# Intel® Wireless Gigabit v2.6

## User Guide

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# Revision History

| Revision | Description | Date |
|---|---|---|
| 1.0 | Initial release. | May 16, 2013 |
| 1.1 | Alpha update | November 25, 2013 |
| 2.0 | Beta update | April 9, 2014 |
| 2.1 | Beta 1.5 update | June 30, 2014 |
| 2.2 | Beta 2 update | September 11, 2014 |
| 2.3 | Chapter 2.2 flashing dock instructions | October 23, 2014 |
| 3.0 | PV version updates | November 26, 2014 |
| 3.1 | Added 4.1.1. Maple Peak DisplayPort Bandwidth and other limitations | January 8, 2015 |
| 3.2 | SW version 2.0 | March 30, 2015 |
| 3.3 | Added win10 user guide | August 5, 2015 |
| 3.4 | Update sections 1.2 & 3.4 | October 27, 2015 |
| 3.5 | Update Intel Product Improvement Program (chapter 2)<br>Update to v2.2 | December 2, 2015 |
| 3.6 | Updated welcome screen and no scanning time after disconnect | March, 12, 2016 |
| 3.7 | Added WiGig events in Windows Event Viewer, added Pin based pairing capability | April, 17, 2016 |
| 3.8 | Update section 3.1.9 | May 1, 2016 |
| 3.9 | Update section 3.1.9 with additional info on PIN based pairing | May 10, 2016 |

§

# 1 Introduction

This chapter provides an overview of the Intel® Wireless Gigabit (WiGig) solution, which comprises the Intel® Tri-Band Wireless-AC17265 (Client), Intel® Tri-Band Wireless-AC18265 (Client), the Intel® Wireless Gigabit Sink W13100 (Dock), and the Intel® Wireless Gigabit Antenna-M 10041/2R (Antenna).

## 1.1 Scope

This document familiarizes customers with the Intel® WiGig software (SW) solution components and provides installation and configuration details.

## 1.2 References

**Table 1–1 References**

| | Document name | Description |
|---|---|---|
| Ref 1 | *537180_Maple_Peak_External_Product_Specification_Rev.3.1* | *Maple Peak External Product Specifications (EPS)* |
| Ref 2 | *557654_Maple_Peak_WiGig_SNK_EPS_Rev1.0* | *Maple Peak WiGig SNK External Product Specifications (EPS)* |
| Ref 3 | *557232_WiGig_R-FEM_External_Product_Specification_Rev1.0* | *WiGig R-FEM External Product Specifications (EPS)* |
| Ref 4 | *553630_Intel_Wireless_Douglas_Peak_and_Pine_Peak_EPS_Rev1.0* | *Douglas Peak and Pine Peak External Product Specifications (EPS)* |
| Ref 5 | 545844_Intel_WiGig_Maple_Peak _API_SDK Rev3.0 | *WiGig SDK Package* |
| Ref 6 | *557869_Intel_Wireless_Tri-Band_18260_DgP_WiGig_W11000_PnP_PDG_Rev2.0* | *Douglas Peak and Pine Peak Platform Design Guidelines* |
| Ref 7 | *Intel_Wireless_Gigabit_DFC-DFB_Tool_User_Guide_Rev3.3* | *DFC and DFB Tools User Guide* |

## 1.3 Wireless docking

The main use of Intel® WiGig at product launch is wireless docking in conjunction with the Maple Peak SNK.

Wireless docking generally occurs when the user is working 2–4 feet from the display(s). The user experiences the same kind of responsiveness as operating a workstation/desktop.

### 1.3.1 “Place to Dock, Snap to Go” experience

Wireless docking is designed to minimize user actions. After the initial WPS-based pairing, the typical user is able to auto-dock, meaning the device automatically connects to the dock and peripheral when in range of the dock. In other words, by the time the device is on the desk, it is already docked.

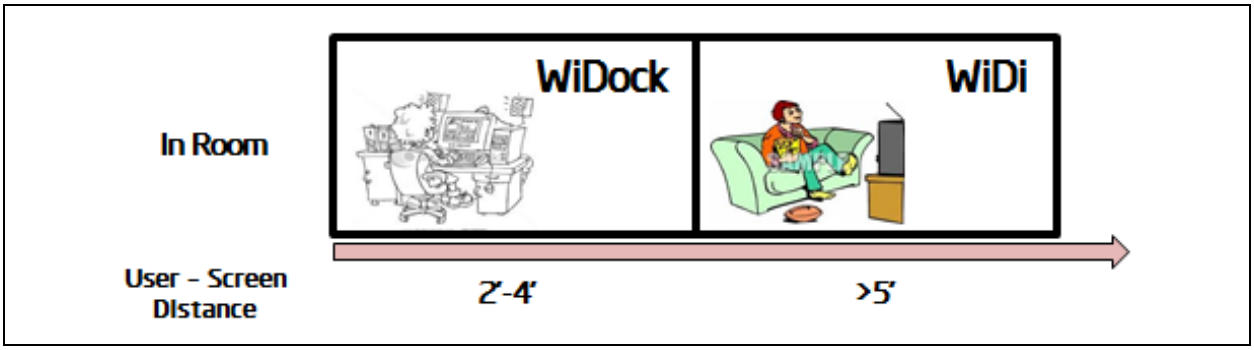
Undocking is as simple, allowing the user to grab the device and walk away.

### 1.3.2 Wireless Docking (WiDock) and Wireless Display (WiDi)

WiDock differs from other models, such as Miracast* or Intel® Wireless Display, in which the user is further from the screen (such as on the couch or in a conference room), and is focused on content

consumption (watching a video, sharing a screen with others, gaming) rather than productivity or content creation.

**Figure 1-1 WiDock use models**




### 1.3.3 Wireless peripheral

The wireless peripheral feature allows a device to interact with high-speed USB peripherals over WiGig. For example, a directly attached storage device equipped with Maple Peak SNK would allow a high-speed USB 3.0 connection with Intel WiGig equipped tablet or notebook.

When connecting, many of the wireless docking capabilities would be applicable (excluding of course the display capabilities), allowing USB 3.0 like throughputs (>1 Gbps) for on-desk distances.

## 1.4 Key features

See Ref 4 (EPS document).

## 1.5 SW and HW deliverables

See Ref 4 (EPS document).

## 1.6 Notebook platform preparations for WiDock

- Operating system:
  - Microsoft Windows 7* 32/64, Microsoft Windows 8.1* U 64, Microsoft Windows 10*

## 1.7 Known limitations

See Ref 4 (EPS document).

