IDF13

Intel® Wireless Display Technical Overview: Enabling Dual Screen Applications

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Intel Corporation

EXPS001

intel Look Inside.™

Agenda

1. What is a Dual Screen App / Demo
2. Dual Screen Environment
3. Duplicate v. Extended Mode Illustrated
4. Application Ideation
5. Data Flow and Enabled App Features
6. Miracast* & WiDi - Compare / Contrast
7. Windows* 8 & Windows 8.1 - Compare / Contrast

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Intel® WiDi (Wireless Display) Dual Screen Apps

One App w/ 2 windows on Two monitors

App Window #1
Curate, search & control on 2' screen

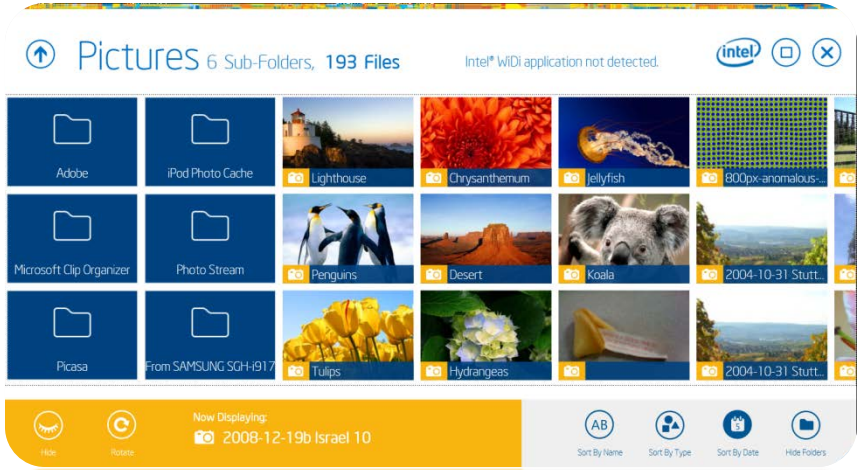
WiDi

App Window #2
View content on 10' large screen

2' & 10' refer to the distance from the screen

Show Demo…

Intel® WiDi Media Share…



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Dual Screen UX - Environment

The dual screen apps are a new innovative paradigm!

- Consumers are already “multitasking” using Mobile Devices & TVs

Miracast* broad adoption creates a large target

- OS vendors (Android* 4.2.2 and Windows* 8.1)[1] support it
- Many Smart DTV & phone vendors support it

Intel® platforms + Intel® WiDi is the best Miracast solution

- Intel WiDi is a superset implementation of Miracast (features + performance)
- The Ultrabook™ with 4th Generation Intel® Core™ processor and GPU is an amazing dual screen platform
- Touch, hardware video codecs, multi-roll radio & 3D Visualization
- Protected content ready via HDCP 2.1

Existing OS APIs for ISVs

- Miracast removes all app-to-app multi-OS comms
- One application with two windows; only common OS APIs
- Single PC app with no CE app required

The Numbers

- Intel WiDi 50Mu+ Tx & 15Mu+ certified Rx (as of mid-2013)
- Miracast number can be found on the Wi-Fi Alliance* web site

[1]Apple* AirPlay* is a proprietary solution

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Intel® WiDi – *Dual Screen Interaction*

Use Case: Dual monitors

Duplicate mode:

Easy to understand
Side-by-side
Monitors

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Intel® WiDi – *Dual Screen Interaction*

Use Case: Dual monitors for docking

Extended mode:

Easy to understand Side-by-side Monitors

End users understand “Docking” i.e., Dual Screen side-by-side extended mode

Use Case: 10’ Display Changes Everything

Intel® WiDi – *Dual Screen Interaction*

Extended mode:

Push Second Display to TV at 10’ Distance, Changes Everything!

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Intel® WiDi – *Dual Screen Interaction*

Use Case: Same screen on both monitors

Duplicate mode:

Same app UI on both screens
Good for Surfing…

End users understand Dual Screen duplicate mode, even at 10’

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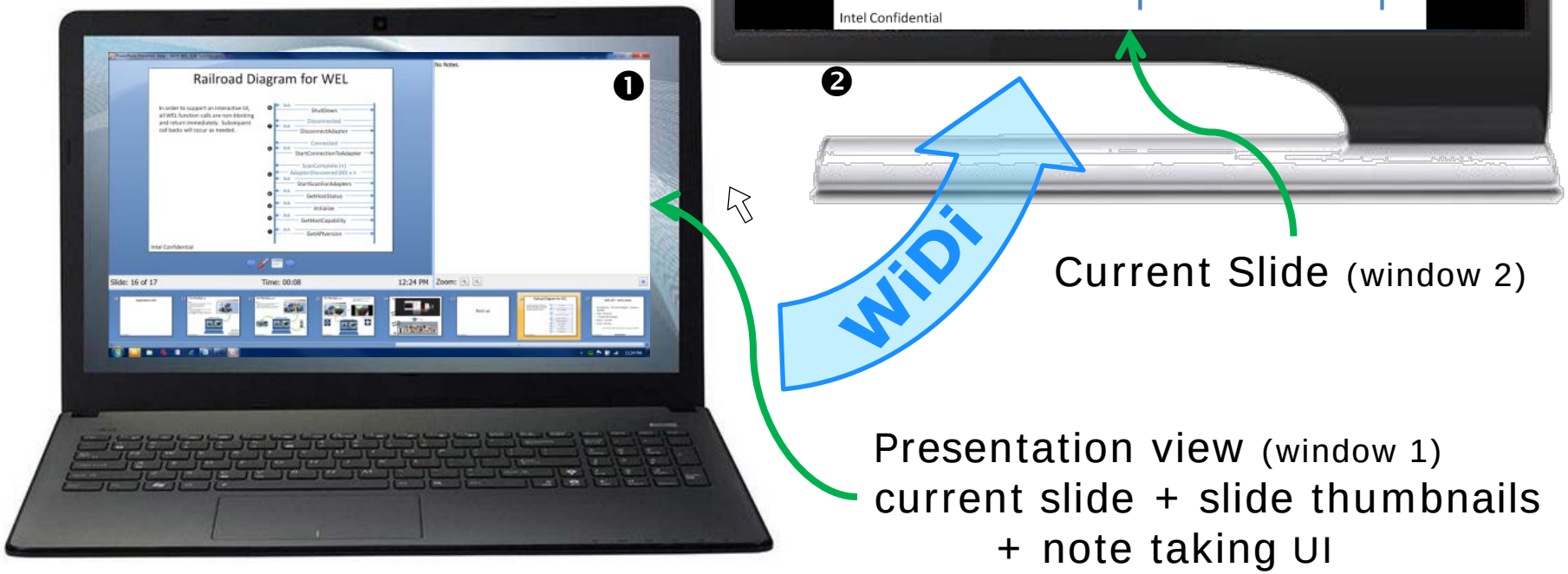
Intel® WiDi – *Dual Screen Interaction*

Use Case: Microsoft* PowerPoint*

Extended mode:

Today: Microsoft* PowerPoint*

2' UB UI + 10' TV UI



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Intel® *WiDi* - *Dual Screen Interaction*

Extended mode:

Dragging apps to 10' display is difficult for End User

Dual Screen extended mode: Hard to drag applications to second display 10' away!

