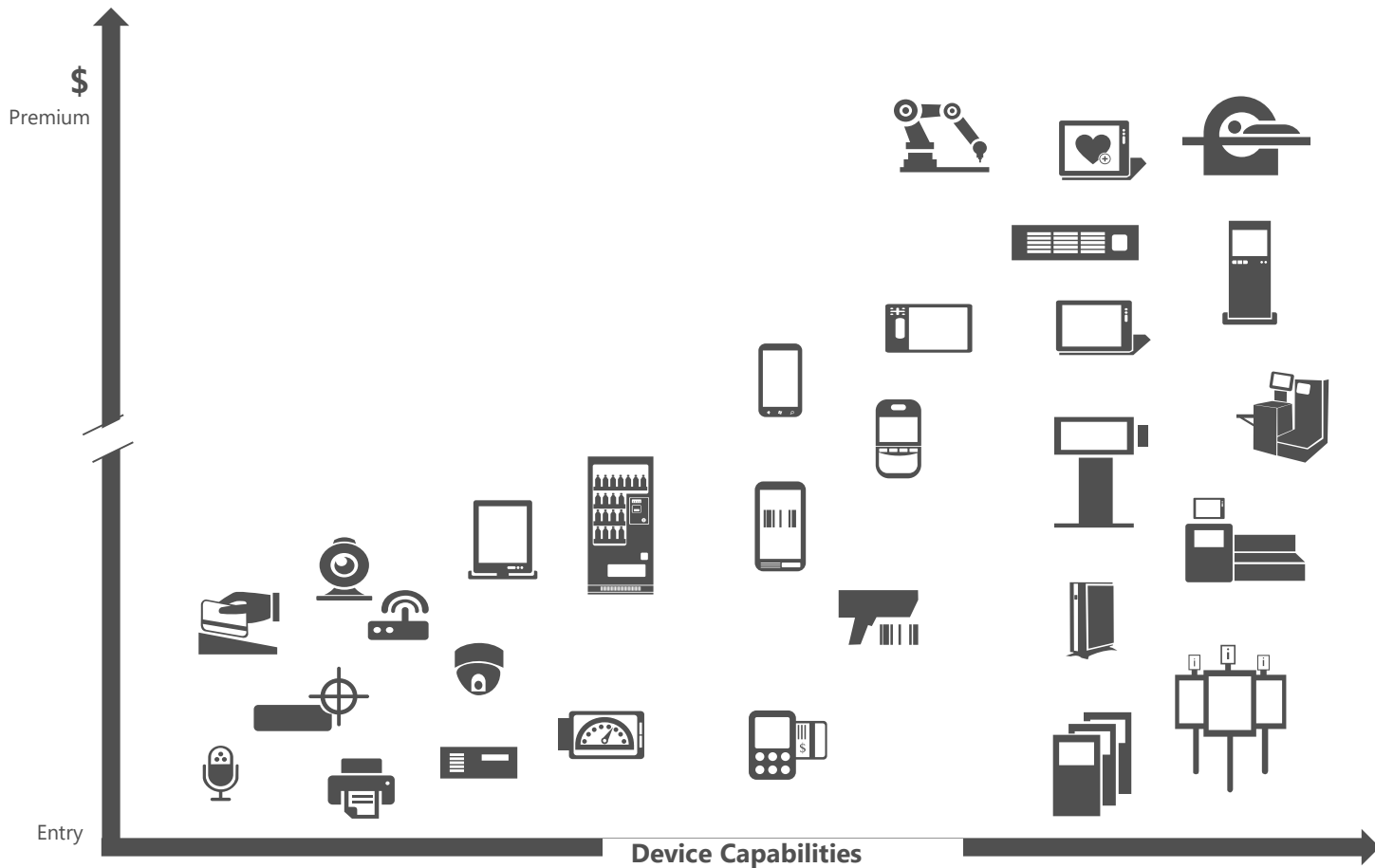


# Windows 10 IoT Technical Overview

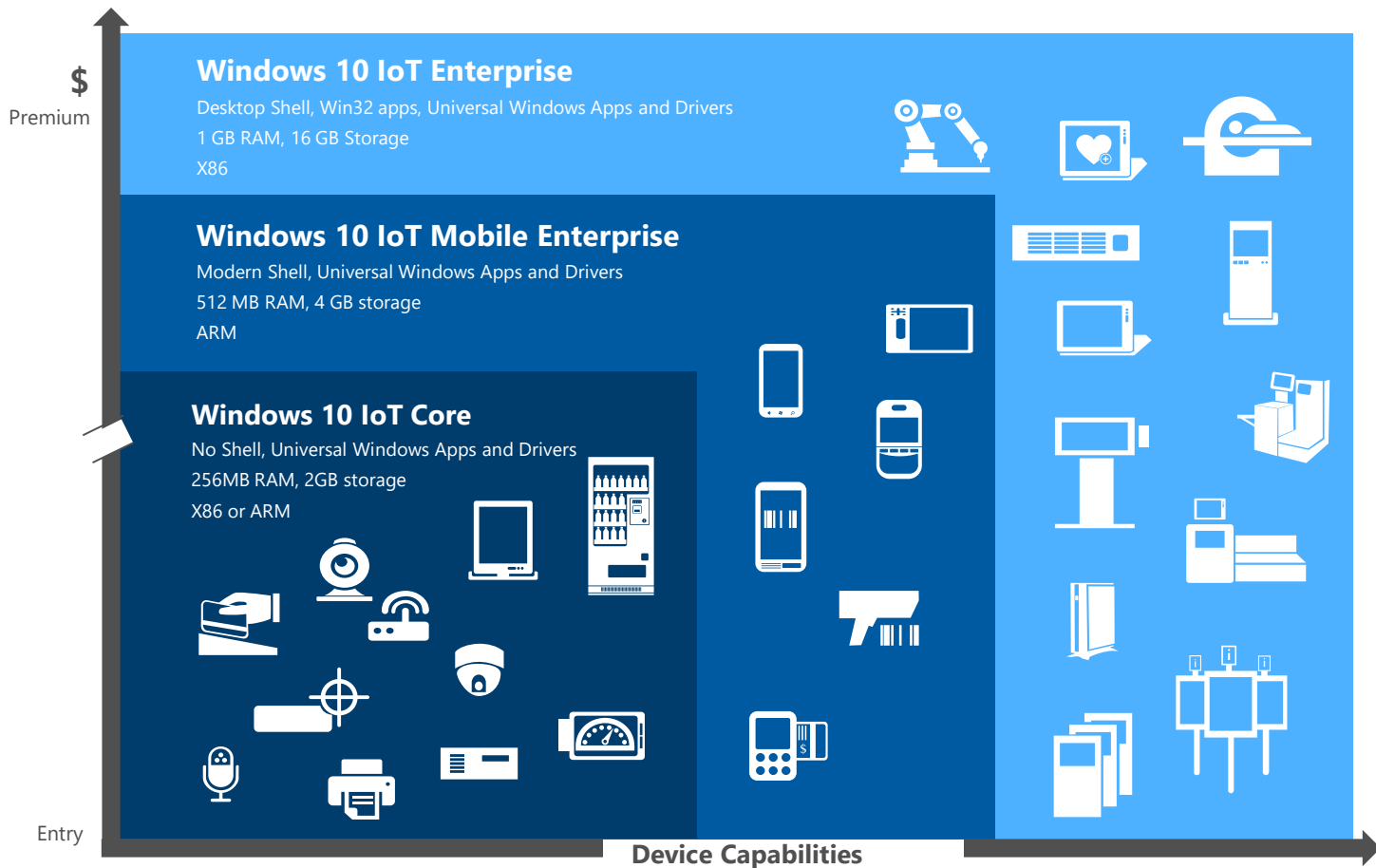
---

**이창섭** 부장  
IoT Device Experience  
Microsoft

# Windows Devices



# Windows 10 IoT





# One Windows Platform



IoT Gateways	Handheld Terminals	Thin Clients	Industry Tablets	POS Terminals	Digital Signs	ATMs	Industry Robotics	Medical Devices
-----------------	-----------------------	-----------------	---------------------	------------------	------------------	------	----------------------	--------------------

# Secured



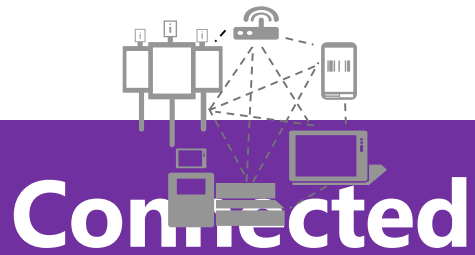
Secured Identities



Secured Data



Secured Devices



Interoperability  
across devices



Easy incorporation  
of sensors and  
peripherals



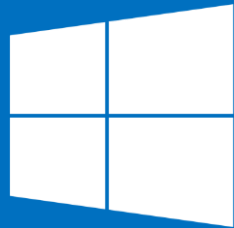
Seamless connectivity  
to Microsoft Azure

# Windows 10 IoT Enterprise

The full version of Windows 10 Enterprise with  
advanced lockdown capabilities

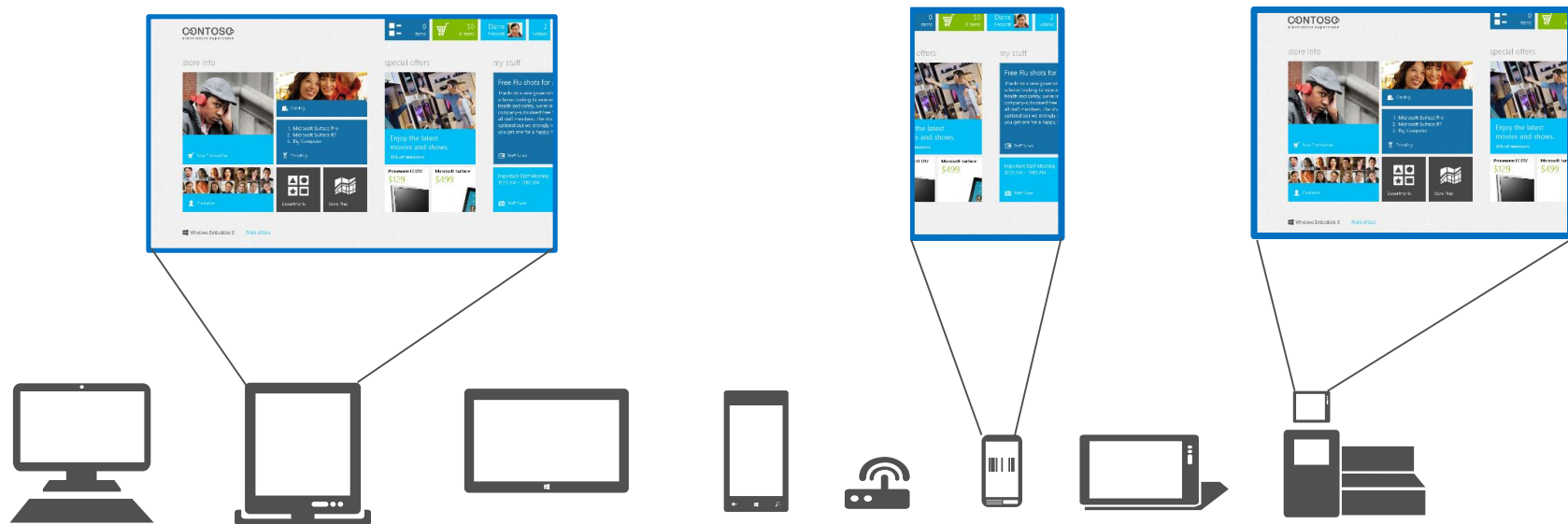
Classic Windows applications and Universal  
Windows apps for mission critical industry devices

# One Windows Platform





# Scale App Investments Across All Windows 10 Editions



**Universal Windows Platform**  
Common & Consistent APIs

# 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 OEMs/ODMSs

Reuse **existing development skills**



## Universal Windows Platform Common & Consistent APIs

### Languages

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

### UI Frameworks

- HTML
- Xaml
- DirectX

### APIs

- WinRT
- Win32
- .NET
- Wiring

### Deployment and Execution

- APPX
- XCopy
- App Isolation

### Tools

- Visual Studio
- PowerShell

# 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

# Windows Universal Driver Platform

Write **ONE** Universal Driver and target all Windows 10 editions - **Converged** device areas/APIs  
**Scale** and get **higher ROI** by selling same components to all Windows 10 editions OEMs/ODMSs

We scanned over **100k drivers** to create a **universal driver API set** for you



## Windows Universal Platform

Common & Consistent Device Driver APIs

WDF  
Audio  
Bluetooth  
Buses (USB, SPB)  
HID(Retail), Buttons  
Camera  
Graphics & Display

Location  
Networking - Wired  
Networking - WLAN  
Security - Biometrics  
Security - Crypto  
Security - Smartcard  
Security - TPM