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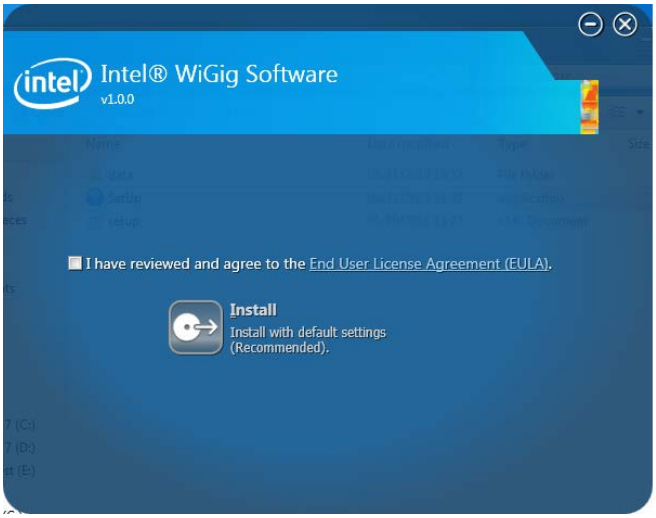
# 2 Software Install

## 2.1 NB-side installation

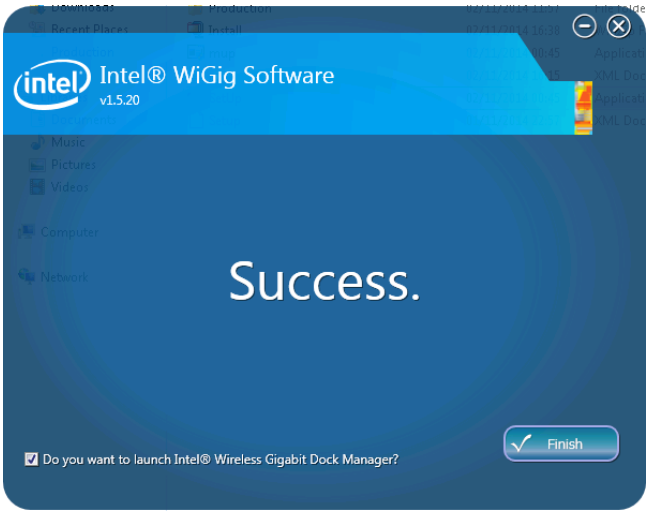
1. Go to G Layout\Win7Plus\ and run Setup.exe.
2. Setup.exe installs the relevant installer for either a 32-bit platform or a 64-bit platform.

**Figure 2-1 End User License Agreement dialog box**



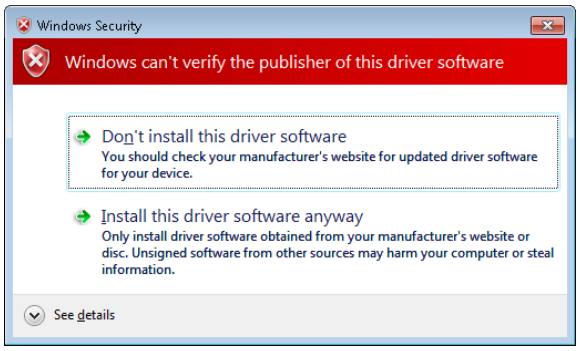

3. Check the *I have reviewed and agree to the EULA* box, and click *Install*. This will install the operational WiGig software for the NB.
4. When the application is successfully installed, select the *Do you want to launch Intel® Wireless Gigabit Dock Manager?* check box. Click *Finish*.
5. You will be able to launch the Intel® Wireless Dock Manager application from the desktop shortcut later if you do not select this option.

**Figure 2-2 Success message**



6. During the first installation, the device driver is installed. If the Windows Security message shown in Figure 2-3 appears, choose *Install this driver software anyway* to continue the installation.

**Figure 2-3 Windows security message**

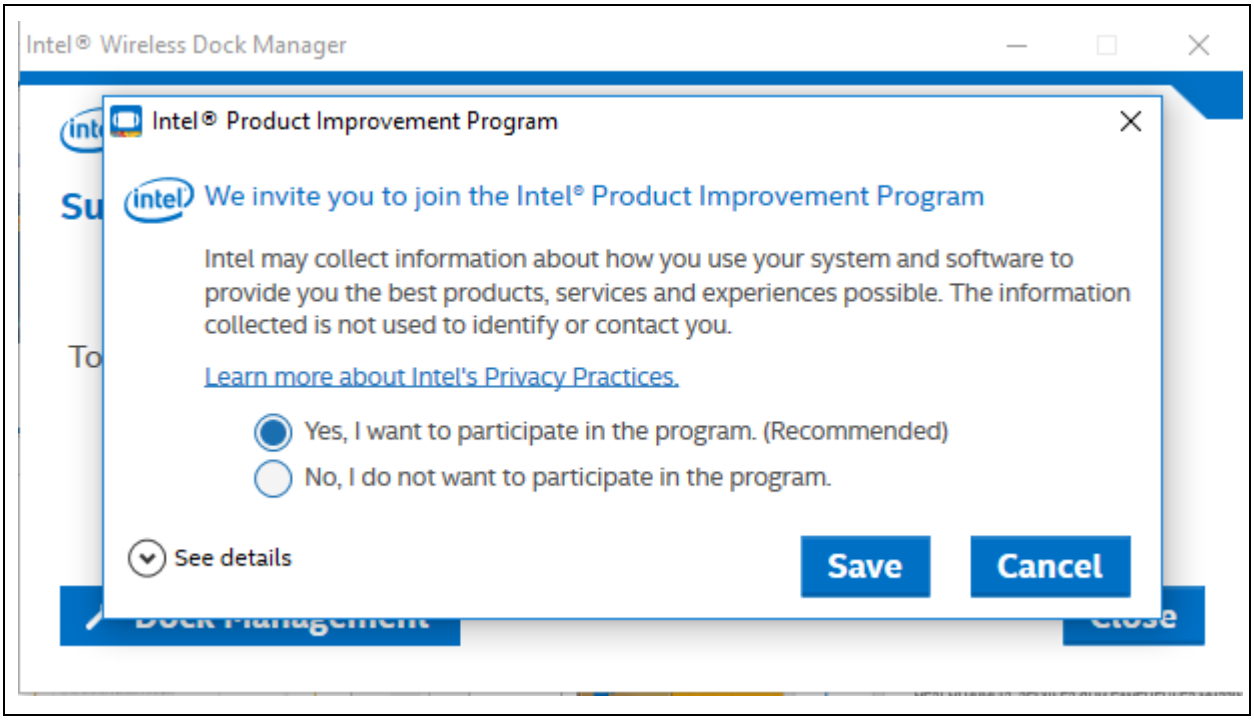



To avoid this window, run the certificate file *(*iCert.spc*)* from the Certificates layout.

To run the installer in silent mode, run the command `setup.exe –q` from a command line.