Use Case: Playing Video Clips

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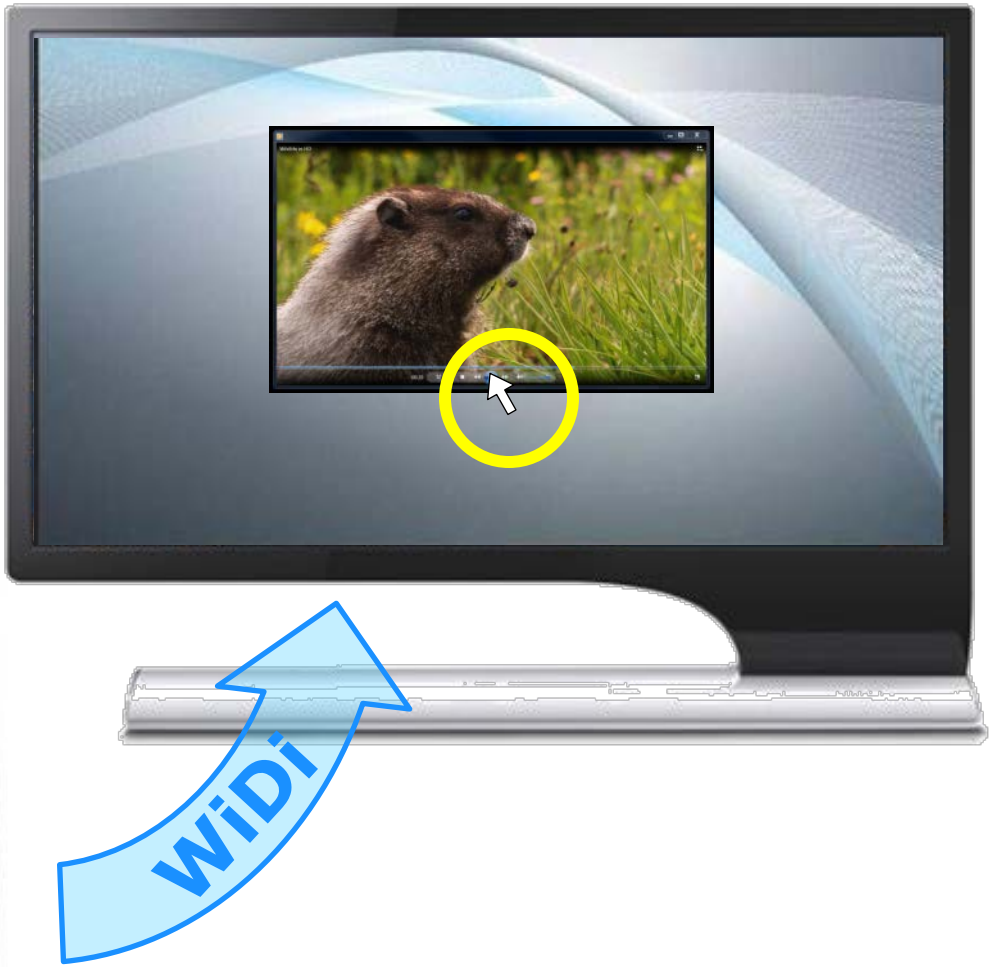
Intel® WiDi - *Dual Screen Interaction*

Use Case: Playing Video Clips

Extended mode:

Dragging apps to 10' display is difficult for end user



Dual Screen extended mode:
Very hard to mouse at 10' away!
- Click to maximize window
- Click to play-pause…

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PREMIUM Content

Today… Premium Content “Only on PC”

EXTREME Content

THE RACE

Follow Driver

Driver Location

Live Feed

Driver Tweets

Driver Stats

Clear All

Load Layout

Save Layout

Driver #48- Car Cam

MPH / POS

Driver #8- Car Cam

MPH / POS

Driver #99- Car Cam

MPH //POS

Driver #10 – Follow the Car Track Cam

Position

Car Race Main Live Feed

Tweet Feeds....

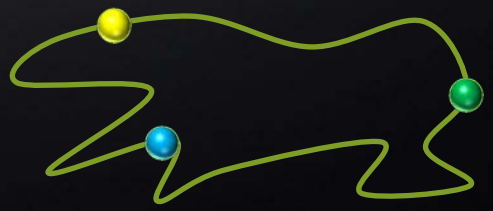
Layout 1

Layout 2

Layout 3

Layout 4

Select Driver, POV, Stats on the PC... where it's easy!

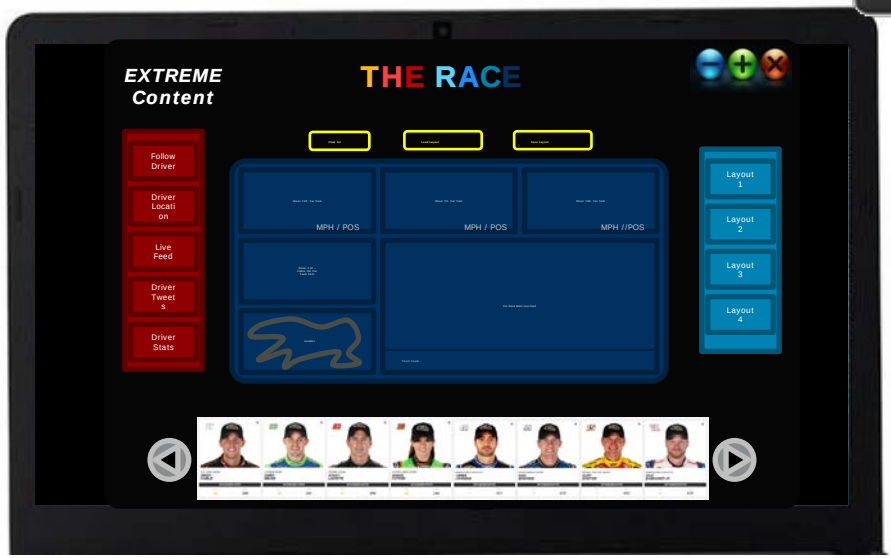


Video Content playing on TV, where it belongs!

Intel® WiDi – *Dual Screen Possibilities*

Multi-video User configured Application

App Window #1
Configure and add select content on 2’ screen



WiDi

App Window #2
View multi-angle Videos & more on 10’ large screen

One application, pulling content from one site, driving two screens!

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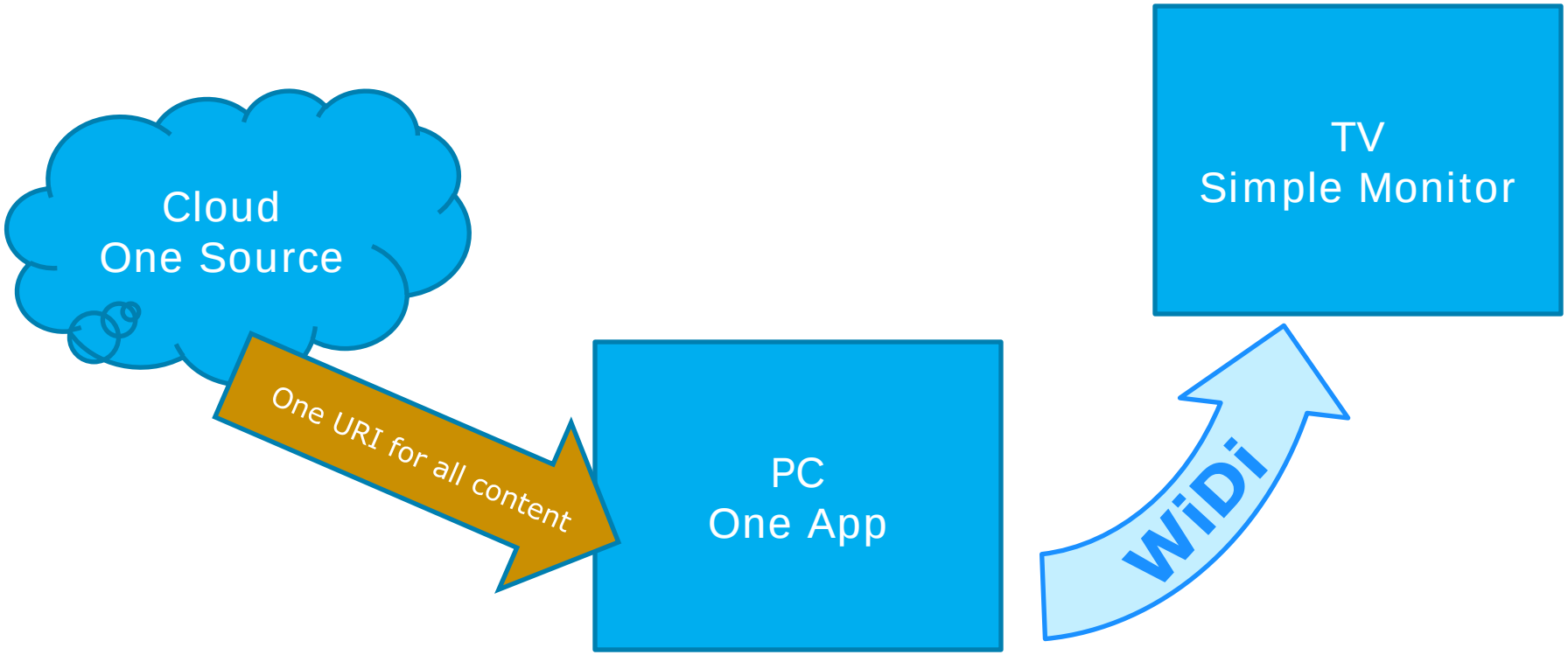
One Source for all content (A/V/P/MD)
One App on one platform (display, curate & config)

