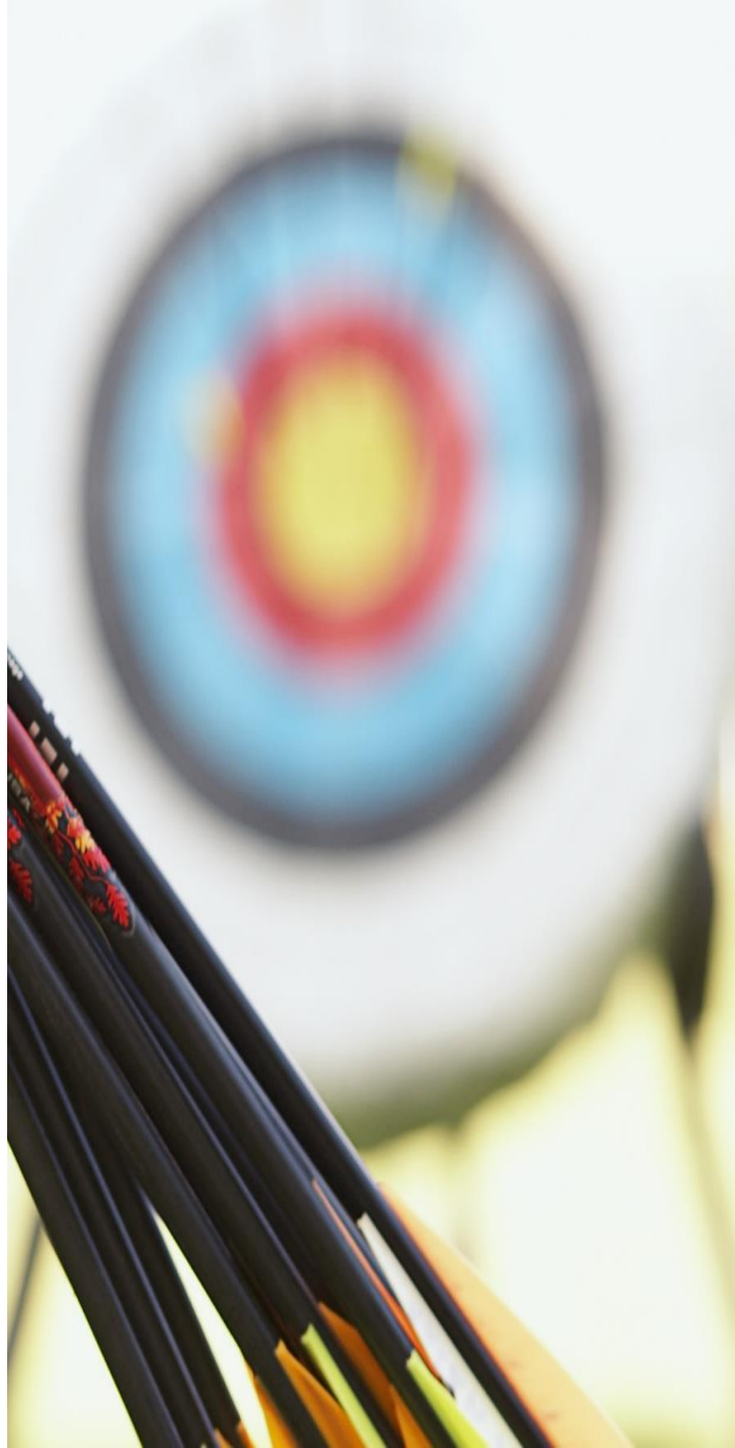
Windows Tech Series

Introduction to Windows 10 IoT

Windows

Objectives

- Review Windows 10 IoT capabilities and philosophy
- Show how to build Windows 10 IoT devices and solutions
- Identify the key features of each Windows 10 IoT edition