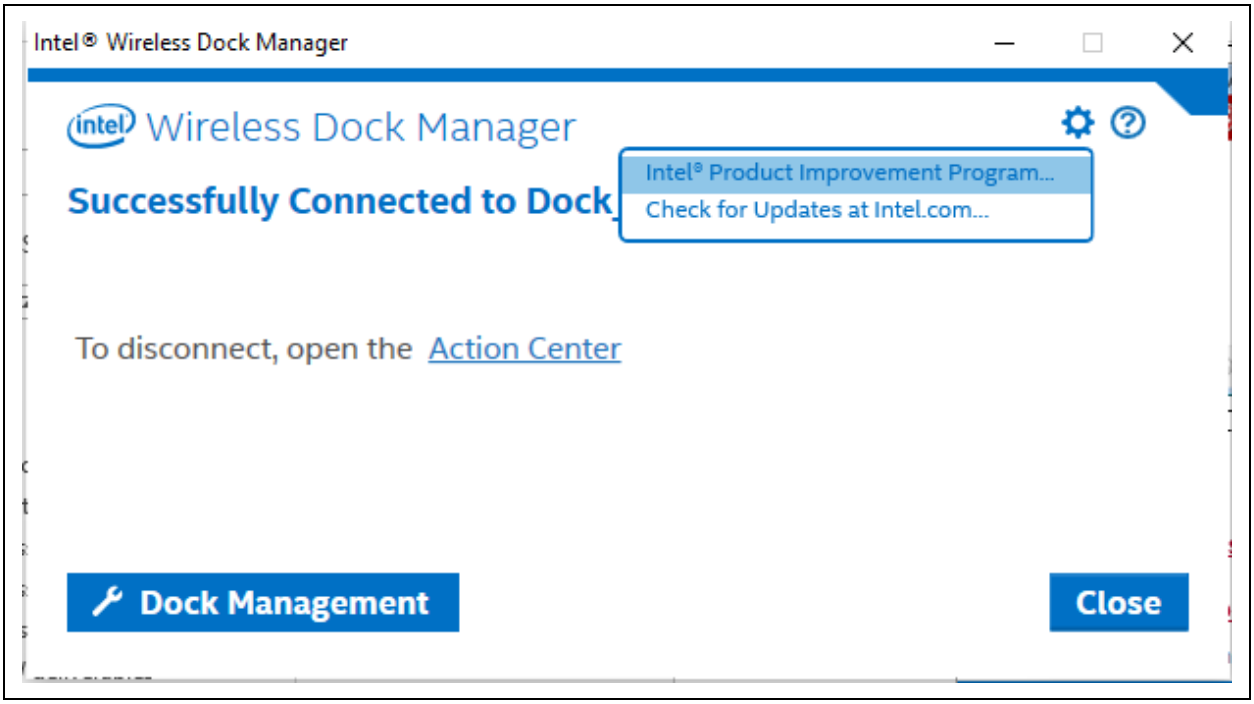
7. By the end of the installation, the user will be asked to participate in the Product Improvement Program, as shown in Figure 2-4.

**Figure 2-4 Product Improvement Program dialog box**




8. You may change your selection at any time on the Settings menu of the Intel Wireless Dock Manager; see Figure 2-5.

**Figure 2-5 Changing Intel® Product Improvement Program selection**

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# 3 WiGig Application User Manual for Windows 7*/8*/8.1*

## 3.1 User manual

The Intel® Wireless Dock Manager is a dedicated application that runs on the client and allows the user to find, connect to, and configure docks.

LEDs on the dock, and an on-screen display (OSD) on the monitor connected to the dock, provide further feedback about the dock status, and assist the user in performing actions.

The activity button on the dock is used in some of the flows (like pairing and connection/disconnection).

### 3.1.1 Launch the Intel® Wireless Dock Manager

The Intel® Wireless Dock Manager starts automatically with Windows.

To invoke the Intel® Wireless Dock Manager interface, double-click the icon on the desktop, labeled *Intel*® Wireless *Dock Manager*.

Alternatively, double-click the WiGig tray icon, or right-click and choose *View available docks*.

A dedicated tray icon can initiate the Intel® Wireless Dock Manager and indicate the relevant status as shown in Figure 3-1:

- **Connected:** The NB is connected to a dock
- **Disconnected:** The NB is not connected to a dock
- **Error:** Error while connecting or weak connection (hover to see the error reason)

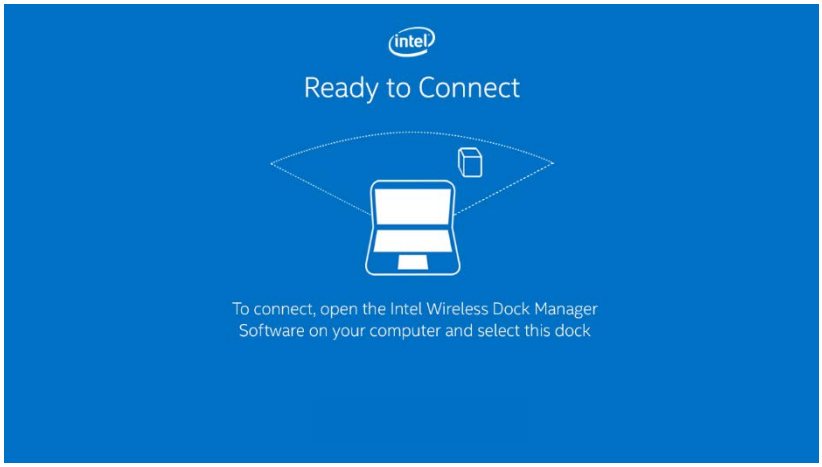
**Figure 3-1 Tray icon indications**

***Note:*** The Intel® Wireless Dock Manager application keeps running from the system tray even if you click the *X* (close window) icon on the application.

### 3.1.2 Make the first connection

1. Turn on the power on your dock. When the dock is ready to accept connections, the external monitor will light up and show the welcome OSD message shown in Figure 3-2.

**Figure 3-2 Welcome OSD message**




2. This screen remains until the connection is made. After a few minutes of inactivity, the monitor turns off to conserve power. Press the dock activity button to wake up the monitor and continue with the connection.
3. WiGig will start scanning for docks in your vicinity. You will see a window similar to that shown in Figure 3-3.

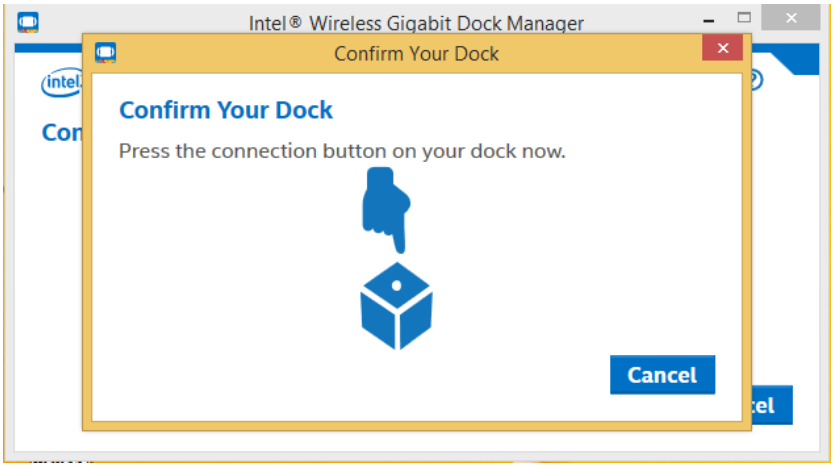
**Figure 3-3 Dock select**

4. Choose the dock you wish to connect to by clicking it.

***Note:*** Since this is the first time you are connecting to this dock, you will need to pair with it. Pairing creates a set of authentication keys that uniquely identify your client and dock pair, and allow them to communicate in a secured, encrypted manner over-the-air.