NFC  
Sensors  
Thermal  
Touch  
UEFI  
Video

# Why move to Universal Driver?

If you are using	Actions to take	Why
Inbox/Class drivers	<ul style="list-style-type: none"><li>• It just works! core device types Storage, mouse, keyboard, touch, video,...</li></ul>	<b>Your device automatically leverages a large ecosystem of peripherals</b>
Kernel Mode drivers	<ul style="list-style-type: none"><li>• High backwards-compatibility for converged device areas</li><li>• Make minimal changes and test</li></ul>	<b>Your driver runs on more editions</b>
User Mode drivers and services	<ul style="list-style-type: none"><li>• Know that Windows Universal Platform Win32 API surface is smaller than desktop Windows</li><li>• Use replacement APIs where available</li><li>• Re-design/re-implementation if APIs are not available and test</li></ul>	<b>Your driver runs on more editions</b>

# Device Management for Windows 10 IoT Devices

One Windows Platform



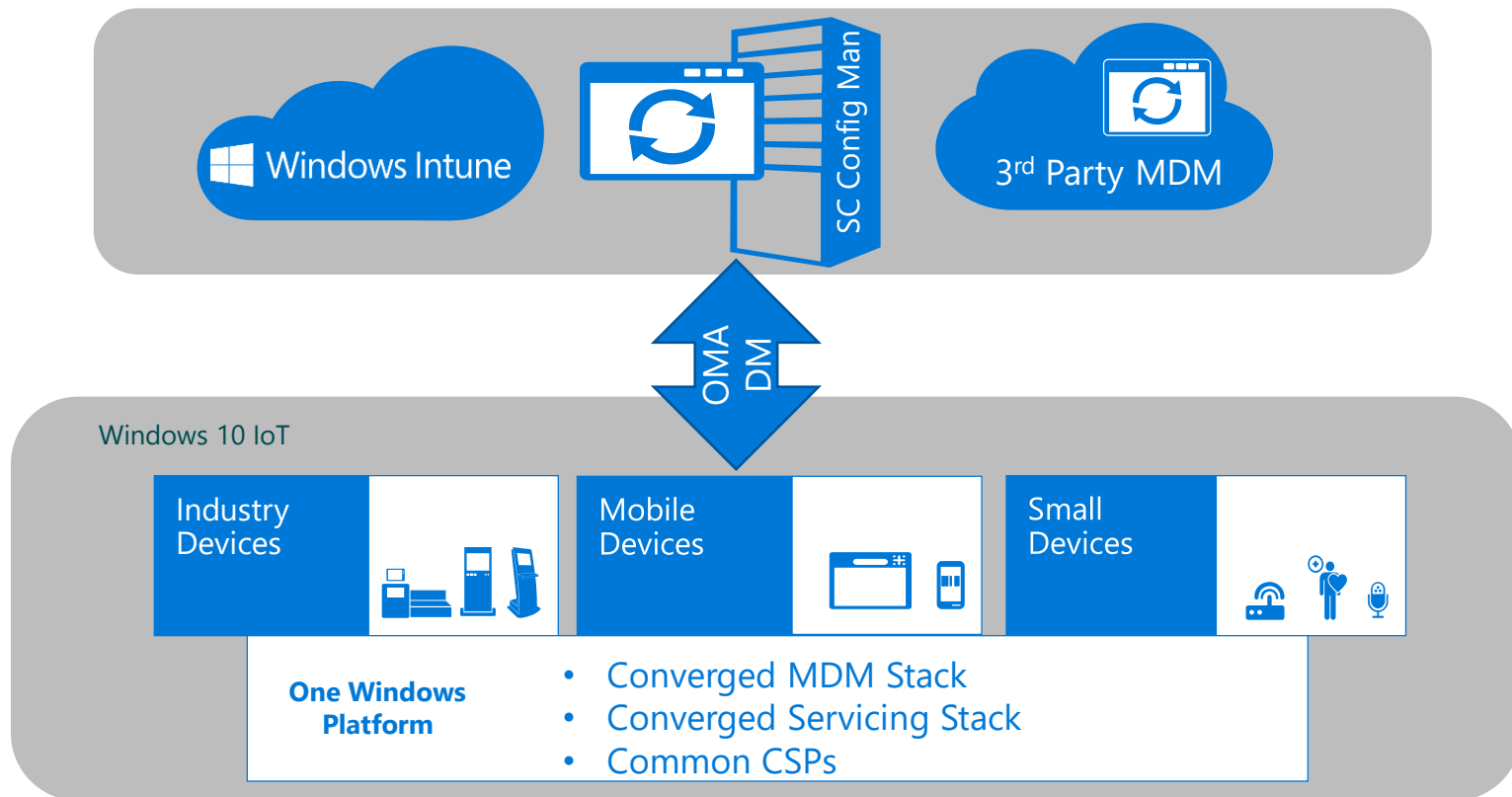
Consistent across  
PC/mobile and Industry  
Devices

1<sup>st</sup> and 3<sup>rd</sup> part support

Advanced MDM support

# Consistent Device Management

for all Windows 10 IoT devices



# Tools

## ADK & ICD

One Windows Platform



Same tools across PC,  
Phone and now IoT

Easier to customize the  
Device Experience



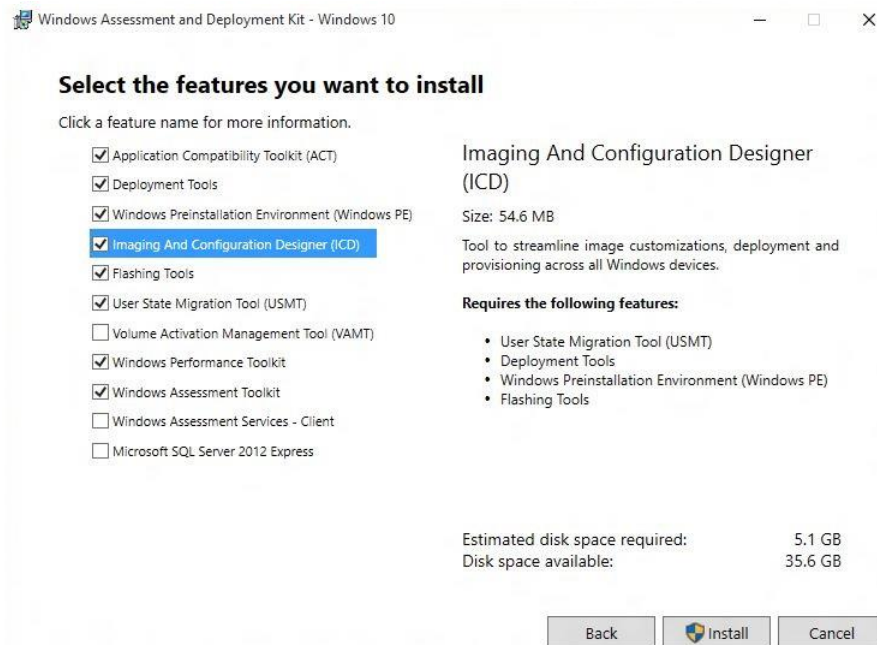
# Windows Assessment and Deployment Kit ( ADK)