Windows 10 IoT Overview

Microsoft IoT – solutions from device to cloud

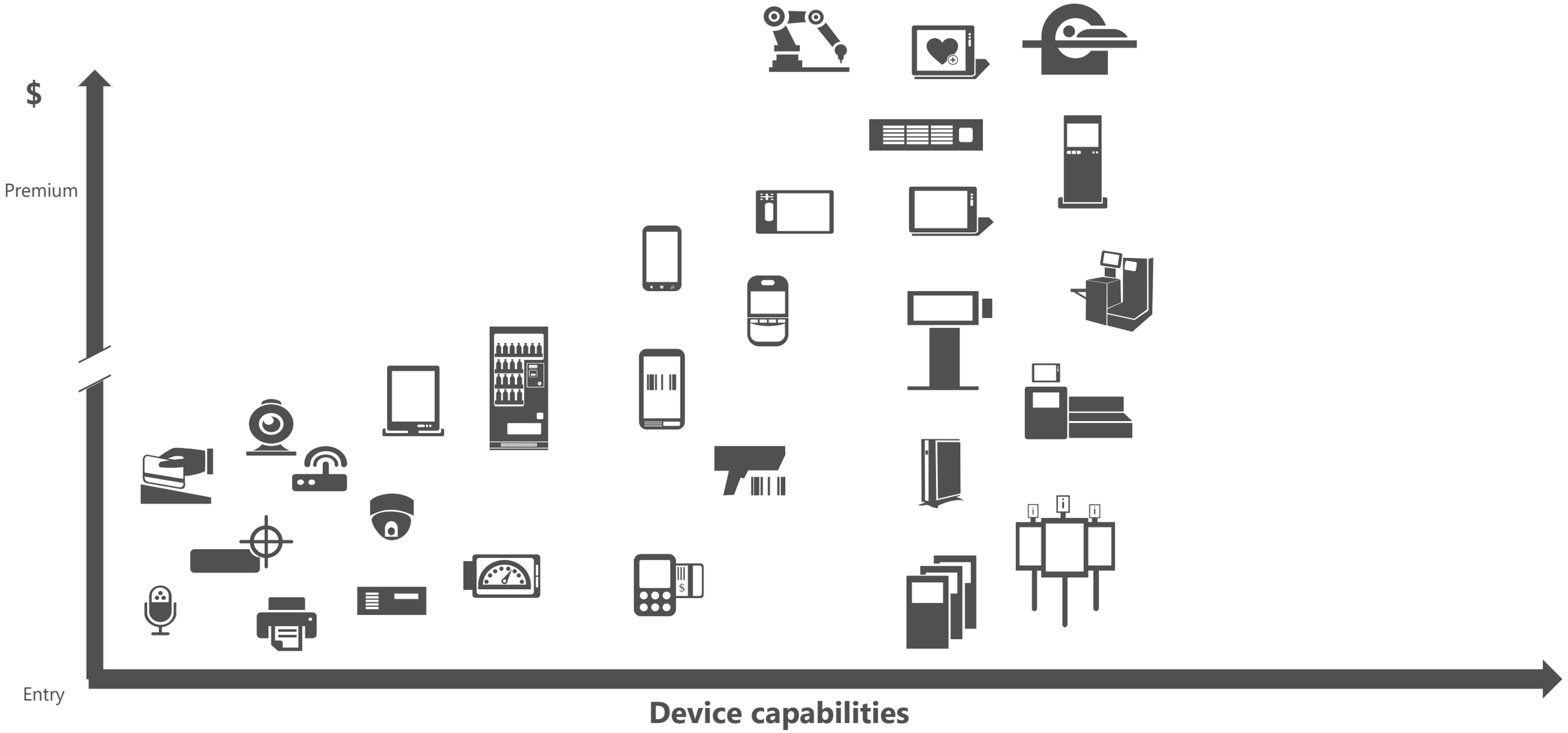
Windows

IoT editions power a broad range of devices
20 years of history in embedded devices
One Windows platform for all devices
Enterprise-ready, maker-friendly
Designed for today's IoT environments
Free IoT core edition!

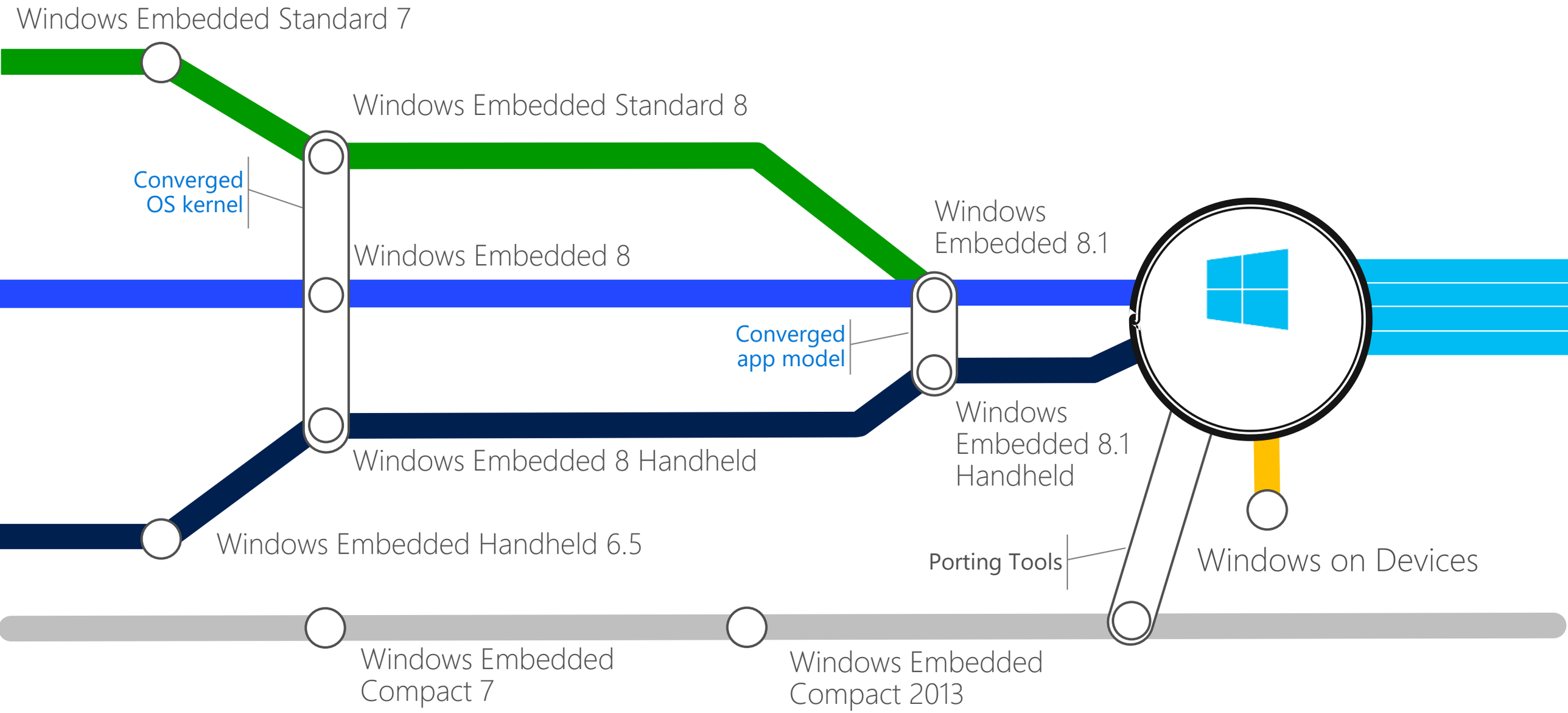
Azure IoT

Cloud-based IoT services and solutions
Easy to provision, use and manage
Pay as you go, scale as you need
Global reach, hyper scale
End-to-end security and privacy
Windows, Mbed, Linux, iOS, Android, RTOS support