- Dual Screen app dev on a PC is both well understood and hosted in an accessible environment
- ISV enjoy the most CPU / GPU power for creating dynamic and super rich content user experiences



4th Generation Intel® Core™ Processor Enables
Dual Screen Apps with a Dynamic UX

Dynamic Experience:

The Ultrabook™ with 4th Generation Intel® Core™ and GPU is an AMAZING dual screen platform!!

- **Touch** – all Ultrabooks require touch interface for direct manipulation
- **Hardware Video Codecs** – multi video encode/decodes do not saturate CPU
- **3D Visualization** – Intel® Graphics support spectacular graphics experience on multiple screens
- **Multiple frame buffers** – Windows* OS supports multiple monitors
- **Multi-roll WiFi radio** – Intel® WiFi supports simultaneous connection
  - Access Point (internet) plus Peer-to-Peer device (Intel® WiDi)

Possible Dual Screen App Categories

Dual Screen UX ideas for a variety of application categories

Movie / TV Media

- Sharing/Playing
  - Netflix*, Hulu*, etc.
  - YouTube*, TED TV

Personal "Digital Signage"

- Locale info – Time/Date, Weather, Traffic,
- My Info – schedule, commute, ToDo,
- My content – photos, music
- Social media – Facebook*, Flickr*…

Gaming

- Audience view
- Light wt gaming
  - Maps
  - Backpack contents
- Private vs. Public screen
  - (i.e., Poker / Battleship)

Live Events

- Multi-view camera angle
- Choose your announcer
- Fantasy team
- Stats

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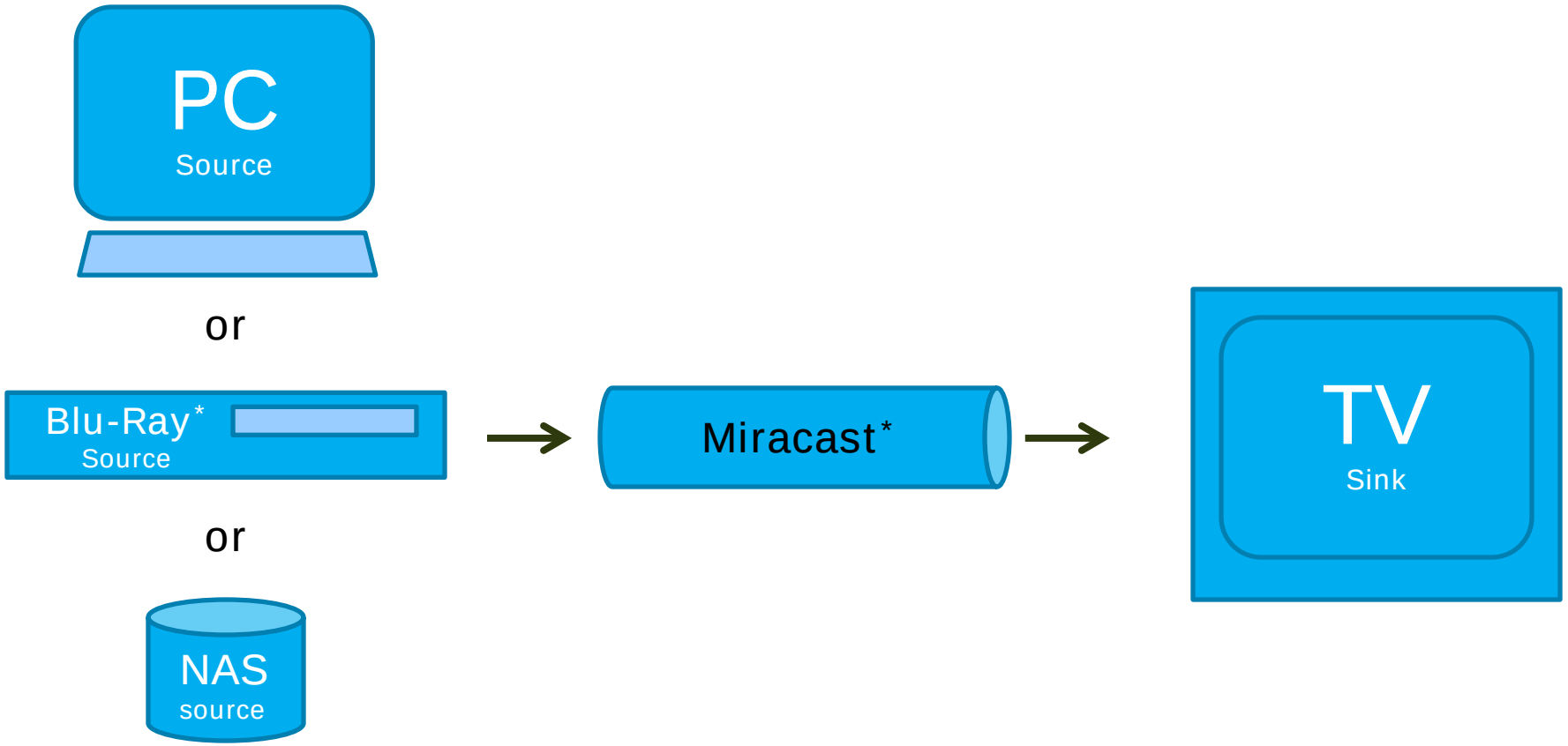
A Miracast* Specification *Primer*

- **Miracast* Requirements:**
  - **Peer-to-Peer WiFi Connection**
    - Use WiFi Direct*
  - **Video Stream Definition**
    - MP4 (always)
    - Frame Rate
    - Frame Dimensions
    - Audio Format

