Agenda

Windows 10 Device Programs
Windows 10 Key Features
Windows 10 Hardware Investments
Continuum
Documents that Empower the Ecosystem

Windows Engineering Guidance
Focused on documenting guidance to build products that deliver best in class user experience

Hardware Compatibility Program
Communicates Windows engineering requirements for firmware, drivers and if implemented features to ensure application and device compatibility
Available at RTM

Minimum HW Specification
Lists the minimum hardware required based off of engineering constraints to run Windows
Available prior to RTM
Scope of Compatibility Program and Kit

Windows Compatibility Program
• Covers Desktop & Server
• No Program for Mobile & IoT

Hardware Lab Kit (HLK)
• Validation for Desktop, Server, Mobile
• Full test coverage for Desktop & Server
• Capable of validating Mobile but not all areas have tests
Windows
Hello:
Biometric face and fingerprint authentication
Develop Biometric Devices

Windows Hello Face Authentication

- Factory install the latest drivers and firmware & make updates available on Windows Update
- Design to current MSDN guidance on Windows Hello hardware specifications and testing requirements
  - Ensure there is ample IR Illumination for environments with high ambient light
  - Provide a sufficient field of view (FOV) to enable quick and natural enrollments and device unlocks
  - Enable concurrent RGB – IR device access support

Windows Hello Fingerprint Authentication

- Fingerprint components must pass Windows 10 HLK for Fingerprint and also complete Windows Hello security review
Cortana:
Now available above the Lock Screen
Designing for Cortana with Voice

Standard Specs for Cortana with Voice

- Normal ambient noise level test ($\geq 57$ dBA SPL)
  - Test $85\%$ Accuracy within 0.5m

- Ensure your driver exposes
  - Number of microphones
  - Microphone gain
  - Correct microphone geometry
  - Audio Pipeline being used
Windows Ink
## Windows Ink and Active Pen

### Deliver Active Pens and Controllers

<table>
<thead>
<tr>
<th>IHVs</th>
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</thead>
<tbody>
<tr>
<td>• Support the Microsoft Pen Protocol in your active pen and touch controller IC’s</td>
</tr>
<tr>
<td>• Align with <em>Pen and Touch Windows Compatibility guidelines for Windows Digitizer Class Input Devices</em> on MSDN</td>
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<tr>
<td>• Accurate within .5mm in the center of the screen</td>
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<tr>
<td>• All pens must have an eraser and support hover</td>
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<tr>
<td>• All supported by an in-box class driver that eliminates the necessity for any drivers</td>
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<table>
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<tr>
<th>ODMs / OEMs</th>
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<tr>
<td>• Bundle a Windows 10 Compatible Active Pen with support for the Microsoft Pen protocol with your device</td>
</tr>
<tr>
<td>• Ask your touch controller IHVs for simultaneous pen &amp; touch</td>
</tr>
</tbody>
</table>

### Pens that support Microsoft Pen Protocol

| • Sunwoda – derrick@sunwoda.com |
| • APS – lenaliu@aps-sz.com |
| • Wacom – ide.nobutaka@wacom.co.jp |
Windows 10 Hardware Investments
Touch

Platform
• Now universal across Desktop and Mobile
• Touch Input now supported via Miracast UIBC

Pen + Touch
• Enable simultaneous pen and touch experiences on capable touch ICs

Improvements
• Investments to improve touch input based on telemetry
Precision Touchpad

**Gestures**
- Four finger swipes to switch desktops
- Gesture detection works even with resting contacts or palms
- Smoother, quicker detection for multi-finger gestures

**AppCompat**
- Improved scroll performance for widely used Win32k apps such as Chrome, Firefox, and Adobe apps

**Improvements**
- Enhanced pointer stability during button presses and lifts
- Expanded tuning parameters for palm rejection to better scale across device sizes
- Additional hardware palm rejection support from increased Confidence bit capabilities
Precision Touchpad Gestures

We’ve significantly reduced the cost of Precision Touchpads and replaced edge gestures with new, easier-to-use multi-finger gestures.