Windows Assessment  
Toolkit

Windows Performance  
Toolkit

NEW

Windows Imaging and  
Configuration Designer



# Configure OS to create your device experience

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

The screenshot displays the Windows Imaging and Configuration Designer (ICD) application. On the left, a blue sidebar contains a 'Provisioning Package' cloud icon with a downward arrow, and two buttons: 'New provisioning package' and 'New Windows image customization'. The main window is titled 'Windows Imaging and Configuration Designer' and shows a 'Create' tab with 'Project\_1' and 'Lockdown2' tabs. The 'Available customizations' pane on the left lists deployment assets, including Settings, Accounts, Certificates, Commands, Connections, ConnectivityProfiles, DeviceManagement, EditionUpgrade, Folders, FRX, KioskModeApp, KioskModeAppSettings, Maps, ModernAppInstall, ModernAppUninstall, and Policies. The 'Policies' pane on the right shows a list of policies with their current configuration status:

Policy	Status
AllowActionCenterNotifications	NOT CONFIGURED
AllowAddingNonMicrosoftAccountsManual	NOT CONFIGURED
AllowAddProvisioningPackage	NOT CONFIGURED
AllowAllTrustedApps	NOT CONFIGURED
AllowAutoConnectToWiFiSenseHotspots	NOT CONFIGURED
AllowAutoUpdate	Numeric only; Default = 1
AllowBluetooth	NOT CONFIGURED

The bottom status bar indicates 'READY', '0 Customizations', '0 Invalid', 'WORKFLOW: PROVISIONING PACKAGE', and 'IMAGE: COMMON TO ALL WINDOWS EDITIONS'.

# Secured



# Enterprise Grade Security for Mission Critical Devices



Next Generation  
Credentials

BitLocker

Device Guard

# Advanced Lockdown for Mission Critical Devices

Create a consistent and predictable device and user experience for Line of Business apps



# Lockdown Comparisons

	Windows Embedded 8.1 Industry Pro		Windows 10 IoT Enterprise
Lockdown Capability	Feature Mapping		
Protect devices physical storage media	Unified Write Filter	----->	Unified Write Filter
Boot fast to a know state on the device	HORM	X	
Suppress Windows UI elements displayed during Windows logon and shutdown	Embedded Logon	----->	Embedded Logon
Block edge gestures	Gesture Filter	----->	Assigned Access
Block hotkeys and other key combinations	Keyboard Filter	----->	Assigned Access / Shell Launcher
Launch a desktop app on login	Shell Launcher	----->	Shell Launcher
Launch a Universal Windows app on login	Application Launcher	----->	Assigned Access
Suppress system dialogs & control processes that can run	Dialog Filter	----->	AppLocker & MDM policies
Suppress toast notifications	Toast Filter	----->	MDM & Group policies
Configure lockdown features	Embedded Lockdown Manager	----->	ICD / Provisioning package(s)
Restrict USB devices / peripherals on system	USB Filter	----->	MDM & Group policies
Launch a Universal Windows app on login plus lock access to system	Assigned Access	----->	Assigned Access
Custom brand a device by removing and/or replace Windows UI boot elements	Embedded Boot Experience / Unbranded Screens	----->	Embedded Boot Experience / Unbranded Screens
Suppress Windows UI elements displayed during logon and logoff	Embedded Logon	----->	Embedded Logon

# Connected



# Bringing it all together



## The latest connectivity options

Ethernet, Mobile Broadband – MBB USB Class driver, OEM BSP support  
Wi-Fi, Wi-Fi Direct, Bluetooth, BTLE