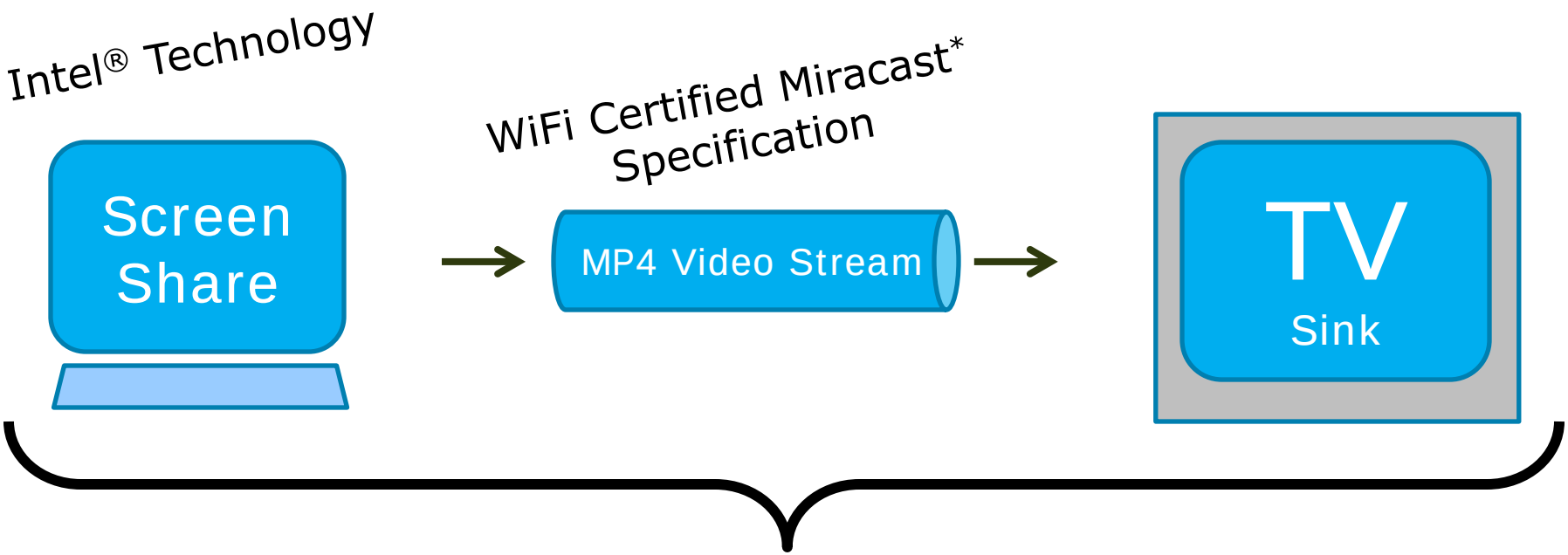
- Miracast:
  - is NOT an application
  - is NOT an end-to-end solutions for screen sharing
  - makes NO assumptions about the video source
  - is only a video pipe between a *source* and a *sink*

Miracast* is Not Just for Computers



Miracast makes no assumptions about Video Source

Intel® WiDi is PC Screen Sharing based on Miracast* Specification



Intel® WiDi End-to-End Screen Sharing solution!!!

Miracast makes no assumptions about Video Source

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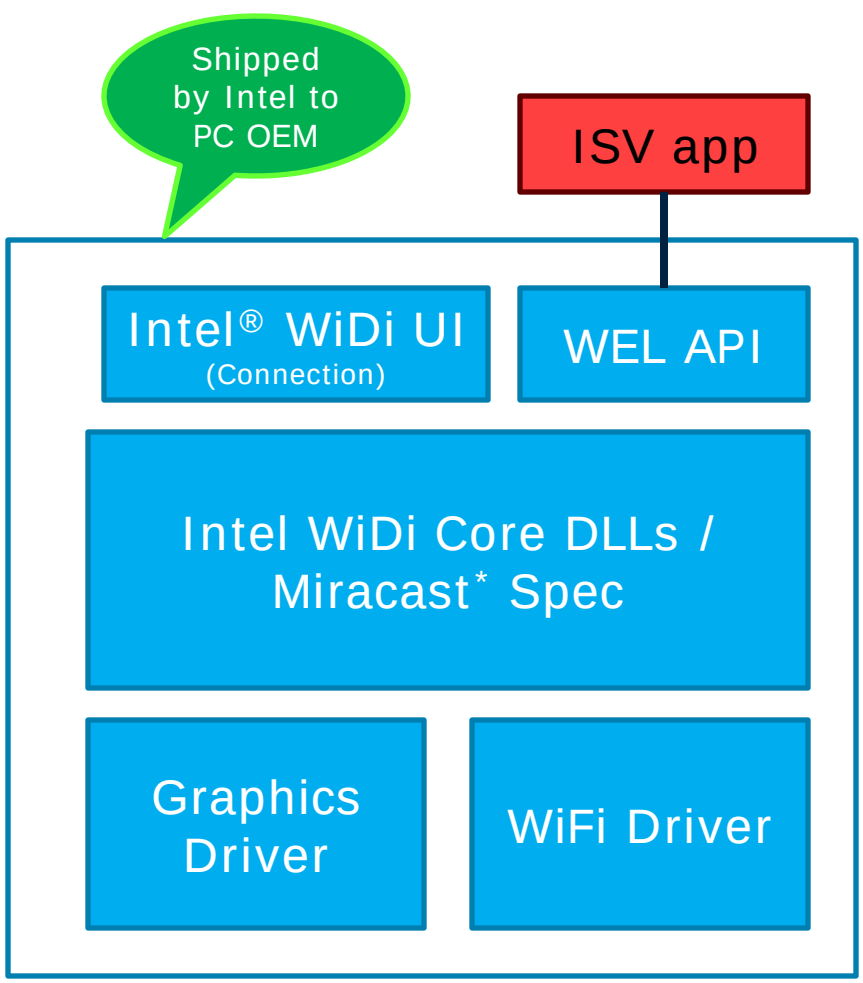
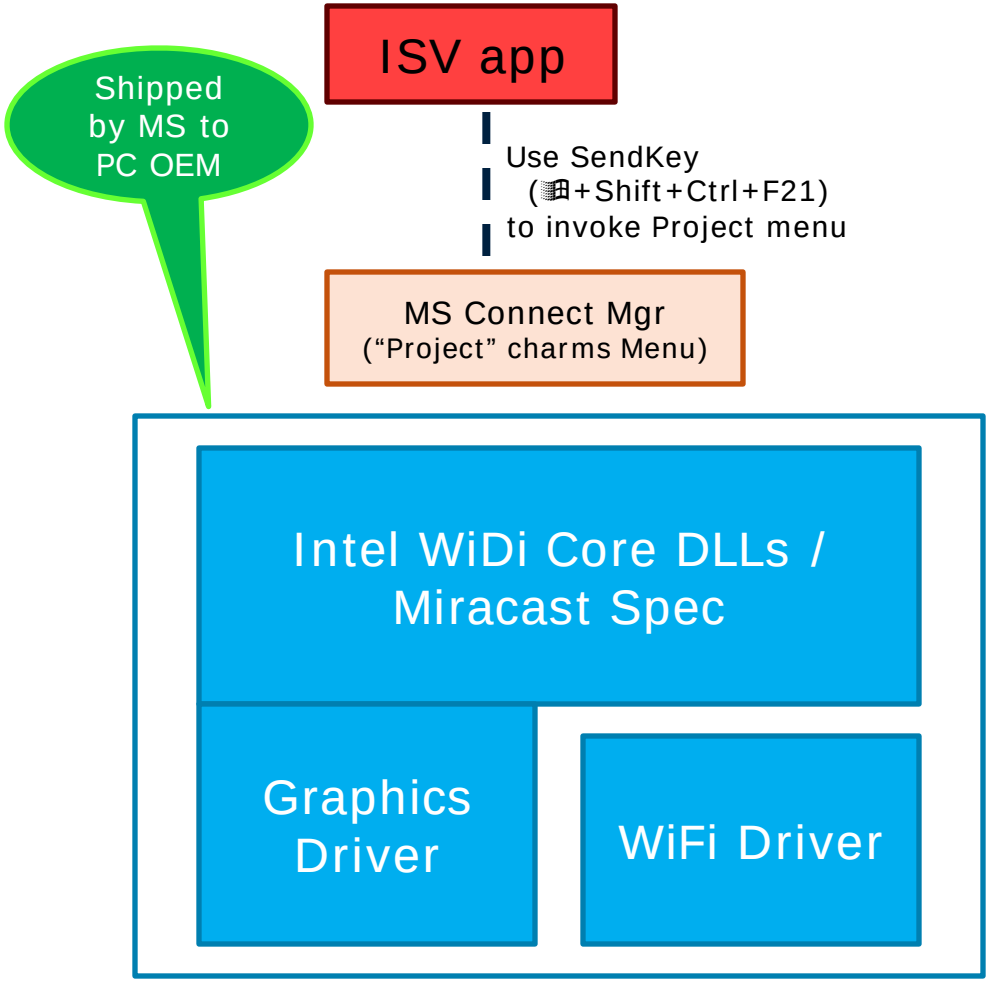
Intel® WiDi (Miracast*) Support for Windows* 8 vs. Windows 8.1