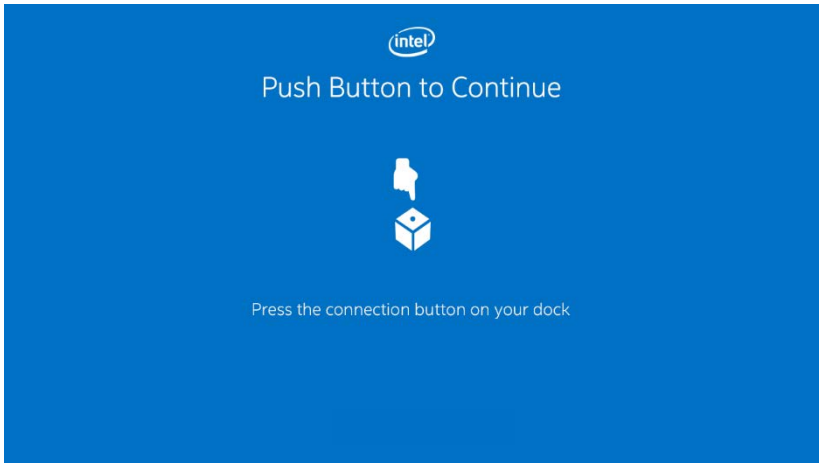
5. Press the connection button on your dock to confirm it, as indicated in Figure 3-4.

**Figure 3-4 Dock confirmation message**




6. A corresponding OSD will appear on the external monitor, as shown in Figure 3-5.

**Figure 3-5 Dock confirmation OSD**




7. Press the activity button on the dock to complete the pairing process. The Connected dialog box appears shortly after, as shown in Figure 3-6.

**Figure 3-6 Dock connected message**

***Note:*** A successful connection is also indicated by the dock LED (if available), and the external monitor and USB devices being connected and enumerated on your client (you will hear the Windows hot-plug audio tone cues).

Congratulations! You have made your first wireless docking connection.

## 3.1.3 Automatic connection default

While connecting to the dock for the first time, you will see the message to set the dock to be automatically connected or not, as shown in Figure 3-7.

**Figure 3-7 Automatically Connect to this Dock message**

For docks you connect to regularly, select *Yes*. For public docks or ones you use rarely, select *No*.

### 3.1.4 Automatic connections

If a dock is set to connect automatically, WiGig will attempt to automatically connect to this dock once in range. To this end, WiGig keeps scanning in the background, while consuming very little power.

To connect, simply place your client (assumed to be in S0) near the dock. Within several seconds, WiGig will discover the dock and will connect to it automatically. You do not have to invoke the Wireless Dock Manager, open the lid or take any action, just wait until the external screen comes up and USB devices are enumerated, and you can start working.

When successfully connected to a dock, the dock LED changes color (color is specific to dock vendor).

***Note:*** For the connection to be fully completed automatically, as described above, the client needs to be powered on and active (such as in S0). If the client is in S3, WiGig will automatically discover the dock, and then you can use the dock button to wake up the client and complete the docking procedure. See Section 3.1.6 for more details. Ability to wake up the client from the dock is vendor specific and is configured in the BIOS.

You can disable auto-connect by changing the toggle on the main Wireless Dock Manager screen while connected, as shown in Figure 3-8.

**Figure 3-8 Disabling the auto-connect setting**

You can only change a dock between automatic and manual connection when you are actively connected to the dock.

Once auto-connect is disabled, the client will no longer connect automatically and you will have to manually select the dock from the client, as described in Section 3.1.5.

### 3.1.5 Manually connect to a dock

To manually connect to a dock, choose the dock from the list of docks by clicking on it, as shown in Figure 3-9.

**Figure 3-9 Manual dock connection**

Docks that you have already paired with in the past will appear with a dark background color. Docks that you have never paired with will appear with a light background color.

The list is being refreshed automatically, as WiGig keeps scanning in the background.

Another method to connect to a dock is via the tray icon. If there is only a single paired dock in range (that is, a dock you have already paired with in the past), you can right-click the tray icon and choose *Connect to <dock name>*. Right-clicking when there is more than one paired dock in range, or no paired docks, will give you the option to open the Wireless Dock Manager (View available docks), where you can choose your desired dock from the list.

When successfully connected to a dock, the dock LED changes color (color is specific to dock vendor).

### 3.1.6 Automatic connection in S3 (depends on BIOS configuration)

When getting in range with a paired dock that is set to auto-connect, and the client is sleeping (S3), the WiGig radio will discover the dock and establish a low power link to it, known as low-power connected. This mode may be indicated by the LED changing color.

While in this mode, the system is kept in its low power state (S3), and WiGig will wait for an indication from the dock side to wake up the system and complete the connection procedure. This can be achieved by pressing the activity button on the dock. When the button is pressed, the client is moved to S0, and the connection completes automatically.

Once fully connected, the dock LED may change color.

### 3.1.7 Automatic connection in connected standby

When getting in range with a paired dock that is set to auto-connect, and the client is *connected standby* low-power mode, the WiGig radio will automatically connect to the dock. The devices connected to the dock will be connected and enumerated on the client, however the external monitor will not come up and the system will remain in connected standby.

To take the system out of connected standby, and light up the screen, press the activity button on the dock, or alternatively click the mouse or press the keyboard.

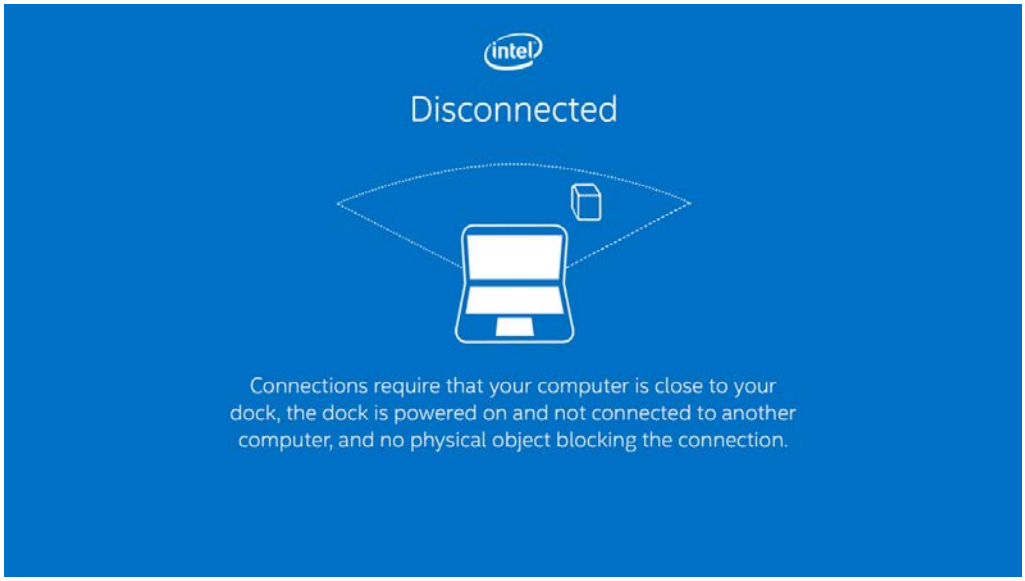
### 3.1.8 Disconnect from the dock

There are several methods in which you can disconnect an active connection:

1. First, you can simply take your client and walk out of range from the dock. WiGig will eventually lose the link, and the dock will be disconnected. Once disconnected, WiGig automatically starts scanning again to discover auto-connect docks in range.