## Your devices work together

Device interoperability with open standards

## Sensor access from Universal Windows apps

Directly interact with hardware busses to build innovative IoT devices

## Sensor to Cloud

Azure services to build IoT solutions



# Interoperability across devices - AllJoyn

Discovery

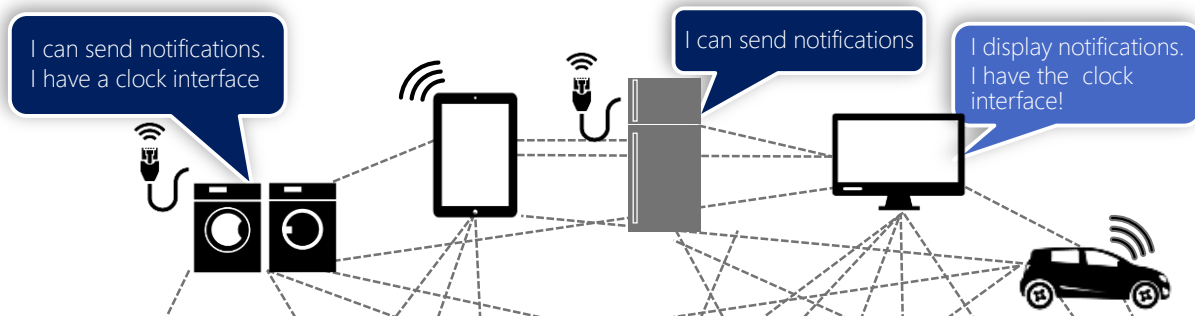
Security

Management

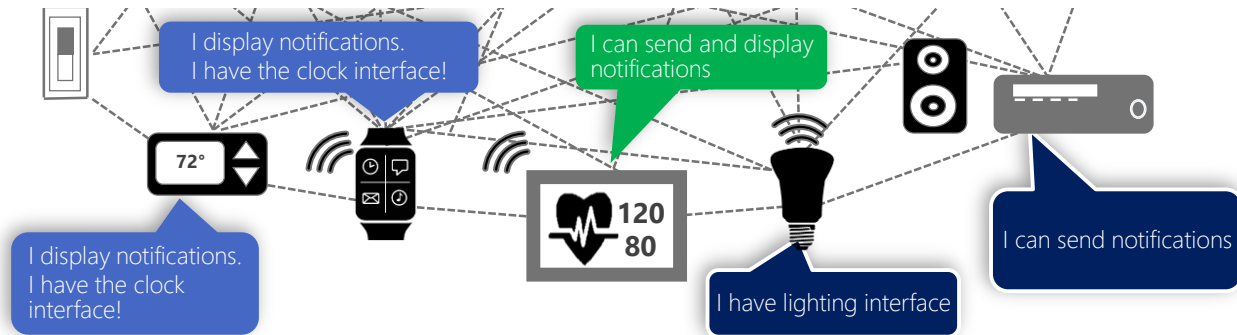
Interoperability

Open Source

Cross Platform



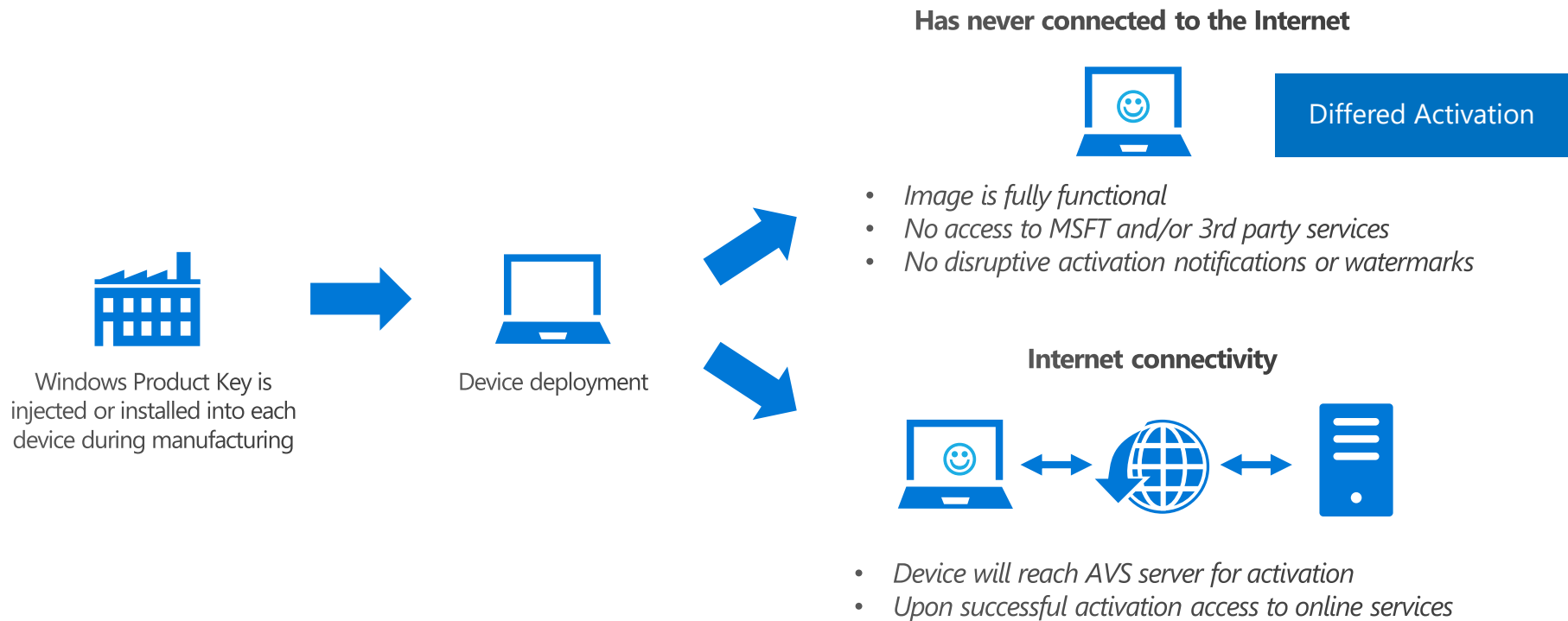
## Your Devices Work Together Across Protocol and Ecosystem Barriers



# Activation

Reduced barriers to build & deploy devices on Windows 10

# Activation States for Windows 10 IoT Enterprise



*Note: Activation failure UX will be appear if activation fails*

# **Servicing for Mission Critical Systems**

Windows 10 IoT  
Enterprise

Long Lifecycle Support

Enterprise class support  
for your mission critical  
systems keeping you  
in control

# Servicing Cycle for Windows 10 IoT Enterprise

## LONGER LIFECYCLE

Maintain 10 year support lifecycle

## SECURITY UPDATES

Continue monthly security updates

## NO FREQUENT FEATURE UPDATES

Receive monthly security updates for designated rollups for 10 years after release

Microsoft will designate a long term support rollup every 2-3 years



### **Device Servicing**

OEM provides Customer security updates obtained from My OEM, and Customer deploys them via WSUS, Intune, System Center, or 3<sup>rd</sup> party MDM solution

### **New device**

OEM builds devices using RTM bits obtained from SOC



# Where to you get updates?

Updates will be posted through MyOEM and WU

Enterprise LTSB can pick up updates from the OEM who get them from MyOEM

Enterprise LTSB can also pick up updates from WU

# Min System Requirements

for Windows 10 IoT Enterprise OS only

Component	Windows 10 IoT Enterprise
Processor	1 GHz or faster (x86)
RAM	1GB for 32-bit processors 2GB for 64-bit processors
Storage	Storage = 16GB (20GB for 64-bit processors) SD card = optional
Display	800 x 600
Graphics card	DirectX 9 or later with WDDM 1.0 driver
Connectors	Optional
Wireless	Optional
Accelerometer & Proximity Sensor	Optional
Touch	

[Reference online for the latest System Requirements](#)

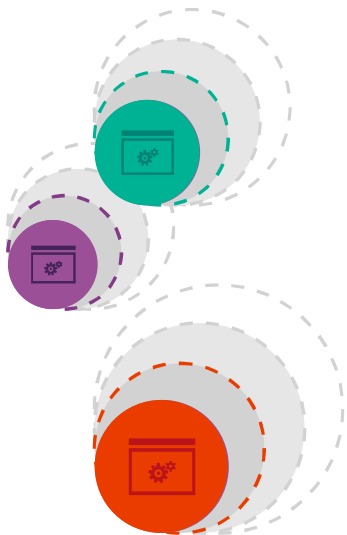
# Windows 10 IoT Core

## Technical Overview



# Core Devices

Windows 10 IoT Core is designed specifically for small, low cost devices



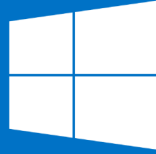
- Target both ARM and x86 and only support Universal apps (no classic Win32/.NET app);
- Target devices with lower system requirements, i.e., processor speed, RAM, storage, etc. (e.g. 256MB RAM available for OS, 400MHz, 2GB storage)
- No Windows certification requirements

# Windows 10 IoT Core – Servicing capabilities

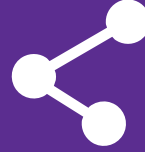
	Windows 10 IoT Core SKU	Windows 10 IoT Core Pro SKU
Capabilities	Current Branch (CB)	Current Branch for Business(CBB)
Recommended OEM use scenario	Consumer type devices	Enterprise devices
Value of the latest features as they are released	✓	✓
Ongoing security updates for the lifetime of the branch	✓	✓
SCCM/Intune hybrid support	✓	✓
feature upgrade required to stay supported	✓	✓
WSUS support to stage and deploy updates by pulling from MU Catalog		✓
Several months to consume feature updates		✓
Ability to turn off auto-updates and set maintenance window		✓
License cost	No Royalty	Low cost licensing*