Windows* 8



Windows 8.1

How to Scan and Connect (Intel® WiDi 4.1 app)

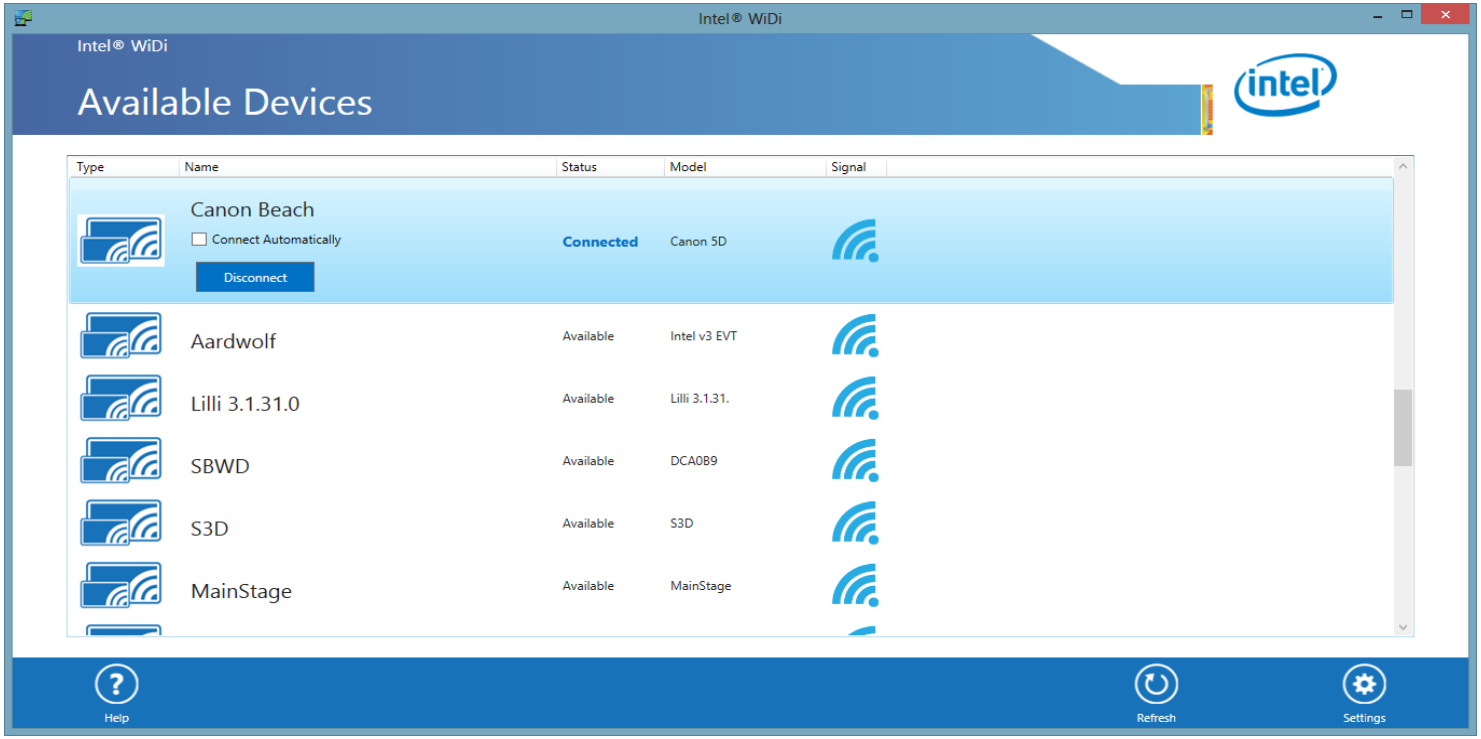
Use Intel® WiDi Display App UI = **Scan and Connect** (Windows* 7/8)

List Devices

Connect UI

Disconnect UI

Signal Strength



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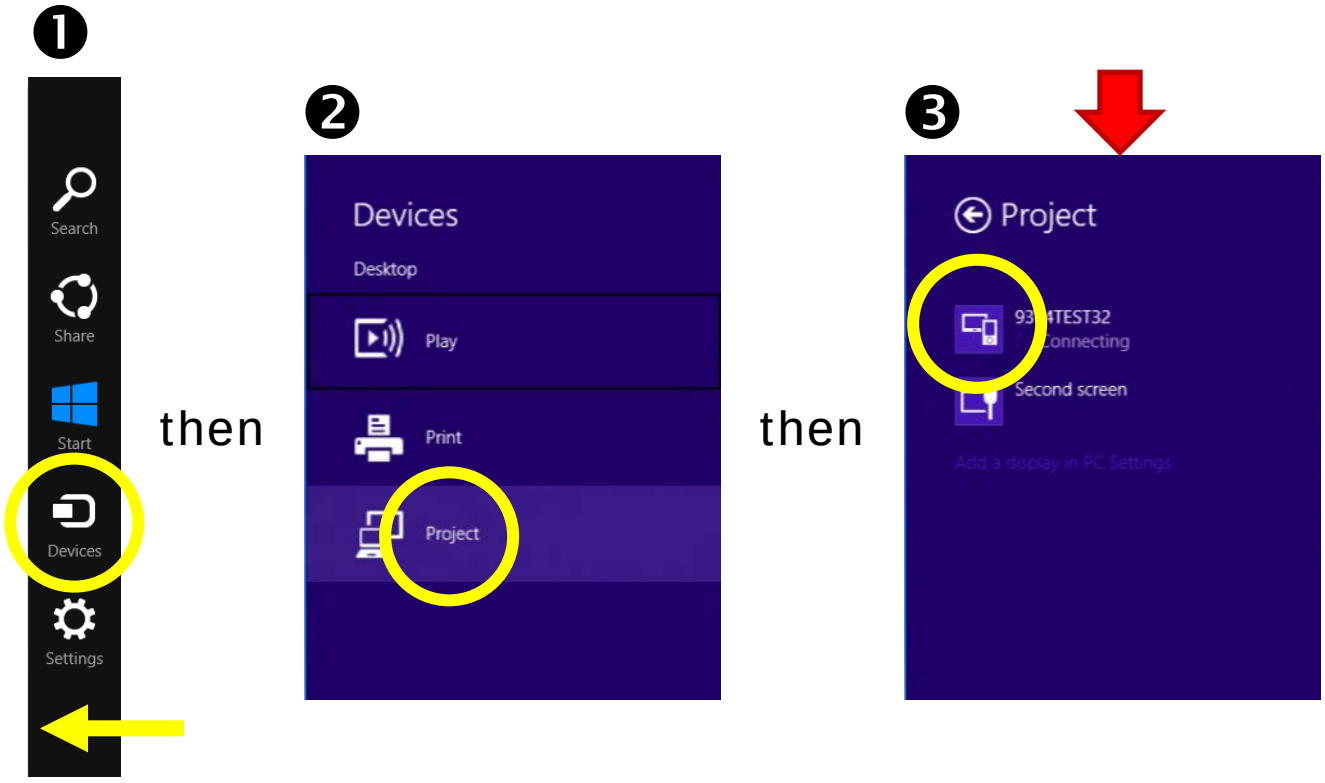
Intel® WiDi - How to Scan and Connect - Windows* 8.1