1-Finger:
- Left Click
- Double-Click
- Move Cursor
- Tap + Slide

2-Finger:
- Right Click
- Scroll / Pan
- Pinch / Zoom

3-Finger:
- Invoke Cortana
- Multitasking Gestures

4-Finger:
- Invoke Action Center
Multitasking Gestures in Windows 10

Task View

Switch Tasks

Show Desktop

winhec
Media

Playback
• Inbox support for Mono (Single-Channel) or Stereo playback for supported Opus profiles in Media Source Extensions
• Inbox support for VP9 to enable playback of WebM in Microsoft Edge

Improvements
• Audio Troubleshooter notification prompt shows up when we suspect you may need audio help
• Improved audio routing makes it easy to control where your audio goes (UI)
• Microphone improvements enable a better, more seamless Cortana experience with lower power consumption

Casting
• Support for protected content via “Cast media to device” in Edge
• Support for casting audio from background apps
Wi-Fi
Wi-Fi & Miracast

Miracast Receiver App
- In-box receiver display (Sink) application

Mobile Hotspot
- New feature that will allow users to easily create a mobile hotspot from their Windows 10 PC – requires WDI drivers

Hotspot 2.0 Rel 2
- Works over existing Windows 10 WDI WLAN drivers (no driver changes)
- Online sign-up, based on Passpoint Rel 2 standard
Receiver app feature will be automatically enabled by Windows if the system supports it.

If no WDI driver detected, Wireless display capability will not be advertised.

Wireless display capability can be overridden to be “Always On” or “Always Off”.

“Ask to project” can be set to first time only.

For protected Content support, the device running the app must have HDCP 2.2 Rx keys installed.
Mobile Hotspot

Mobile Hotspot page includes drop-down to choose which internet connection you want to share.

The dropdown list represents all the public interfaces that you’re currently connected to. Either one or combination of: Ethernet, Cellular, Wi-Fi.
Bluetooth
Bluetooth

Support Factory Pairing of Bluetooth LE devices
• Allows OEMs to automatically pre-pair Bluetooth LE devices during first boot through OEM manufacturing processes

Add Audio/Video Remote Control Profile (AVCRP) 1.5
• The Audio/Video Remote Control Profile (AVRCP) is used for browsing music on a car head unit (Mobile only)

API support for non-paired connections
• Seamless (no user interaction required) discovery of services and associated data using RFCOMM
Location
Location

Active Tracking
• Enable Bing and Cortana to provide better user experiences with power efficient active location tracking

Faster Fixes
• Faster location fixes using sensor based activity detection (Stationary, Walking, Driving....)

Location Injection on Desktop
• When location can’t be automatically identified by the device, there’s UI that allows the user to provide it
Near Field Communication (NFC)
Near Field Communication (NFC)

Tap to Login on Windows (desktop)

- Enables users to tap their NFC-enabled badge to their NFC-Enabled Windows device to login.
- Fast and seamless login experience; No password required after initial login.
- Fast User Switching in communal device usage scenario
- Requires PC with NFC radio and Smartcard and/or Phone with an NFC Badge
- Currently only available from HID
NFC Class Extension (CX) Driver

Microsoft recommends that IHVs and OEMs use the new NFC Class Extension (CX) Driver driver model which supports all NFC modes (proximity, smart card reader; HCE, and UICC emulation); and provides better reliability/maintenance.

In June 2017, NFC Class Extension (CX) drivers will be required to pass HLK compatibility testing.

CX drivers will become Universal Drivers and work across Phone/Tablet/Laptop/IoT devices.