Windows for industry devices



Platform convergence journey



One Windows Platform

One Windows Platform

IoT Gateways

Handheld Terminals

Thin Clients

Industry Tablets

POS Terminals

Digital Signs

ATMs

Industry Robotics

Medical Devices

Security

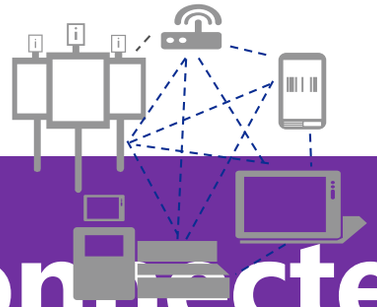
Secured

Secured Identities

Secured Data

Secured Devices

Connectivity



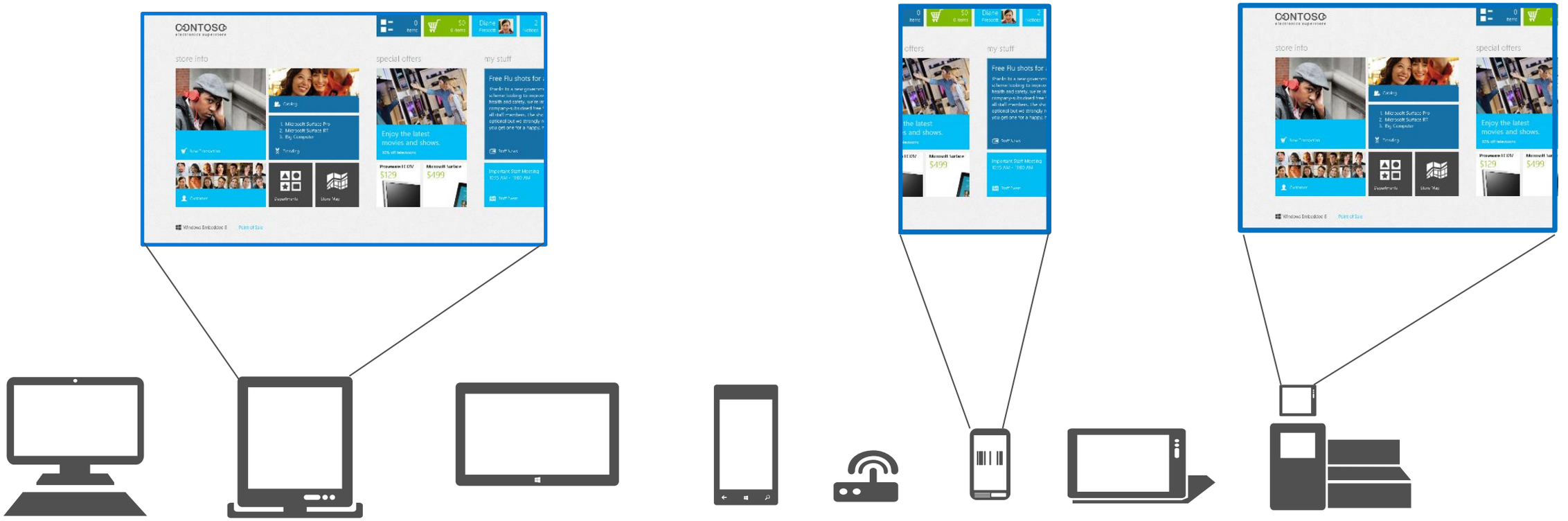
Connected

Interoperability across devices

Easy incorporation of sensors and peripherals

Seamless connectivity to Microsoft Azure

One Windows – scale app investments



Universal Windows Platform
Common and Consistent APIs

One Windows – Universal App Platform

- **Converged** APIs, write **ONE** universal app and target all Windows 10 editions
- **Scale** and get **higher ROI** by selling same app to all Windows 10 editions
- Re-use **existing development skills**

Universal Windows Platform

Common and Consistent APIs

Languages
- C++ /CX
- C#, VB
- JS
- Python
- Node.js

UI Frameworks
- HTML
- Xaml
- DirectX

APIs
- WinRT
- Win32
- .NET

Deployment and Execution
- APPX
- App Isolation

Tools
- Visual Studio
- PowerShell
- SSH

Universal driver – benefits

If you are using	Required actions … if any	Benefits
Inbox/Class drivers	• It just works! Core device types storage, mouse, keyboard, touch, video, and so on	**Your device automatically leverages a large ecosystem of peripherals**
Kernel Mode drivers	• High backwards-compatibility for converged device areas • Make minimal changes and test	**Your driver runs on more editions**
User Mode drivers and services	• Know that Windows Universal Platform Win32 API surface is smaller than desktop Windows • Use replacement APIs where available • Redesign/re-implementation if APIs are not available and test	**Your driver runs on more editions**

Porting existing apps/drivers for IoT Core

- Compared to Windows desktop, UWP/UD **API surface is rich** but smaller
- Use **app migration tool** to analyze compatibility of your apps

If you are using (not supported on small devices)	**Instead use**
App logic and code	
Win32/Native	Win32/Native in OneCore.lib (subset of Desktop API surface)
.NET libraries	.NET libraries supported in UWP (subset of Desktop .NET APIs)
Graphic User Interface	
GDI, MFC, WinForms, WPF	XAML, DirectX, HTML