Manual flow 3 steps…

ISV's UI should launch the "Charms" *Project Menu* via ⊞+Shift+Ctrl+F21



Swipe - Tap **Tap** **Tap**

1 swipe – 3 taps

Previously paired devices show automatically

First Time Pairing on Windows* 8.1

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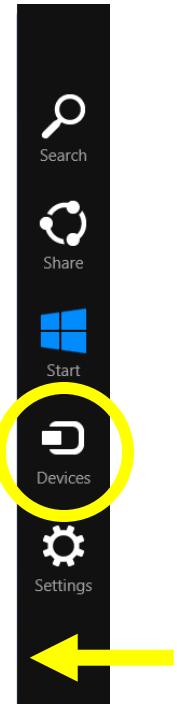

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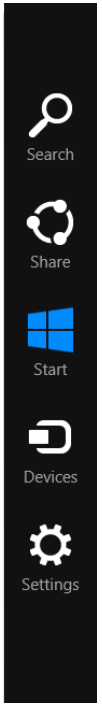

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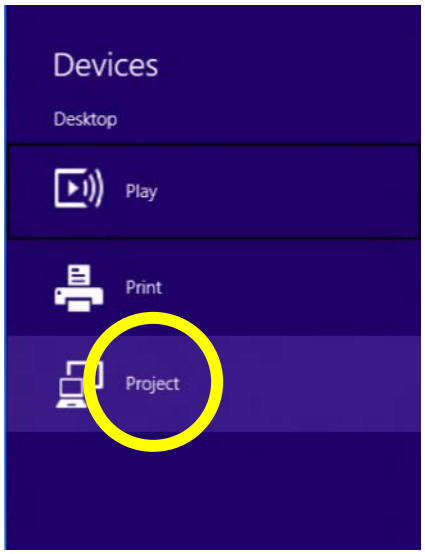

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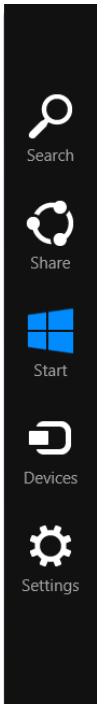

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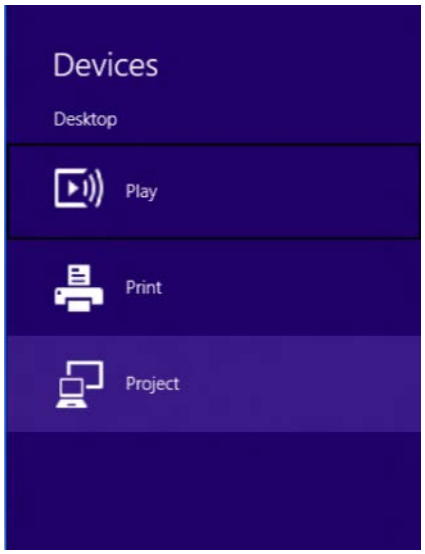

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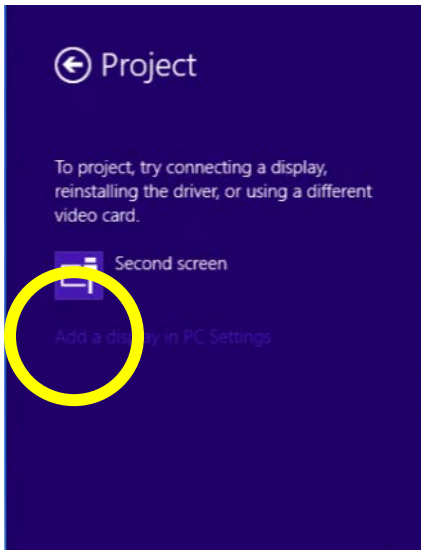

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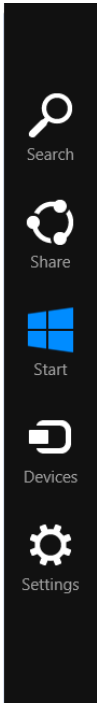

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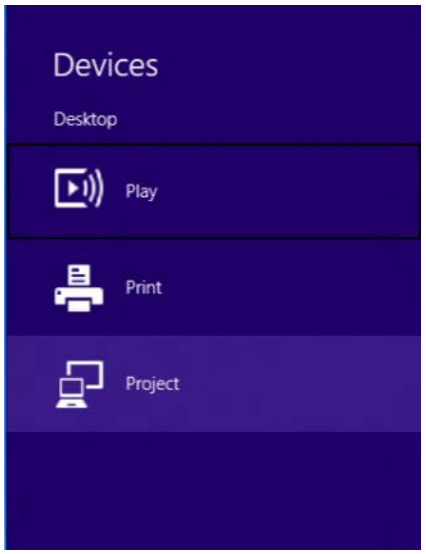

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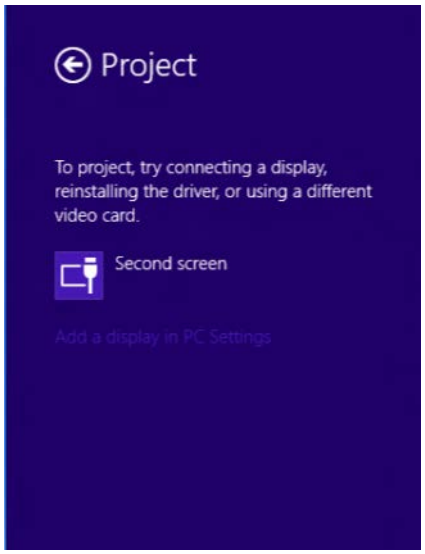

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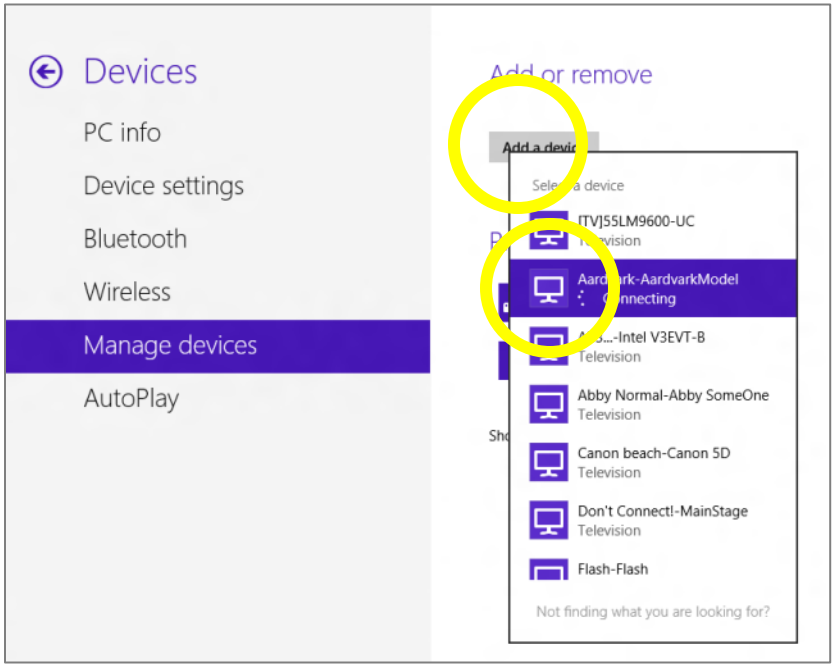

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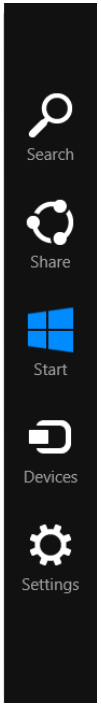