\* Contact your distributor or Microsoft representative for details

**One Windows  
Platform**



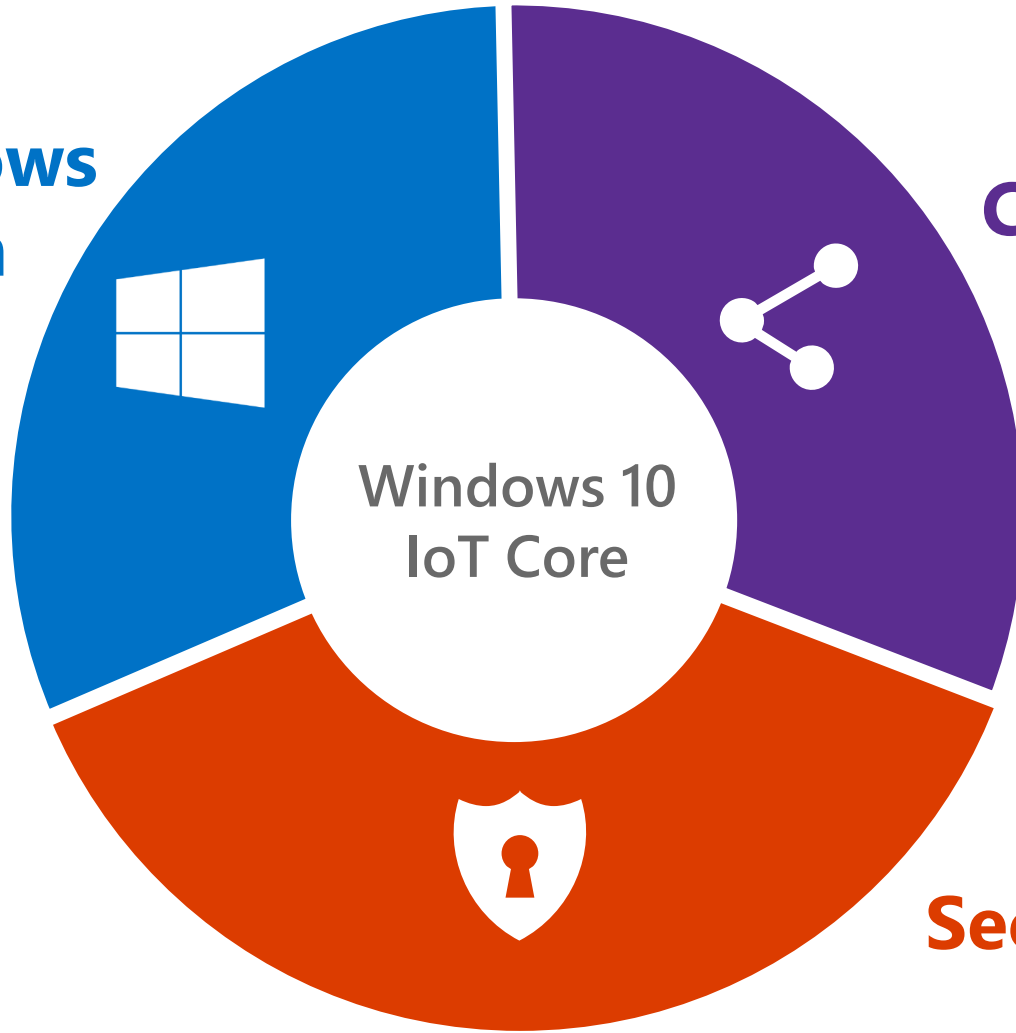
**Connected**



**Secure**



Windows 10  
IoT Core



# Building IoT Devices with UWP

## "Embedded" Mode

Access to system  
settings

APIs to access  
busses

Background  
Services for long  
running tasks

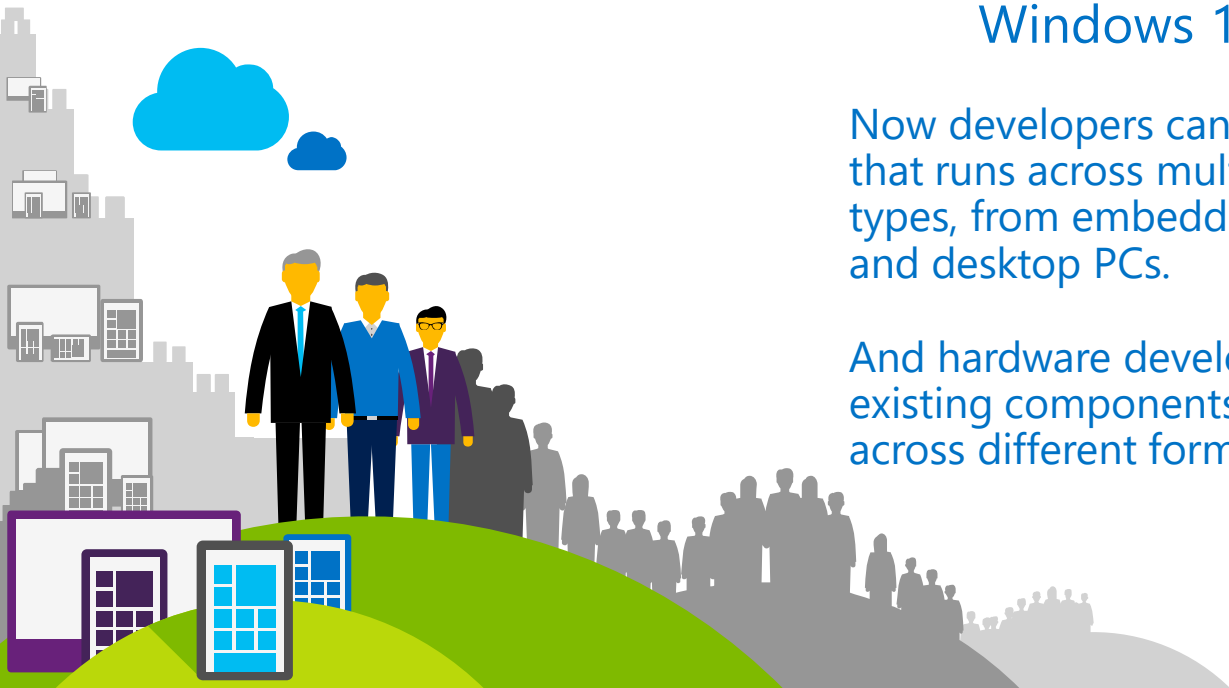


# Leverage Universal Windows Drivers

## Leverage Universal Windows Drivers for Windows 10 IoT Core

Now developers can create a single driver that runs across multiple different device types, from embedded systems to tablets and desktop PCs.