Building Windows IoT Devices and Solutions

Building IoT devices with UWP

"Embedded" Mode

- Extend UWP to IoT capabilities on all Windows 10 editions

Access to system settings

- APIs to change system settings, such as power state, radio control and Bluetooth

APIs to access busses

- GPIO, I2C, SPI and easy access to custom hardware

Background services for long running tasks

- Hardware monitoring and service hosting

Building devices – access to device hardware

UWP enables:

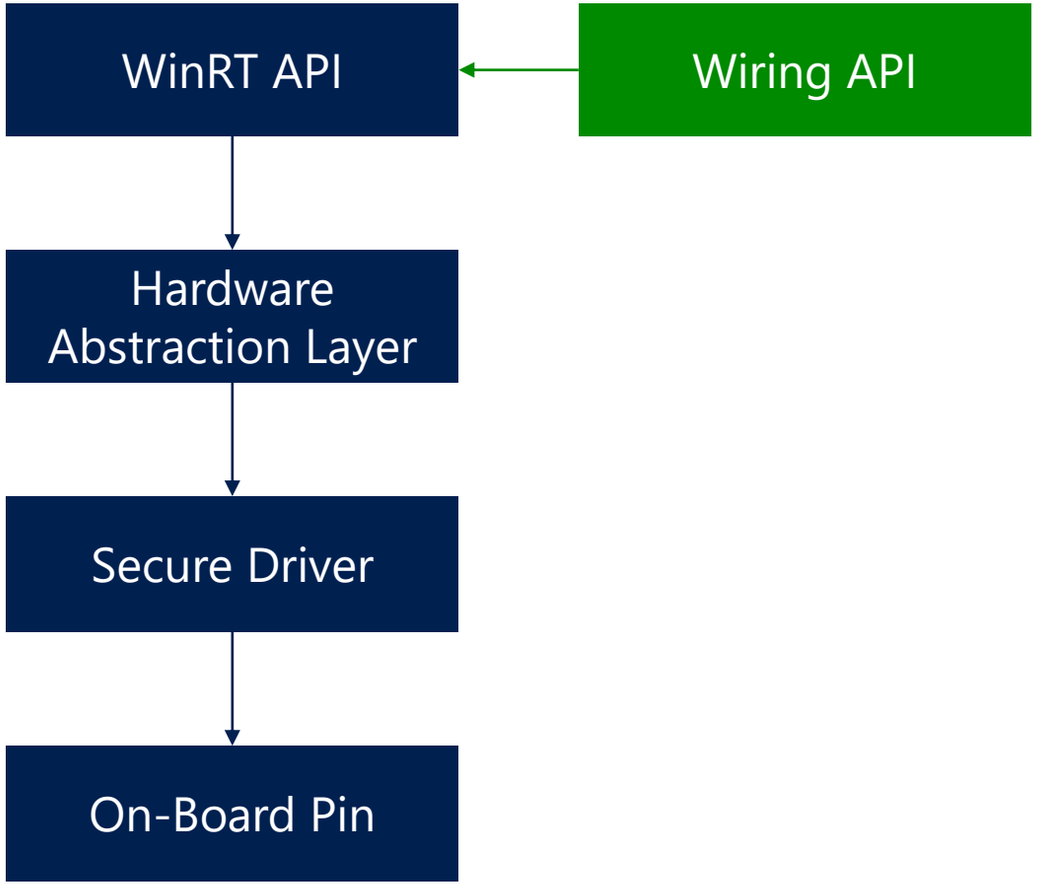
- Apps to perform Bluetooth pairing, discovery and discoverable modes using Bluetooth APIs
- Wi-Fi Direct Incoming/Connect APIs
- ISVs to author apps that interact with connected cash drawers:
  - Network-connected (using IP address)
  - Bluetooth-connected (using MAC address)
  - Query for capabilities
  - Open the cash drawer
  - Obtain data and statistics

UWP access to custom hardware

Support external component(s) connected through standard busses

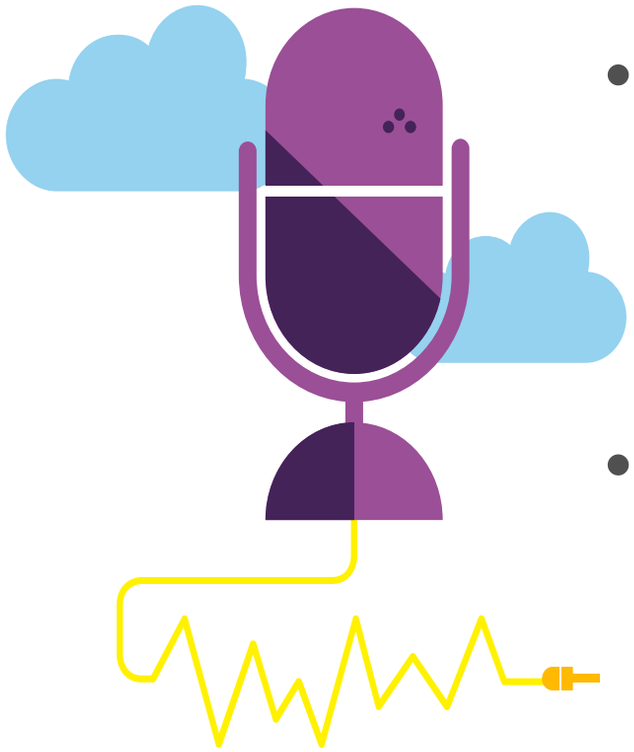
Classes:

- GPIO (General Purpose Input/Output)
- I2C (*I squared C*)
- SPI (Serial Peripheral Interface)
- Custom



Easily integrate and communicate to sensors, microcontrollers and other small peripherals