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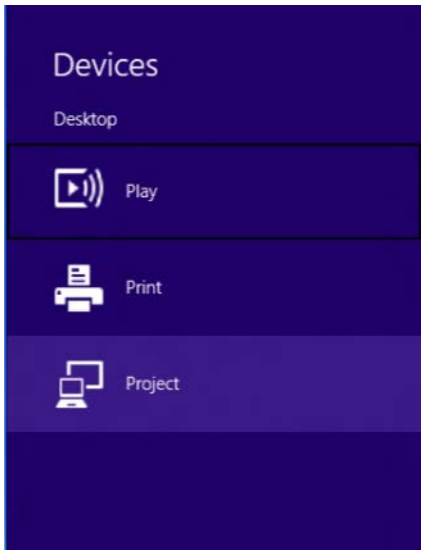

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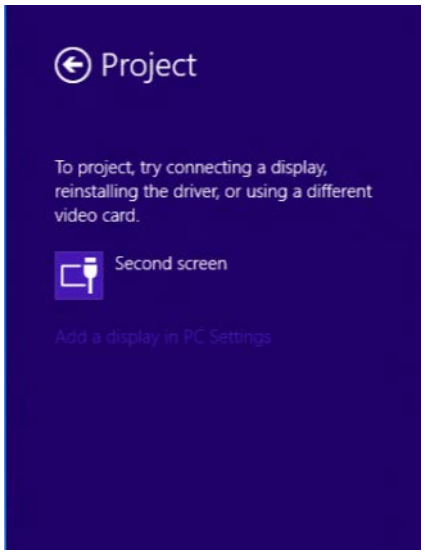

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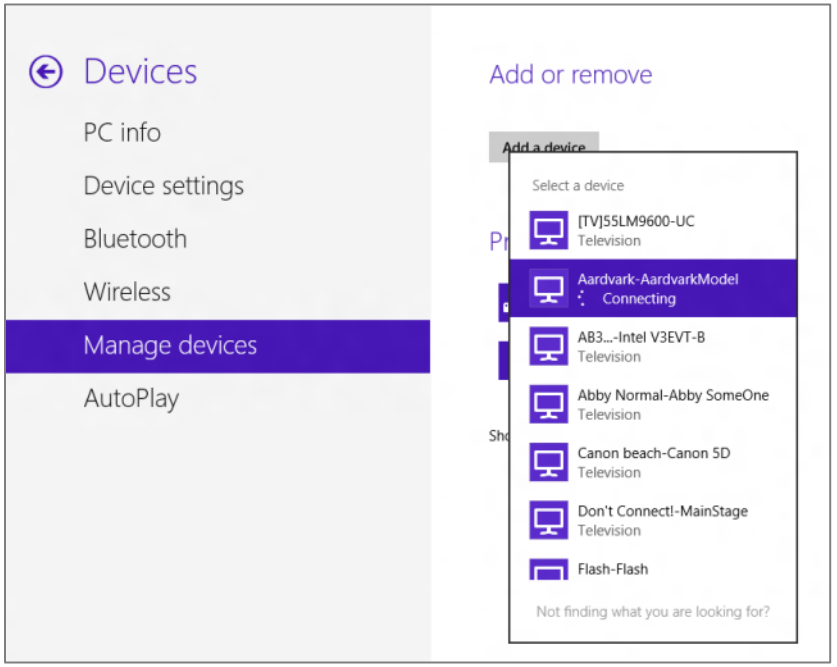

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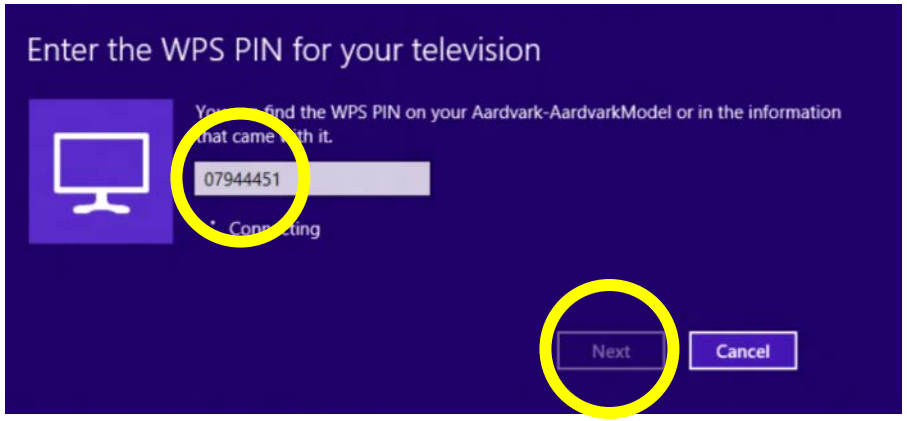

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1 swipe – 7 taps – 1 keypad

First Time Pairing on Windows* 8.1

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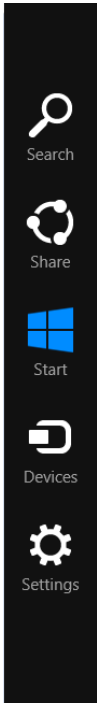

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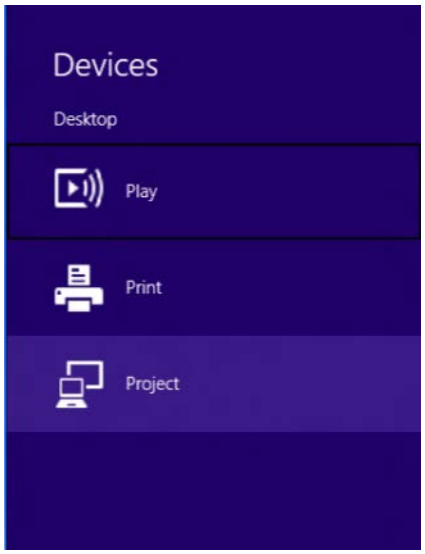

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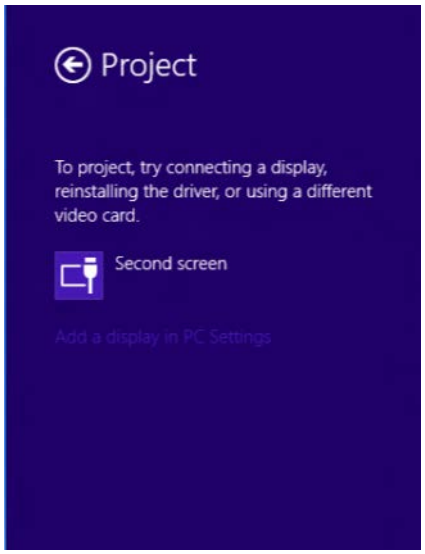

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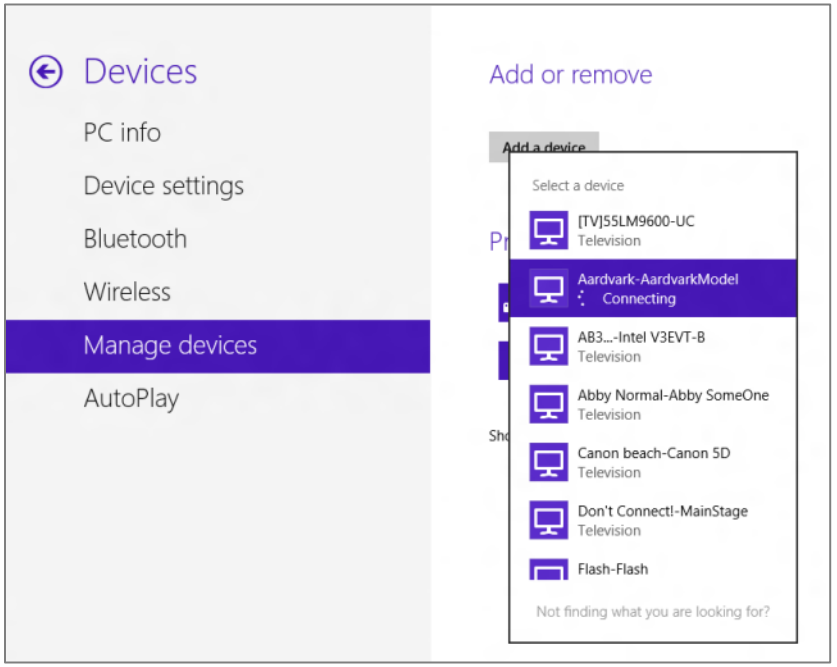