   This method is also known as *auto-disconnect*. In this case, the OSD will display the message pictured in Figure 3-10 after disconnecting.

**Figure 3-10 Dock disconnection mesage**




***Note:*** Disconnecting by getting out of range (auto-disconnect) is experienced by the system as a USB surprise-removal event. While Windows has become better and better over the years with handling surprise removals, there is still always a chance of data loss/corruption when surprise-removing USB Mass Storage devices connected to the dock (other devices, such as HID, USB LAN, USB audio, etc., do not suffer). If this is a concern, for example, if you have a Mass Storage device connected to your dock, and you have just recently finished accessing this device, it may be advisable to safely remove this USB device (right-click on the USB icon in the system tray), or to disconnect WiGig manually, as described below. In any case, it is advised to act in a similar manner to undocking from a wired dock, as the same issues are present there as well.

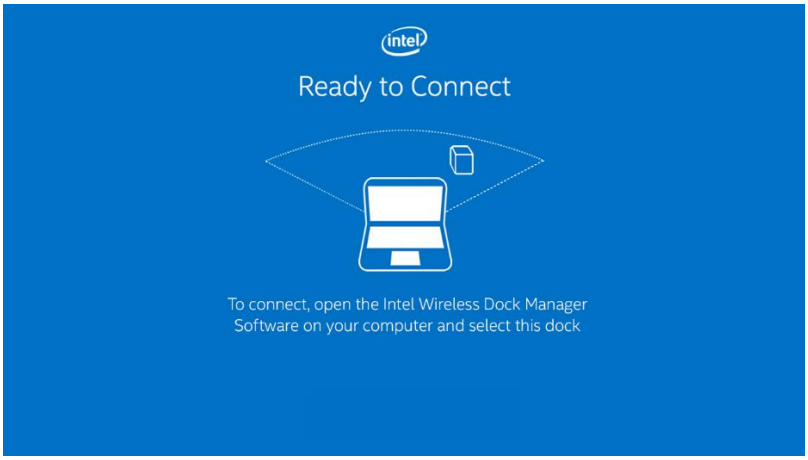
2. To manually disconnect, invoke the Wireless Dock Manager and click the *Disconnect* button in the main window. Alternatively, you can right-click the system tray icon and choose *Disconnect from <dock name>*.

**Figure 3-11 Manual disconnect option**

3. Another method for manually disconnecting is to press and hold the activity button on the dock for more than four seconds. This method is especially useful for closed-lid operations, or if you are trying to manually disconnect a system where you cannot access the Wireless Dock Manager (like when the system is locked and you do not know the password).

   Once disconnected, the dock LED changes color (color is specific to dock vendor), and the OSD shows the Ready to Connect message, as shown in Figure 3-12.

**Figure 3-12 Ready to connect message**

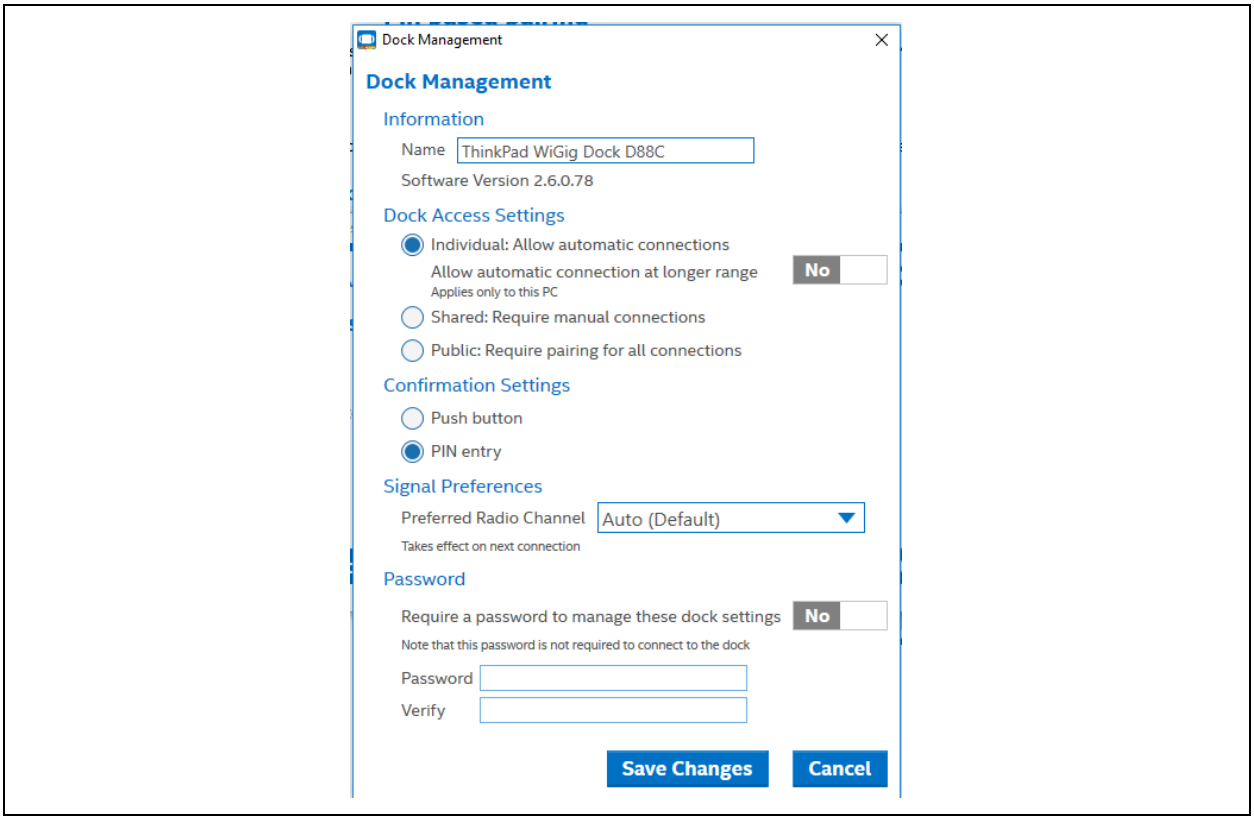



***Note:*** Manually disconnecting from a dock that is set to connect automatically will temporarily disable auto-connect to this dock. This is to prevent the connection from being recovered immediately. To re-enable automatic connections to this dock, the client needs to get out of range (for about 13 seconds) and then return.