- The NFC class extension source code is open source and publically available on GitHub - https://github.com/Microsoft/NFC-Class-Extension-Driver
- Documentation for the code is available here: https://msdn.microsoft.com/en-us/library/windows/hardware/dn905534(v=vs.85).aspx
Sensors

Ambient light improvements
• Converged algorithms and updated UI to improve ambient light scenarios for Windows Mobile

Add support for new sensors
• We standardized HID usages for some new sensor types and added them to the HID sensor driver
• This will result in customers not having to write custom drivers to support these sensors.
New Sensors

The list of sensor types that were standardized are:

**HEALTH**
- Activity detection
- Pedometer
- Breath Rate Monitor
- Heart Rate Monitor

**LIGHT**
- Ultra-Violet (UV) Sensor

**MOTION**
- Gravity Vector sensor
- Linear Accelerometer
- Geo-magnetic

**ENVIRONMENTAL**
- Altimeter
Introduced a new HLK requirement for systems that support Dual Role, or Power Delivery, or Alternate Modes. Now those systems are required to implement either USB Type-C Connector System Software Interface (UCSI) (if EC is used) or USB connector manager framework extension (UcmCx) driver (if no EC).

MSDN Resources:

- UCSIcontrol.exe, which is part of the MUTT tool test package to test for UCSI implementation: [https://msdn.microsoft.com/en-us/library/windows/hardware/dn376875(v=vs.85).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/dn376875(v=vs.85).aspx)
Storage
Storage

NVMe
• Added support for Host Memory Buffer (HMB) as Defined by the NVMe 1.2 specification
• Added support for Timestamp so the NVMe device can query the host time

eMMC
• Added support for eMMC HS400 (high speed) mode

Universal Flash Storage (UFS)
• UFS is the evolution of flash storage designed for mobile and tablet devices
• Inbox driver support added for UFS based on version 2.0 of the specification
Windows 10 Continuum
Continuum

Continuum is a term that defines a transformative experience - changing the primary Windows experience to be optimized for an alternative input method or form factor.

So a laptop can be used like a tablet and a phone can be used like a PC.
Once you start, you can’t be stopped.

Continuum helps ensure your apps and content display beautifully in different modes and screen sizes so you can do great things.

(Screen simulated, subject to change. Some apps sold separately. App and content availability and experience may vary by region and device.)
Why choose Windows with Continuum
[desktop experience]

1. **The best screen is the one you’re on.**
   Continuum is an exclusive new feature where your screen transforms as needed to stay in an optimized state of productivity. When you change from tablet to desktop mode or project to a second display, Continuum keeps everything looking great and working the way it should.*

2. **Touch or type – it’s all good.**
   Type when you need, touch when you want.** You always have the choice of running in desktop or tablet mode and you can change anytime you want – your screen will give you a smooth transition and a beautiful display. Available exclusively on Windows, this feature is called Continuum and it is designed to ensure that the best screen is always the one you’re on.

3. **Smooth scaling.**
   With Continuum, apps can be built to scale smoothly from screen to screen, so they look great and work beautifully from the smallest app window to the largest high-res displays, even up to 8k.*

4. **Adapts to you.**
   Onscreen features, like menus and taskbars, adapt themselves for easy navigation; controls stay consistent so there’s no re-learning. It’s the best combination of familiarity and flexibility.*

*App experiences may vary. **Requires touchscreen capability.
Continuum Shines on 2-in-1s and Tablets

**Tablets**
Pure tablets and devices that can dock to external monitor + keyboard + mouse

**Detachables**
Tablet-like devices with custom-designed detachable keyboards

**Convertibles**
Laptop-like devices with keyboards that fold or swivel away
How to use Tablet Mode

While in tablet mode, your user experience dynamically changes to be a more touch friendly experience, including the task bar. You could still use a mouse and keyboard, it means that the layout has been optimized for touch based interaction.

While in PC mode, your user experience is optimized for a keyboard and mouse. It doesn’t mean you can’t use touch if your device supports it, but optimized to how you naturally interact with a mouse and a keyboard.

