

Technical WHITE PAPER



Extend the Life of your Mobile Applications

Microsoft Embedded Operating Systems

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Introduction

Consumer expectations based on smartphones of recent years has raised the bar in terms of innovative approaches to automation and mobility in the workplace. Enterprise applications demand ever higher levels of reliability, security and ease of use for their business critical devices.

Currently, there is a shift in technology in the works but it is still very much evolving. Android is gaining and now has greater than 40% market share in the rugged handheld category (as of Q1 2019), versus Microsoft's ~50% (mainly Windows Embedded). But the high cost to transition from Windows to Android from an application and support perspective has many enterprise customers wanting to extend current applications for at least one more hardware lifecycle.

This white paper will examine the current state of the Windows legacy operating systems along with what enterprise customers can expect from a support perspective the next 3-5 years.

Demands of the Rugged Handheld Industry

Enterprise customers demand high reliability and excellent customer service. Datalogic understands that beyond just a rugged handheld, partners and customers expect providers to deliver reliable products and top notch support. Customer loyalty is only earned by the support received from their suppliers. And length of support provided by the manufacturer is a critical factor for enterprise customers.

One of the requirements from Enterprise customers in this regard, is for their hardware supplier to provide the same or compatible device for an extended lifecycle, often 5-7 years or more. With Android devices that is quite challenging due to the annual OS upgrades and shorter platform lifecycles. However, with Windows Embedded OS, Datalogic is able to offer continuity for yet another hardware lifecycle with our X4 generation. And as described below, support for the OS by the hardware manufacturer can go on long after Microsoft has stopped their official support of the Windows Embedded kernel.

Best Legacy OS Choice: Windows Embedded Compact 7

Determining a platform of choice for mobile products is key to the success and acceptance of a product. There is always a tradeoff between high tech, new features vs. reliability, and legacy compatibility. Compatibility weighs heavily on acceptance from the enterprise due to the high investment in mission critical applications.

In 2011, Microsoft released the seventh major version of Windows Embedded Compact (CE) Operating System (also known as WEC7). As Extended Support for CE6 from Microsoft ended in 2018, WEC7 is now the platform of choice for Windows Embedded, and powers the X4 product line of Datalogic mobile computers. While WEC7 doesn't have any major architectural changes compared to CE6, it does include several new interesting features. This includes: support for gestures, IE7 with Flash, kernel support for more physical RAM, support for ARM v7, an updated network stack (NDIS 6.1 and Bluetooth 2.1 EDR), and support for TLS v1.2.



Datalogic Skorpio X4 (WEC7 device)

Most enterprise customers have a significant investment in applications, with the majority of data collection apps having been written for the legacy Windows Embedded OS. Many end customers have decided to extend the life of their legacy applications for one more generation due to the high cost to re-write the applications for Android, extensive UI changes required which impacts re-training of employees, and the potential security vulnerabilities of a consumer operating system such as Android requiring regular patches.

Maximizing the Datalogic Product Lifecycle

Microsoft has the best OS support lifecycle policy in the industry by far and provides consistent and predictable guidelines for product support to its partners starting from product release and throughout that product’s life. Fifteen years of product availability, ten+ years of support, no-cost security updates, and premier account management are key advantages of being a Microsoft OEM partner.

Following is the Microsoft Windows Embedded support lifecycle along with Datalogic’s plan for availability and support in the product offerings:

<u>Current Windows Operating System:</u>	Microsoft Extended Support End Date	Datalogic Last Sales Date (projected)	Datalogic Software Support End Date
Windows Embedded Compact 7 [WEC7] (Falcon X4, Skorpion X4, Joya Touch, Rhino II)	April 2021	Dec 2021	Dec 2024

<u>Previous Windows Operating Systems:</u>			
Windows Embedded Handheld 6.5 (Falcon X3+, Lynx)	January 2020	Dec 2019 (FX3+) Jun 2019 (Lynx)	Dec 2022 (FX3+) Dec 2020 (Lynx)
Windows Compact Embedded 6 [CE 6] (Falcon X3+, Skorpion X3, Memor X3)	April 2018	Dec 2019 (FX3+) Dec 2020 (MX3)	Dec 2022 (FX3+, SX3, MX3)

SOURCE: MICROSOFT & DATALOGIC

An important note on this subject is to remind Datalogic partners and end customers that the Microsoft Support End Dates are related to Microsoft OS core updates that Datalogic end customers would never receive directly; they are furnished to the device manufacturers only and they decide if the patch or update warrants a new firmware image (may not impact their customer use cases).