### 3.1.9 PIN-based pairing

Intel Wireless Dock Manager version 2.6 or newer allows WiGig pairing using a PIN, without the need to push the button on the dock. To enable PIN-based pairing, select the *PIN entry* option from the Dock Management menu, as shown in Figure 3-13.

**Figure 3-13 Enabling PIN-based pairing**




There are dock products that have no push button option. Such docks are configured in the factory with no PBC button available. (See Ref 7). For these dock products, PIN-based pairing is the default pairing method, and the Confirmation Settings options do not appear in the Dock Management menu.

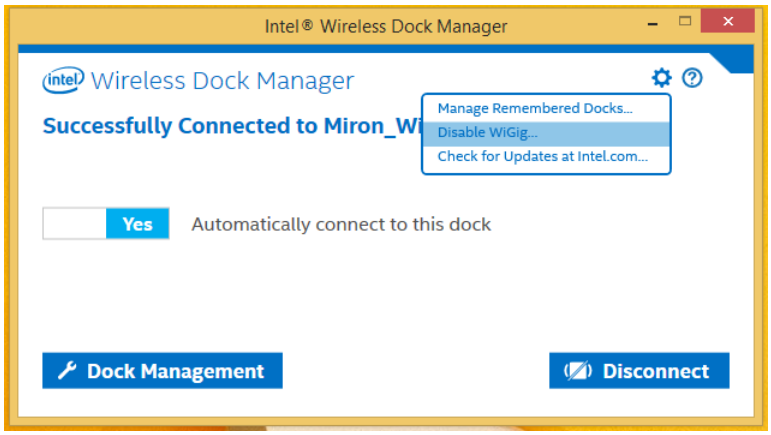
Once the PIN entry is configured, the user is prompted to enter the PIN number when trying to connect to the dock, as shown in Figure 3-14. The PIN number will be shown in an OSD on the monitor connected to the dock.

**Figure 3-14 PIN-based pairing in OSD**

## 3.1.10 Disable and enable WiGig

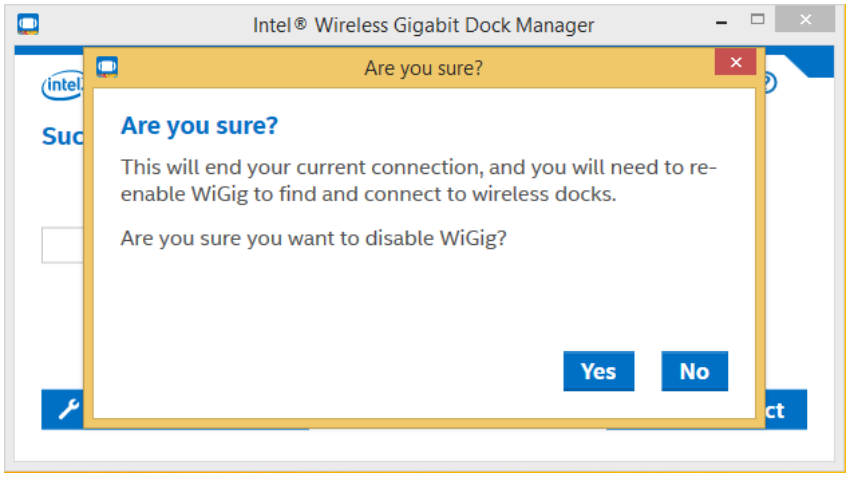
1. To disable WiGig, click on the gear icon in the upper right of the main Wireless Dock Manager screen, shown in Figure 3-14. A popup-menu will come up.

**Figure 3-15 Disable WiGig using the gear icon**




2. Choose the first menu option, *Disable WiGig*. A warning may appear, depending on whether you are currently connected or not.

**Figure 3-16 Disable WiGig warning message**




3. Choose *Yes* to disable WiGig.
4. When WiGig is disabled, you cannot find and connect to wireless docks; the message shown in Figure 3-16 appears. Disabling WiGig minimizes the power consumption of the WiGig radio in the client.

**Figure 3-17 WiGig disabled confirmation message**

5. To enable WiGig, click the *Enable WiGig* button.

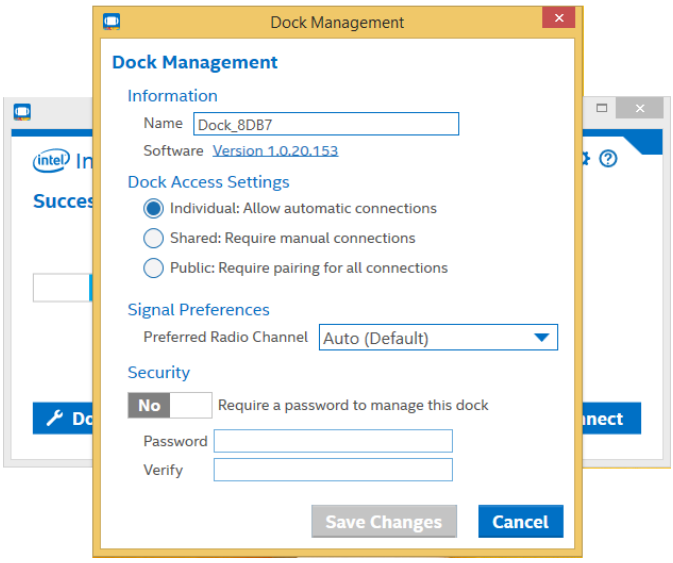
## 3.2 Change dock settings

1. To access the dock settings, click the *Dock Management* button on the main Wireless Dock Manager window while connected to a dock, as shown in Figure 3-17.

**Figure 3-18 Dock Management button**

2. This will open up the Dock Management dialog box, as shown in Figure 3-18.

**Figure 3-19 Dock management dialog box**




3. In the Dock Management dialog box, you can configure the following settings:
   - **Information**
     - **Name:** This field determines how will the dock be called and presented in the scan list in the Wireless Dock Manager. This field accepts only Latin letters, digits, and a few special characters such as space and underscore.

***Note:*** The factory setting for dock name is a prefix, *Doc*, and an automatic suffix of the last four nibbles of the MAC address of the dock. This helps users to distinguish between similar docks whose names have not been customized. Once the user changes the dock name, the last four nibbles of the MAC address are no longer appended to it. To re-enable this behavior, the dock must be reset to the factory defaults by pressing the recovery button on the dock for 10 seconds.

- **Software:** This shows the version of the currently installed software. Clicking this item will allow you to manually update your dock software, as described in Section 3.3.1. Also, when an update is available for your dock, it will show up next to the version number. Click the *Update Available* link to start the software update procedure.

