Windows 10 IoT Core requirements, assuming that ATM manufacturers move to Windows 10 IoT Core. A CEN XFS strategy may have more impact to ATM operators if that means adopting a Windows 10 OS. It is recommended that CE-based ATM deployers analyze their options.

## 4.2. Current Windows 7/XP Users

Windows 10 IoT Core is a subset of Windows 10, but a number of features are disabled. In addition, Windows 10 IoT Core:

- Does not support Win32 code, causing sever re-developments, and
- Lacks driver availability

However, Windows 10 IoT Core does include Windows 10’s advanced security solutions, such as SecureBoot and DeviceGuard. More importantly, through Windows CE, Microsoft has proven that OSs for embedded systems are not subject to an increasing number of updates.

Fit to the ATM industry	Windows 10	Windows 10 IoT core
<i>Strengths</i>	Windows 7 compatible	Focus on embedded systems Limited support (based on CE experience) Limited costs
<i>Weaknesses</i>	Not feasible for long-lasting devices (e.g. updates, processor support) New commercial model	Compatibility issues (Win32 code)

From a mass-market viewpoint, it appears the ATM industry needs something between Windows 10 IoT Core and Windows 10:

- A basic, trimmed-down version of a commercial OS with substantial driver support and support for current software solutions
- Stability: no distractions, such as Skylake CPUs or speculations about frequent OS updates
- A clear and stable pricing mechanism (preferably low-cost)

Applying Windows 10 IoT Core for mainstream Windows 7 and XP users demands a wider industry discussion around requirements. Such discussion might allow Microsoft to decide if Windows 10 IoT Core (or an amended version) can meet the needs of the ATM industry.

## 4.3. Future Cloud-Based Architecture

In March 2016, the ATM Industry Association published a report around the impact of cloud-based thinking on the current ATM hardware and software. The report introduces the idea of conceptually splitting an ATM between slow-changing parts, such as the cash dispenser, and rapidly-changing parts, such as the PC, OS and EPP. The CEN XFS layer would be a cloud-based solution.

Assuming that a magnetic stripe is no longer needed, and the tablet can read the card through a near field communication (NFC) reader, and the tablet supports PIN entry, then the number of external components needing software interfaces is significantly reduced. Some of the current limitations may not be a future issue; however, one cannot ignore the overriding issue of short-term software compatibility.