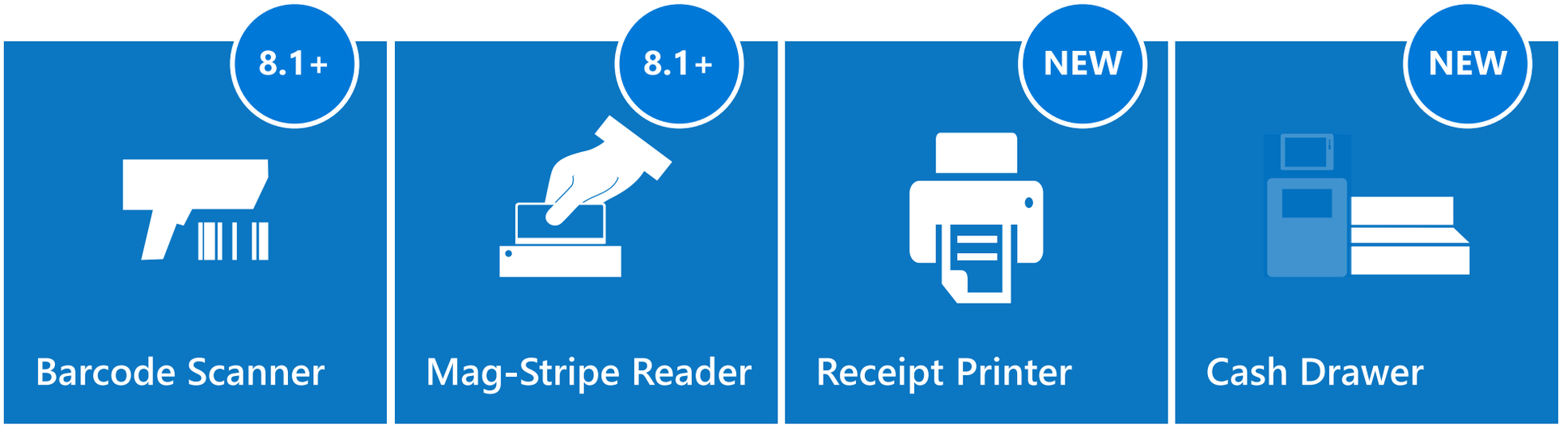
Cloud-enabled language processing



- Bing Cloud Speech
  - Speech interpretation via knowledge graph (recognition of relative time expressions, and so on)
  - Search
  - Dictation
- Project Oxford – add image and speech processing to any app via a web request
  - Face Detection, Face Verification, Speech to Text , Text to Speech, Vision Feature Analysis, Optical Character Recognition, Vision Thumbnails
- Language Understanding Intelligent Service (LUIS-beta)
  - Pre-built world-class models to recognize entities like places, times, numbers, temperatures, and common requests (for example, set an alarm for 08:00)

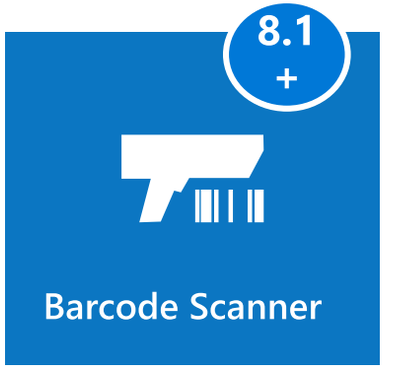
Building devices – retail line of business solutions

Retail Peripherals Supported Inbox



- APIs in Windows 10 SDK and DDK
- Adapted from UnifiedPOS standard

Barcode Scanner



- Windows 8.1+
  - WinRT API for Barcode Scanner
    - New with Windows 8.1/Handheld 8.1
    - Adapted from UnifiedPOS standard
    - 93 barcode symbologies supported
    - Driver defined profiles (aka scanner settings)
  - Device Support Story
    - Supported

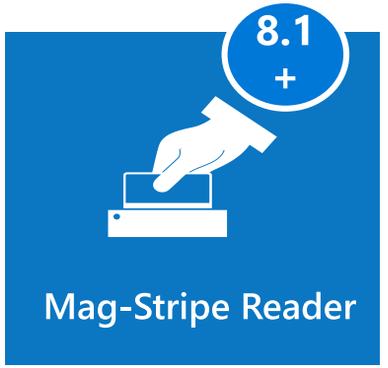
    USB.HID.Scanner (Class Driver)
    - Not Supported

    USB.HID.VendorSpecific

    Bluetooth

- Windows 10
  - Windows 10/Windows Mobile SDK
  - Converge Windows/Handheld Implementations
  - Expose driver interfaces in DDK
  - Enterprise deployment of Scanner Profiles
  - Updated sample code for UWP

Magnetic Stripe Reader



- Windows 8.1+
  - WinRT API for Mag-Stripe Reader
    - New with Windows 8.1/Handheld 8.1
    - Adapted from UnifiedPOS standard
  - Device Support Story
    - Support hard coded for:

Magtek MagneSafe (VID:0801 PID:0011)
Magtek Dynamag (VID:0801 PID:0002)
IDTech SecureMag (VID:0ACD PID:2010)
IDTech MiniMag (VID:0ACD PID:0500)

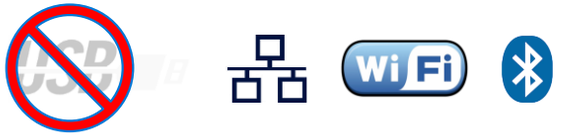
- Windows 10
  - Windows 10/Windows Mobile SDK
  - Converge Windows/Handheld Implementations
  - Expose driver interfaces in Windows DDK
  - Support OEM VID/PID for compatible models via INF
  - Updated sample code for UWP