– **Dock Access Settings**
  - **Individual:** Allows automatic connections. This setting enables the auto-connect toggle on connected clients, as described in Section 3.1.3. This is the only setting with which the dock can be automatically connected to, and is particularly suitable for private docks for individuals.
  - **Shared:** Requires manual confirmation. This setting forces manual connections by disabling the auto-connect toggle on connected clients. This setting is particularly suitable for shared docks in multi-users environments, where it may be undesirable to allow automatic connection to prevent users from inadvertently connecting to the dock while in range (remember that a dock that is currently connected to a user cannot accept other user's connections, and will not be seen in their scan list).
  - **Public:** Requires pairing for all connections. This settings forces the user to pair on every connection (such as. pairing data is lost upon disconnect). This is the most secure setting, and is mostly suitable for docks where the convenience of connection is less of a concern, for example in airports, cafes or hotels.

– **Signal Preferences**
  - **Preferred Radio Channel:** Allows you to assign a specific operating channel, or enable automatic selection by the dock. It is recommended to leave this as *Auto*, as this will allow the dock to select the best channel to operate in, based on interference and other factors.

– **Password**
  - Enable this to assign a password for protecting the dock setting page, preventing unauthorized access.

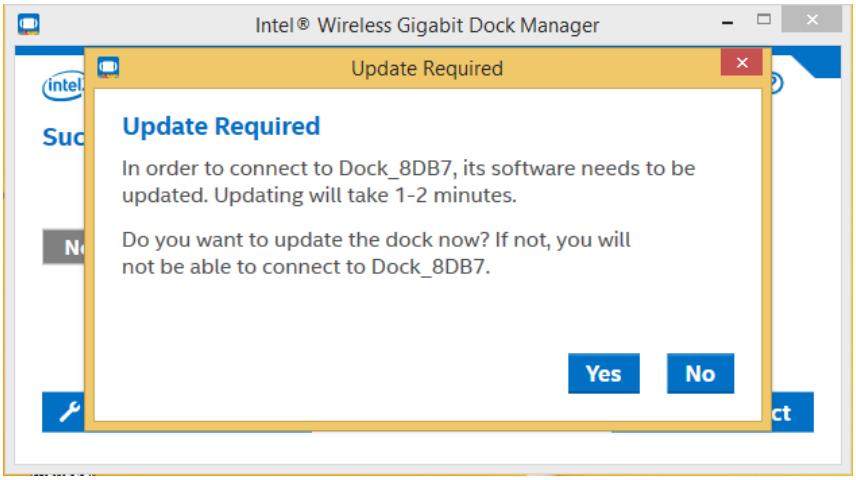
## 3.3 Dock software update

Your dock software can be upgraded over the air, from the client.

### 3.3.1 Update during connection

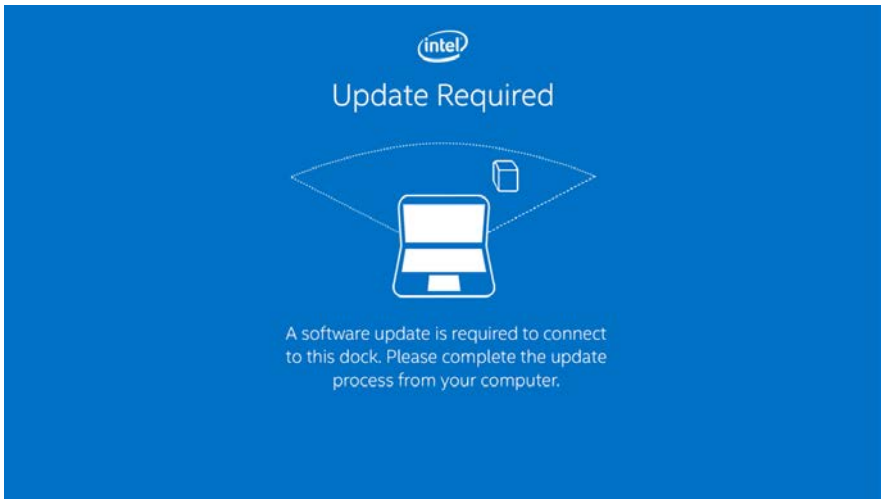
1. When connecting to the dock, the Wireless Dock Manager might inform the user of a mandatory dock software update.
2. On mandatory dock software updates, the Wireless Dock Manager will present the message shown in Figure 3-19 while trying to connect.

**Figure 3-20 Dock software Update Required message**



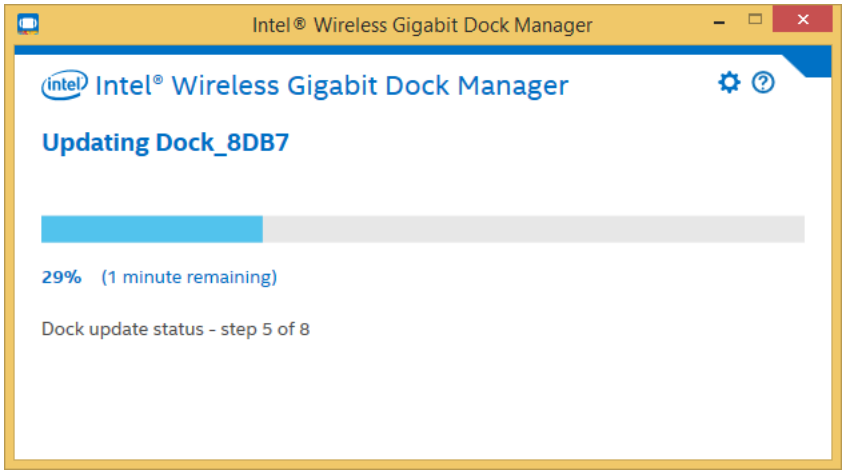

3. In addition, the OSD on the external monitor will show the message shown in Figure 3-20.

**Figure 3-21 OSD Update Required message**



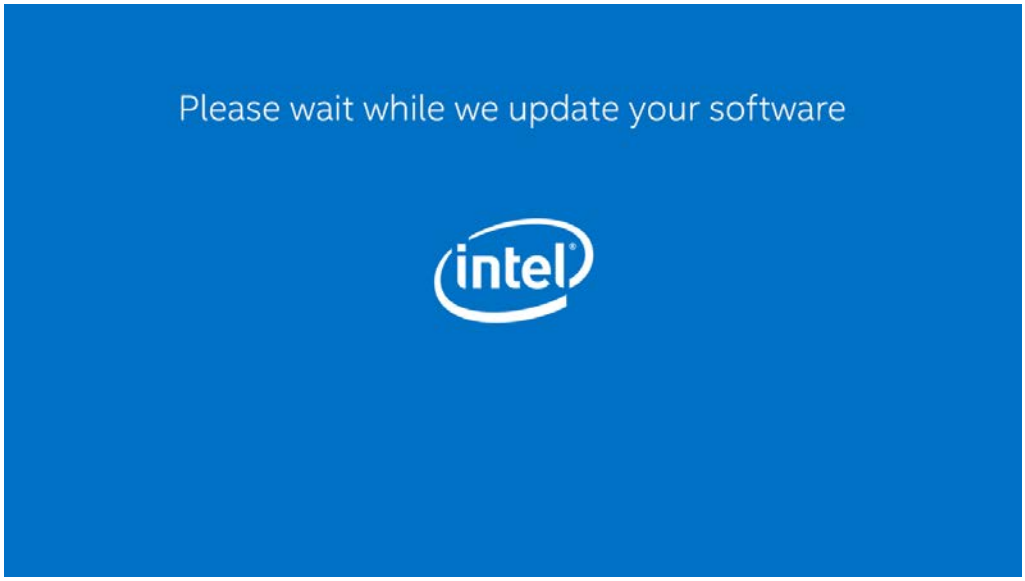

4. Choosing *No* will disconnect. The user cannot connect and work with this dock without performing a software update.
5. Choosing *Yes* will start the dock software update process. A screen similar to the one in Figure 3-21 appears, with a bar indicating progress.