You can switch between modes by going to action center in the task bar. Select devices, can do this with a hardware trigger – detach a keyboard or fold the keyboard back.
Continuum Resources

This document describes how to implement Continuum on 2-in-1 devices and tablets, specifically how to switch in and out of "tablet mode."

Looks like a phone, does like a PC.

Introducing the first smartphone with PC-like power. Equipped with a dongle or dock, use the power of Continuum to display on a big screen and work like a PC, without tying up your phone.* Whatever it is you do, take it to the next level. Do great things.

*Limited to select premium phones at launch. External monitor must support HDMI input. Accessories sold separately. Screens simulated, subject to change. *App availability and experience varies by device and market. Office 365 subscription required for some features.
Why choose Windows with Continuum for phones [mobile experience]

1. **PC-like power.**
PC-like productivity that fits in your pocket – get it on select premium phones running Windows 10.
Use a Continuum-compatible wired or wireless accessory to connect a monitor, keyboard and mouse* – or let your phone screen function as your virtual trackpad and keyboard. Now you’re all set to use great apps like Office for getting things done, like you would on a PC.**

2. **Plug. Project. Perfect.**
Windows gives you projection that’s close to perfection, which is way better than devices that merely mirror what’s on your phone. Just plug in a Continuum-compatible wireless accessory to project to a TV or PC monitor* – apps scale smoothly for a beautiful display and easy navigation, even on your biggest big-screen TV.**

3. **Two screens at once.**
While you’re projecting to another screen, you can continue to use your phone for getting things done.¹
Using two screens at the same time means you can talk, text, tweet, and run apps on your phone – all without interrupting what’s playing on the big screen.

4. **Easier wireless projection.**
No need to hunt, or pay, for an Internet connection. Windows lets you use a Continuum-compatible accessory to wirelessly project content stored on your phone to any second screen without needing to get online.*

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*External monitor must support HDMI input. (If Continuum-compatible accessory is not included, add: "Accessories sold separately.")
**App availability and experience varies by device and market. Office 365 subscription required for some features.
¹Limited to select premium phones at launch.
(Screens simulated, subject to change; Apps sold separately, availability may vary.)
Mobile Docking
USB-C dock recommendations

**Minimum recommendations:**

**On Device:**
- USB Type-C with dual-role support for wired dock configuration
- USB 3.1
- DisplayPort Alternate Mode, pin assignment D. Pin assignment D must support HBR signaling

**On Dock:**
Upstream facing USB port
USB Type-C connector which supports the following features:
- USB 3.1
- DisplayPort Alternate Mode pin assignment D. Pin assignment D must support HBR signaling

**Downstream facing USB ports**
- Minimum 3 x USB-A and/or USB-C 3.1 sockets (can be a combination of USB-A/USB-C)

**Premium recommendations:**

**On Device:**
- USB Type-C with dual-role support for wired dock configuration
- USB 3.1
- DisplayPort Alternate Mode, pin assignment C, D. Pin assignments C, D must support HBR, HBR2 signaling

**On Dock:**
Upstream facing USB port
USB Type-C connector which supports the following features:
- USB 3.1
- DisplayPort Alternate Mode, pin assignments A, B, C, D. Pin assignments C, D must support HBR, HBR2 signaling
- Power Delivery Source Capability of 5V 1.5A, 5V 3A

**Downstream facing USB ports**
- Minimum 3 x USB-A and/or USB-C 3.1 sockets (can be a combination of USB-A/USB-C)
Wi-Fi dock recommendations

Windows Mobile only supports wireless docking over 802.11 Wi-Fi technologies using Miracast and UIBC

To insure the best experience, the Miracast Receiver / Wireless Dock should implement the following:

- A robust implementation of the Wi-Fi Alliance (WFA) Miracast specification
- A robust implementation of the WFA Miracast UIBC specification
- Enhanced Channel Switch (ECSA) – per the 802.11-2007 base Standard
- IP address over EAPOL – per the Wi-Fi Direct v1.4 Specification
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