And hardware developers can use their existing components and device drivers across different form factors.



# Reuse existing code

You don't have to start from scratch!

New API Porting Tool

Verifies how much of your  
existing code will run on  
Windows 10 IoT Core

Identifies equivalent APIs

100  
10101010  
1011100010  
10101010

100  
10101010  
1011100010  
10101010

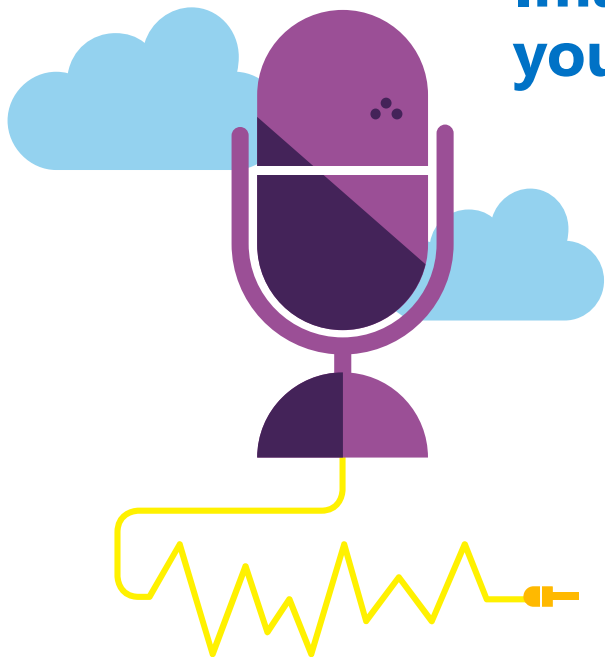


# Design devices with and without displays



Windows 10 IoT Core is optimized for devices with and without displays

# Vision, speech, and sensor perception



**Imagine the powerful industry scenarios  
you can unlock with:**

**Computer Vision -OpenCV**

**Windows Sensor & Perception APIs**

**Speech Recognition and Synthesis APIs**

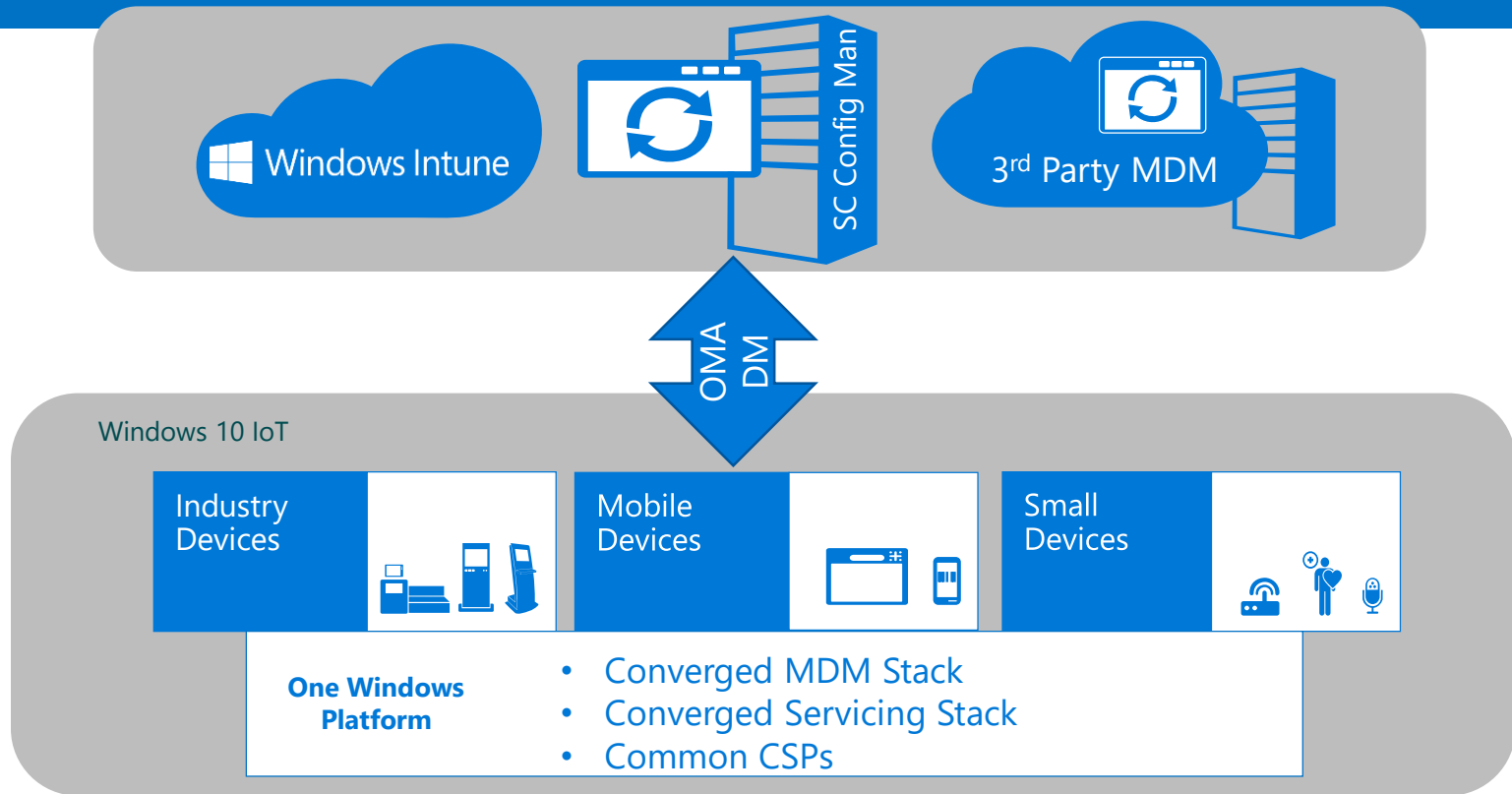
**Bing Cloud Speech**

**Project Oxford**

**Language Understanding Intelligent Service (LUIS-beta)**



# Consistent device management



# Broad Silicon Support



Quad-core ARM Cortex-A7 CPU  
1GB LPDDR2 SDRAM  
Micro SD, Ethernet, USB, HDMI

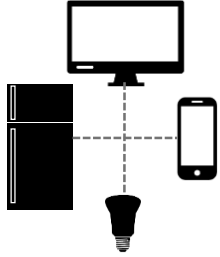


Intel Atom E3800 Processor  
1GB DDR3 RAM  
Micro SD, Ethernet, USB, HDMI

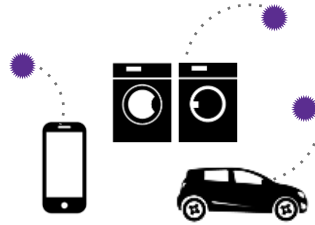


Qualcomm  
1GB LPDDR3, .GB eMMC  
Micro SD, WiFi, BT 4.1 + LE, GPS

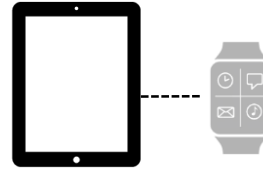
# AllJoyn solves challenges ...in an open interoperable way