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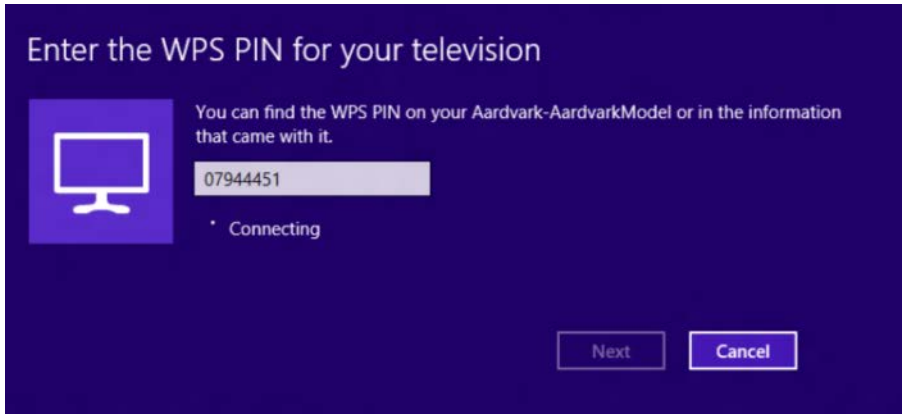

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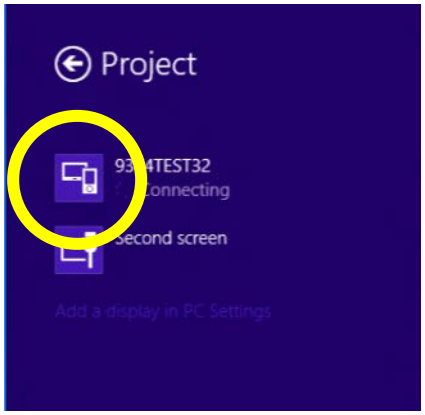

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Supported Windows* App Environments

	Desktop Apps	Modern UI Apps	Web Apps	Intel® WiDi WEL API *optional*
Windows* 7/8	Supported in OS Easy to implement No new APIs	Dual Screen Mode Not Supported	Researching Support Browser Plug-in needed Silverlight* support via Intel wrapper Dll	Intel WiDi Ext Lib (WEL) 2.0 API for "connection" action via Intel
Windows 8.1	Supported in OS Easy to implement No new APIs	New Dual Screen APIs (Avail June 26 '13)	Researching Support Browser Plug-in needed Silverlight support via Intel wrapper Dll	Charms menu "Device–Project" Uses: SendKey "⊞+Shift+Ctrl+F21"
Android* 4.2.2	Supported in OS as Presentation Surface Easy to implement App Service APIs	Implemented as Application or Widget to support multitasking		

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Summary

- Dual Screen Apps are a new growing user experience
- Supported natively in Windows* (DT and New) & Android*
- Development environment = HDMI* cable†
- One application – One content source – 2 windows
  - Easy to develop, no app-to-app sync needed
- CPU and GPU needed to drive exciting experiences
- Lot's of new user experiences to be discovered
- WiDi is the implementation (based on Miracast* spec)
- Miracast is the industry standard

†To get started, of course test on WiDi connection

Next Steps

- Visit the IDZ (Intel Developer Zone) web site for development materials, source code, videos and links
- Get started coding and see how simple it is
- Develop new and exciting apps with two screens to set your product apart from the rest

Additional Sources of Information

PDF of this presentation is available is available from our Technical Session Catalog: www.intel.com/idfsessionsSF. The URL is on top of Session Agenda Pages in Pocket Guide.

Real Applications available today:

- Nerd HQ - a bunch of interviews from Comic Con '13. These are all shot with 3 cameras and this app enables the user to choose the camera angle. Download here: http://smooth-las-akam.istreamplanet.com/players/nerdhq/app/
- Intel WiDi Media Share -The new Intel WiDi Media Share application. https://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=23022

DUAL SCREEN code example:

- Metro Dual screen Project Sample: http://code.msdn.microsoft.com/windowsapps/Projection-sample-526b3c1d
- Projection Manager class: http://msdn.microsoft.com/en-us/library/windows/apps/windows.ui.viewmanagement.projectionmanager.aspx
- ApplicationViewSwitcher class: http://msdn.microsoft.com/en-us/library/windows/apps/windows.ui.viewmanagement.applicationviewswitcher.aspx
- Here is the API for enabling two screen apps on Android: http://developer.android.com/about/versions/android-4.2.html#SecondaryDisplays,

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Back Up

Intel® Wireless Display is Based on the Miracast* Spec[1]

Intel® Wireless Display (Intel® WiDi) Released ver. 1.0 in 2009

- Based on Intel "MyWiFi" peer-to-peer WiFi driver and hardware (multi-roll)
- Based on Intel proprietary RTSP protocol & UDP/IP data plane

In 2010 WiFi Alliance's "WiFi Direct*" spec (peer-to-peer only) was gaining acceptance

- Industry standard peer-to-peer networking protocol w/WPA2 security
- Marvell*, Atheros*, Broadcom*, Intel, Ralink* and Realtek* announced their first products in late 2010
- Android* 4 in 2011

In 2011 WiFi Alliance* started working on "Wireless Display" standard

- Intel submitted Intel WiDi spec for review
- Intel and many other CE and PC vendors participated in review process

In 2012 WiFi Alliance released Miracast* Spec 1.0 *(including WiFi Direct)*

- Similar to Intel's RTSP protocol & UDP/IP data plane
- Intel ported Intel WiDi 4.0 to Miracast Spec 1.0
- Intel added vendor extensions and performance criteria[1] to match WiDi ver. 2/3 feature set
- Intel WiDi software is 1of 5 Miracast Certification "test bed" source applications

[1]Intel WiDi is a *superset* implementation of the Miracast Specification (see backup for details)

Intel® WiDi “Superset Features”

Quality Metrics

- MOS 4 level video quality required
- Low Delay Mode - < 100ms latency screen-to-screen
- Optimized connection time

Additional Features

- Fast Cursor – out of band cursor coordinates to drive RX hardware cursor
- USB over IP – Full HID, Video Camera, and Mass Storage device classes
- Cinematic Sync – WiDi video stream frame rate reconfigures to match the media frame rate
- “PSR” (panel self refresh) – skip non-changing frames to increase battery life and reduce WiFi bandwidth
- IT Modes – The WiDi Rx is a network managed device and enforces supports IT settings i.e., bandwidth limiting, etc.

DLNA v. Miracast* (Intel® WiDi - Screen Sharing)

DLNA:

- Based on serving/streaming media files over a Server/Client/Controller (3 box) method over layer 3 network
- Most implementations have been based on “Pull” method
  - Difficult UX for end users
- Requires the player to locally render the content which requires codecs for all media types
  - Not future proof
  - MPEG II req’ed with $2 lic/unit

Miracast (screen sharing):

- Based on video streaming between Source and Sink over layer 2 network
  - Not file based
- Most implementations based on “Push” method
  - Consol UX easy for users (touch, mouse/KB)
- Requires the Sink to render only MP4