Microsoft Support Lifecycle Policy for Device Manufacturers (OEM’s)

The Microsoft Support Lifecycle (MSL) policy is a worldwide policy. However, Microsoft understands that local laws, market conditions, and support requirements differ around the world and differ by industry sector.

Therefore, Microsoft offers custom support relationships to device manufacturers such as Datalogic that go beyond the Extended Support phase. These custom support relationships include extended support and hotfix service. Also, Microsoft OEM partners, such as Datalogic, offer support well beyond the Microsoft Extended Support phase. Following is a chart summarizing the support provided by Microsoft:

Mainstream Support, Extended Support, and online self-help support (provided to MS OEM's)

Support provided	Mainstream Support	Extended Support
Paid support (per-incident, per hour, and others)	X	X
Security update support	X	X
Non-security hotfix support	X	Available to Device Mfr for added fee
No-charge incident support	X	
Warranty claims	X	
Design changes and feature requests	X	

Note A hotfix is a modification to the commercially available Microsoft product software code to address specific critical problems.

Per Microsoft, "If you own a device or solution developed with Windows Embedded software, please contact the respective manufacturer for support."

Protecting Customer's Investment: Datalogic's Support Policy

Datalogic products are strategically developed to maximize and future proof your investment. As a member of the Microsoft OEM Partner's Program, Datalogic provides support and services beyond Microsoft extended support end dates.

Unlike PCs that run an operating system out of the box, with Datalogic mobile computers - end customers never need to contact Microsoft for any support. As a device manufacturer, Datalogic takes full responsibility for the entire device including the operating system which is one part of our firmware image. Our customers need never be concerned about Microsoft's end of support policies as this has very little likelihood of having an impact on the supportability or reliability of the product, and in the end Datalogic has complete responsibility for its firmware image.

Microsoft typically stops "extended support" after 10 years for embedded products due to the maturity of the product and lack of need for further updates (theory is that the system is very stable even after a few years, but Microsoft continues to support for minimum of 10 years). Datalogic extends Microsoft's support policy to a minimum of 3 years after our announced End of Life of a Datalogic product. Datalogic has the option to request support from Microsoft even after their end of extended support, if needed.

Device downtime is not acceptable in an enterprise environment. Datalogic devices must be in constant use enabling worker productivity as expected by customers. Worldwide support coverage and well trained experts keep Datalogic customers satisfied.

Firmware Image: What is it?

Because there are various elements that make up a mobile computer system, one of them being an operating system, a container is provided to deliver features and functionality provided to end customers. These elements are contained in what is commonly referred to as a "firmware image".

Microsoft provides the operating system which is one (granted "critical") component of the overall firmware, whereas Datalogic provides many other components to offer a complete mobile device firmware image.

Datalogic goes thru an extensive product development and product validation process to ensure stability, security, compatibility with 3rd party software providers and consistency across product platform (extremely important to solution providers that expect one solution to work across Datalogic devices). The following table provides a high level view of what is contained in a Datalogic device firmware image:

Firmware Image Components

Component	Datalogic	Microsoft
Operating System Kernel (WEC7)		X
Radio Drivers*	X	
Supplicant (Security)*	X	
Scanner drivers and decoding algorithms	X	
Development Tools (SDKs)	X	X
Power Management	X	
Connectivity Management	X	
Configuration/Device Maintenance Tools	X	
Device Lockdown and Internet Browser Lockdown*	X	
Device and Application Management (MDM)*	X	
Cross Datalogic device application compatibility	X	
Backwards compatibility for customer applications (within OS constraints)	X	

* May be provided by licensed 3rd parties, certified by Datalogic

After initial product release, there is a continuous cycle of enhancements and corrective maintenance carried out by the device manufacturer (Datalogic) with firmware images. This process includes all activities for the diagnosis and correction of any defect along with updates and enhancements including:

- Defects reported by customers or discovered by Datalogic Quality Assurance team.
- Updates from Microsoft, Datalogic software components or third parties, such as the Wi-Fi driver, the RIL driver, software libraries for scan engine, the tools inside the control panel, SDK software, etc.