Receipt Printer

- Windows 10
  - WinRT API for POS Printer
    - Windows 10/Windows Mobile SDK
    - Adapted from UnifiedPOS standard

Station	API	Interfaces
Receipt Printer	●	●
Slip Printer	●	
Journal Printer	●	

  - Device Support Story
    - ESC/POS printer control language
    - Network and Bluetooth connectivity



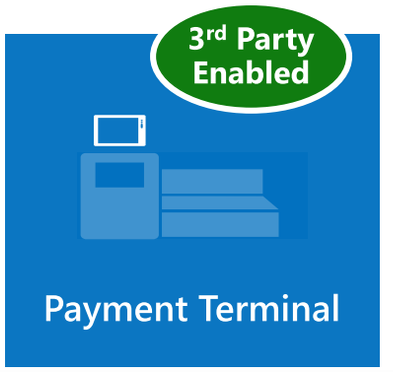
Cash Drawer

- Windows 10
  - WinRT API for Cash Drawer
    - Windows 10/Windows Mobile SDK
    - Adapted from UnifiedPOS standard
  - Device Support Story
    - Network and Bluetooth connected Cash Drawers
    - Legacy Cash Drawers via DK port on Receipt Printer

Payment Terminal

- Third-party Enabled Solutions

Proprietary Interfaces
Third-party provided libraries
Distributed via LoB application



Universal Application

- Payment Terminal Library 1
- Payment Terminal Library 2
- ⋮
- Payment Terminal Library n

Microsoft Point of Service (POS) for .NET

UnifiedPOS interoperability for desktop applications:

OEM or Enterprise can attach and use standard Point of Service (POS) peripherals using inbox software

.NET class library for Unified Point of Service standard

Use proven OS development tools

Video codecs included in Windows 10

Codec\Format	Desktop	Mobile	IoT Core (x86)	IoT Core (ARM)
MPEG-1	✓			
MPEG-2	✓			
MPEG-4 (Part 2)	✓	✓	✓	
H.265	✓	✓	✓	✓
H.264	✓	✓	✓	✓
H.263	✓	✓	✓	
VC-1	✓	✓	✓	✓
WMV7/8/9	✓		✓	✓
WMV9 Screen	✓		✓	
DV	✓			
Motion JPEG	✓	✓	✓	✓

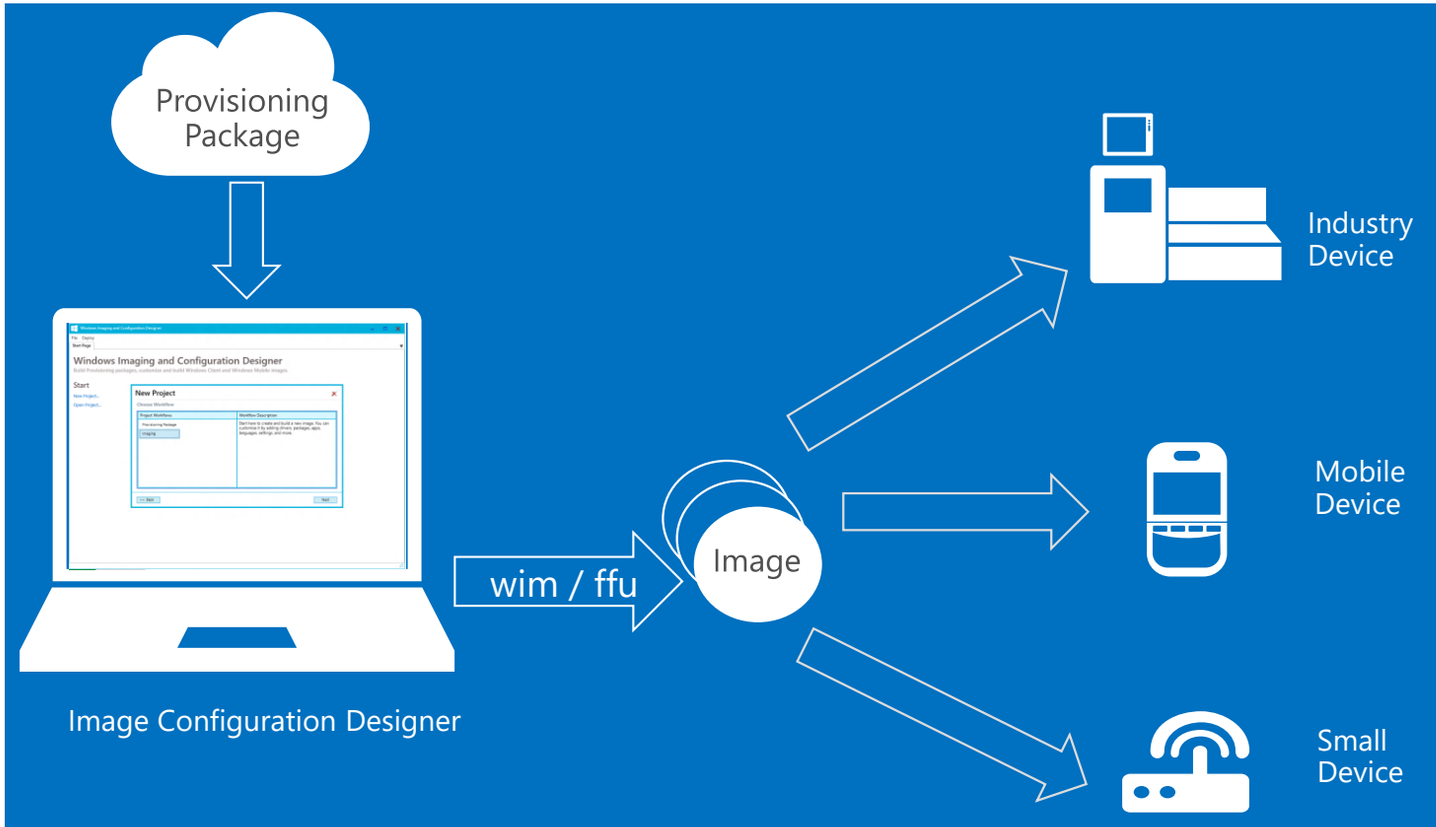
For more details, see the MSDN “Supported codecs” page, at:
https://msdn.microsoft.com/en-us/library/windows/apps/mt282148.aspx