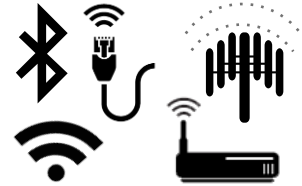
**DISCOVER**  
nearby friendly devices



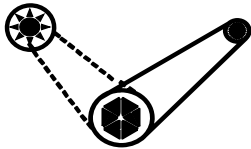
**IDENTIFY**  
services running  
on those devices



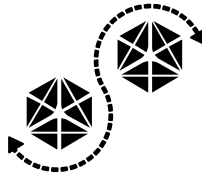
**ADAPT**  
to devices coming  
and going



**MANAGE**  
diverse  
transports



**INTEROPERATE**  
across different OSes



**EXCHANGE**  
information and  
services



**SECURE**  
against nearby bad actors

# Bring it all together

Connect and scale  
with efficiency



Windows 10 IoT



Analyze and act  
on new data



Analytics

Device Registry

Rules and Actions

Dashboards & Visualization

Integrate and transform  
business processes



**SAP**

**salesforce**

Microsoft  
Dynamics

**ORACLE**

**IBM DB2**

**WebSphere**

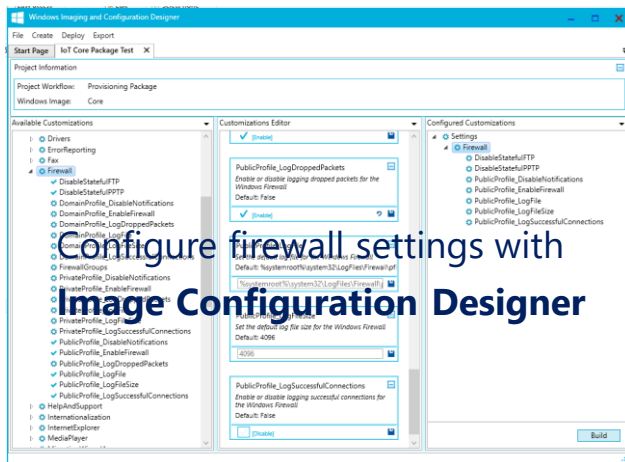
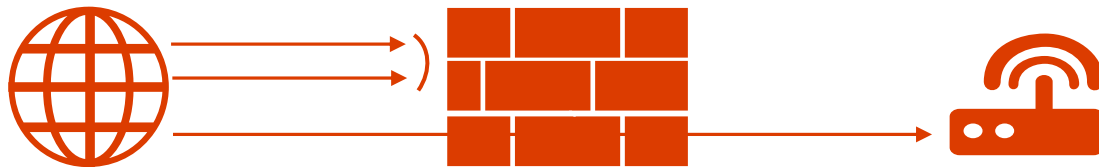
**Informix**  
software

**twitter**

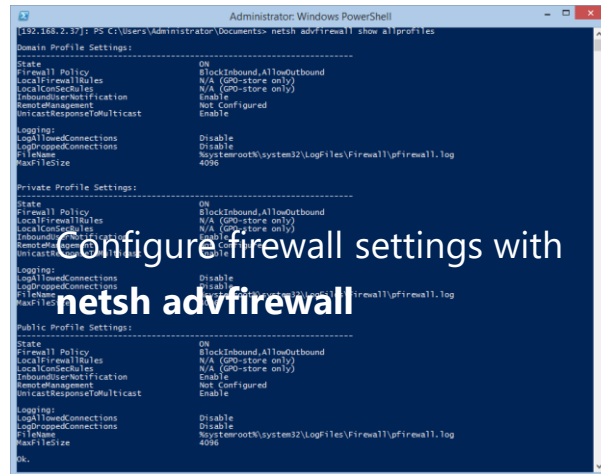
**Office 365**

# Windows Firewall

Blocking inbound connections except those you specifically allow



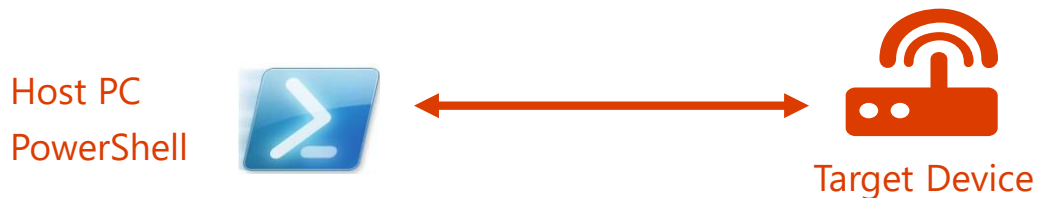
Configure firewall settings with  
**Image Configuration Designer**



Configure firewall settings with  
**netsh advfirewall**

# Secure Remote Device Connection

Trusted relationship between your host PC and your device



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) 2014 Microsoft Corporation. All rights reserved.

PS C:\WINDOWS\system32> set-Item WSMan:\localhost\Client\TrustedHosts -Value 172.31.0.65

WinRM Security Configuration.
This command modifies the TrustedHosts list for the WinRM client. The computers in the TrustedHosts list might not be
authenticated. The client might send credential information to these computers. Are you sure that you want to modify
this list?
[Y] Yes [N] No [S] Suspend [?] Help (default is "Y"): Y
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32> Enter-PSession -ComputerName 172.31.0.65 -Credential Administrator
[172.31.0.65]: PS C:\Users\Administrator\Documents>
```



10101  
01010  
00100

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01010  
00100

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01010  
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00100

# What this means to you

Windows 10 IoT Core is **one platform** that scales across all device form factors with leading **connectivity** to and **enterprise-grade security** for small devices.

With Windows 10 IoT Core, OEMs can **leverage existing skills and investments**, build on a platform that is **always innovating** to meet tomorrow's evolving demands.