Prior to releasing a firmware image, it goes thru rigorous testing cycles and customer validations. New releases must be backward compatible with previous versions and must meet compliance of the product to market demands, legislation, environmental interventions and alignment with other Datalogic products.

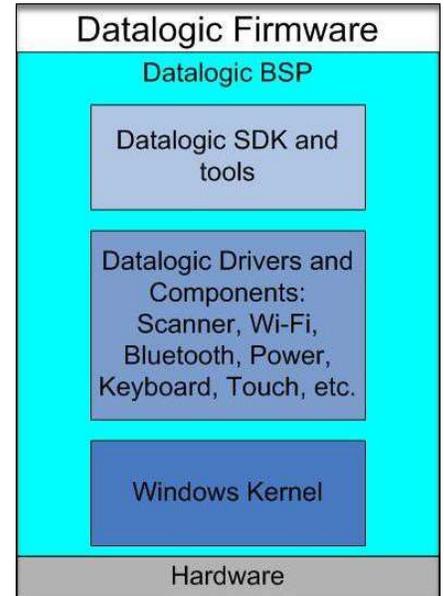
Security landscape in the Windows Embedded world

The Windows Embedded OS market is a very niche market that operates mostly in isolated supply chain environments such as retail store operations or warehouses. For instance, a Windows Embedded customer may be running a browser-based or terminal emulation application that serves as a data collection front end to the customers' WMS system. Typically these systems are WiFi only within a customer's private network.

In comparison to the Desktop Windows OS (or even Linux or MacOS), Windows Embedded has a relatively obscure, small installed base. In this niche, usually closed environment market, security threats are not as prevalent. Security hackers are just not as interested in Windows Embedded systems. Compared to conventional IT systems, the security of embedded systems is less of a concern as they are harder to penetrate. Windows Embedded devices are largely special-purpose devices that operate in a private closed enterprise network surrounded by firewalls, and perform a specific task. These devices don't need as many feature updates as consumer devices and are generally perceived as more stable and secure.

Datalogic provides you with the extra support for your Windows devices

With support nearing the end from Microsoft, many customers may start to worry about the usability and stability of their Windows based devices. While that is a valid worry, customers should not forget the future of their devices depends on the device manufacturer more so than it does on the OS provider (Microsoft). In Windows Legacy/Embedded, the device manufacturer (such as Datalogic) is responsible for the OS and actually maintains critical parts of the source code. The manufacturer maintains the firmware and underlying BSP (Board Support Package), ensuring the validity and soundness of the software running on the handheld devices. Datalogic is part of the embedded OEM program with Microsoft. We contract with Microsoft annually and pay for extended support to be able to provide the support our customers need. Datalogic is also part of the Microsoft private source code program where we have rights and access to critical parts of the code. This gives us the ability to leverage our experienced embedded developers to ensure our firmware is running smoothly years after Microsoft's end of support.



Conclusion: Take your time to transition

Enterprise customers with mission critical applications must decide when is the right time to re-write all their applications for Android, as this seems inevitable. But the cost is high and is certainly not required until 2022 - 2024 timeframe when legacy Windows devices will no longer be sold and support is approaching the end. Meanwhile, Datalogic Windows Embedded Compact 7 devices are readily available and will be supported for years to come.

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Datalogic Group

Datalogic is a global leader in the automatic data capture and process automation markets, specializing in the design and production of bar code readers, mobile computers, sensors for detection, measurement and safety, RFID vision, and laser marking systems. Datalogic solutions help increase the efficiency and quality of processes in the retail, manufacturing, transportation and logistics, and healthcare industries along the entire value chain.

The world's leading players in these industries use Datalogic products, certain of the attention to the customer and of the quality of the products that the Group has been offering for 47 years. Today Datalogic Group, headquartered in Bologna (Italy), employs approximately 3,200 staff worldwide, distributed in 28 countries, with manufacturing and repair facilities in the U.S.A, Brazil, Italy, Slovakia, Hungary, Vietnam, China, and Australia. In 2018, Datalogic had a turnover of 631 million Euros and invested over 61,9 million Euros in research and development, with an asset of more than 1,200 patents in multiple jurisdictions.

Datalogic S.p.A. is listed in the STAR segment of the Italian Stock Exchange since 2001 as DAL.MI. Find more information about Datalogic at www.datalogic.com.

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