Audio codecs included in Windows 10

Codec\Format	Desktop	Mobile	IoT Core (x86)	IoT Core (ARM)
AAC	✓	✓	✓	✓
AC3	✓	✓	✓	
EAC3 / EC3	✓		✓	
ALAC	✓	✓	✓	✓
AMR-NB	✓	✓	✓	✓
FLAC	✓	✓	✓	✓
G.711 (A-Law, µ-law)	✓	✓	✓	✓
GSM 6.10	✓	✓	✓	✓
IMA ADPCM	✓	✓	✓	✓
LPCM	✓	✓	✓	✓
MP3	✓	✓	✓	✓
MPEG-1/2	✓		✓	✓
MS ADPCM	✓	✓	✓	✓
WMA 1/2/3	✓	✓	✓	✓
WMA Pro	✓	✓	✓	✓
WMA Voice	✓		✓	✓

Configure OS to Create Device Experience

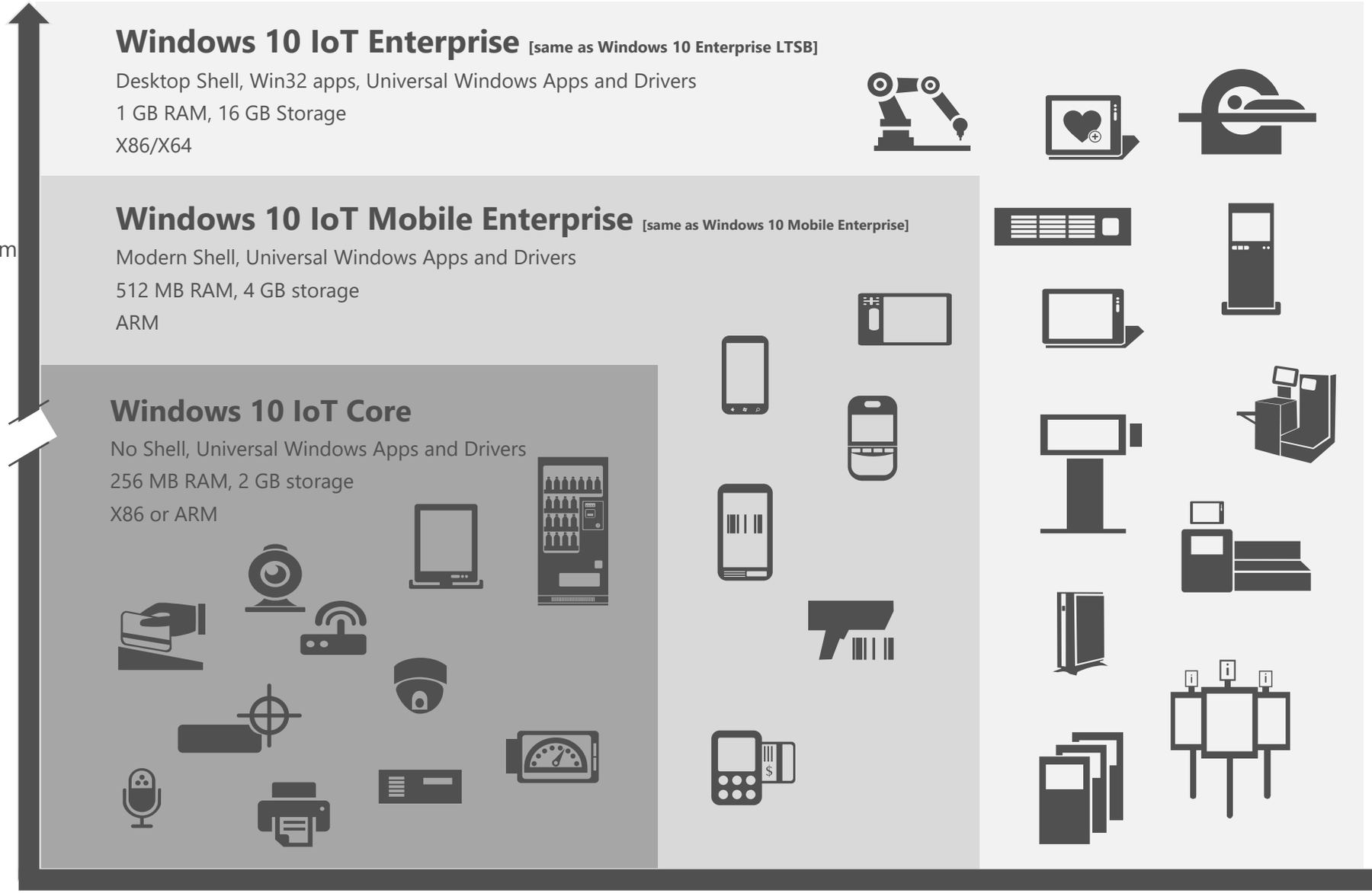
- Image Configuration Designer (ICD) making it easier for Enterprises to customize the Device Experience



1. Customize with Universal Applications, Drivers, Configuration settings
2. Design-in Lockdown settings
3. Customize experience including startup screen
4. Test experience on target device

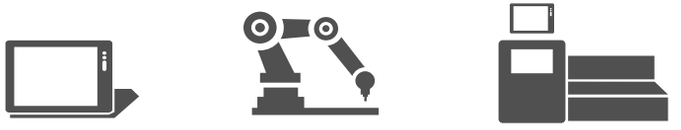
Introduction to Windows 10 IoT Editions

Window 10 IoT editions



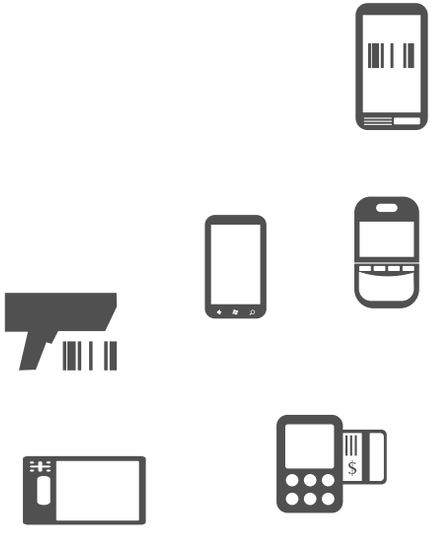
Windows 10 IoT Enterprise

- *Same bits as Windows 10 Enterprise*
- Designed for industry devices, such as ATMs, thin clients, point-of-sale (POS) devices, medical devices and industrial devices
- Provides the full capabilities of Windows 10 Enterprise, with advanced lockdown capabilities for line-of-business use
- Supports both Universal Windows apps and Classic Windows applications



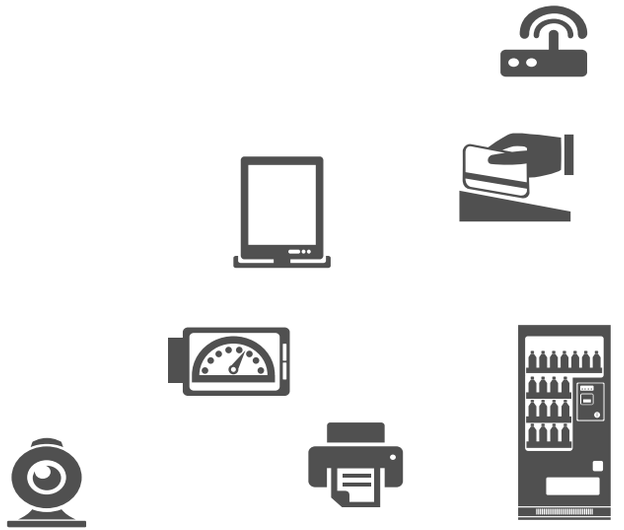
Windows 10 IoT Mobile Enterprise

- *Same bits as Windows 10 Mobile*
- Designed for mobile industry devices such as handheld terminals and mobile POS devices
- Supports Universal Windows apps and additional integrated peripherals and sensors
- Supports multiple user profiles



Windows 10 IoT Core

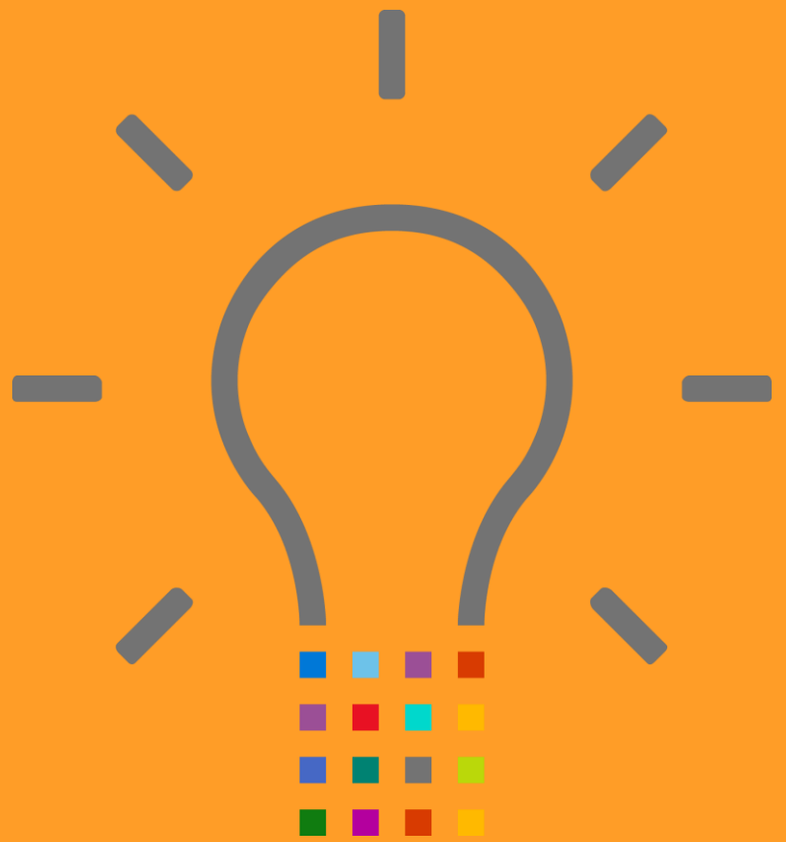
- Optimized for small-footprint, low-cost devices such as gateways supporting Universal Windows apps
- Designed for single-purpose devices; does not include the Windows desktop shell or consumer apps
- Available in two editions:
  - **Royalty-free**
  - **Pro**



Module review

In this module, you learned about:

- Windows 10 IoT capabilities and philosophy
- How to build Windows 10 IoT devices and solutions
- The key features of each Windows 10 IoT edition



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