**Figure 3-22 Dock update progress**




6. During the software update process, the dock LED changes color (color is specific to dock vendor), and the OSD will show the message pictured in Figure 3-22, with bars to indicate progress.

**Figure 3-23 OSD update progress message**

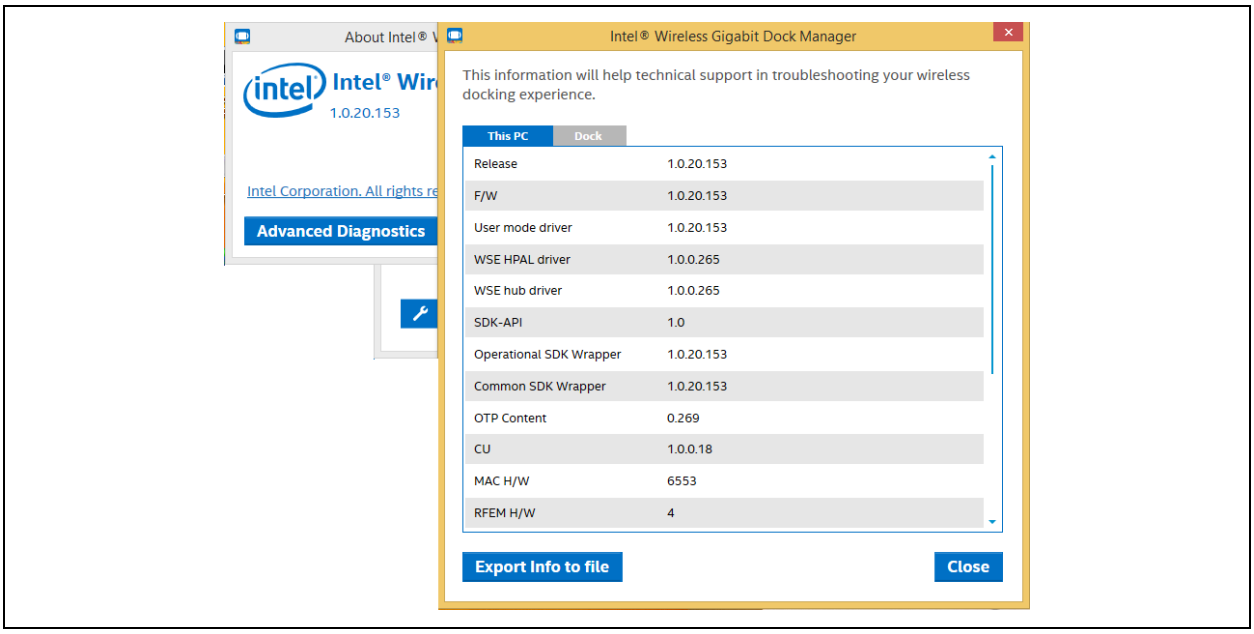



7. Once the update process is complete, the dock is reset, and the client will either automatically re-connect (auto-connect enabled) or the user will need to manually re-connect to the dock (auto-connect disabled).

## 3.4 Diagnostic information

Information shown in diagnostics window will help technical support in troubleshooting your wireless docking experience. In order to open the diagnostics window, click the *Advanced Diagnostics* button in the About window.

**Figure 3-24 Advanced diagnostics window**




## 3.4.1 Details

### 3.4.1.1 This PC tab

The information in the This PC tab provides a diagnostic report for the client.

The reported fields are:

- **Release:** Version of WiGig release, including all SW components in host and device
- **F/W:** Version of firmware running in device
- **User mode driver:** Version of software running in user-mode driver
- **WSE HPAL driver:** Version of software running in WSE-HPAL driver
- **WSE hub driver:** Version of software running in WSE-hub driver
- **SDK-API:** Version of SDK-API
- **Operational SDK Wrapper:** Version of Operational SDK DLL
- **Common SDK Wrapper:** Version of Common SDK DLL
- **OTP Content:** Version of image burned in OTP
- **CU:** Version of CU Application
- **MAC H/W:** Version of M-Chip Si. Possible values are:
  - **6560-6567:** For MpL-C4
  - **6568-6575:** For MpL-C5
- **R-FEM H/W:** Version of R-Chip. Possible values are:
  - **4-5:** in case of R-FEM1
  - **6:** in case of R-FEM2
- **Device ID:** 0x93C, meaning MpL Si
- **Subsystem ID:** Value representing WiGig HW SKU. Details are given in Ref 4.
- **OEM ID:** String configured in OEM-Lock field in BIOS. See more details in Section 8.1.2 in Ref 6.
- **Device State:** See details for Device status field in Section 5.2.1.1.1 in Ref 5.

- **Device State Reason:** See details for Reason for Status field in Section 5.2.1.1.1 in Ref 5.
- **Last Disconnect Reason:** See details for Failed Connection Details field in Section 5.4.11 in Ref 5.
- **H/W status 1:** M-chip junction temperature, in Celsius.
- **H/W status 2:** R-chip junction temperature, in Celsius.

#### 3.4.1.2 Dock Tab

The information in the This PC tab provides a diagnostic report for the dock.

The reported fields are

- **F/W (main):** Version of firmware burned in main slot in Flash
- **F/W (factory):** Version of firmware burned in factory slot in Flash
- **Active F/W:** See details for Active FW field in Section 5.7.20 in Ref 5.
- **OTP Content:** Version of image burned in OTP
- **MAC H/W:** Version of M-Chip Si. Possible values are
  - **6560-6567:** For MpL-C4
  - **6568-6575:** For MpL-C5
- **R-FEM1 H/W:** Version of R-Chip. Possible values are
  - **4-5:** In case of R-FEM1
  - **6:** In case of R-FEM2
- **R-FEM2 H/W:** Version of R-Chip. Possible values are the same as for R-FEM1.
- **MST Hub H/W:** Version of MST Hub hardware
- **MST Hub F/W:** Version of MST Hub firmware
- **Signal Quality:** See details for the Peer-Signal-Quality field in Section 5.4.8 in Ref 5.
- **Performance Quality:** See details for the Peer-Performance-Quality field in Section 5.4.8 in Ref 5.
- **Active Channel:** See details for the Active Channel field in section 5.4.8 in Ref 5.
- **Last F/W update result:** See details for the Status field in Section 5.2.1.6 in Ref 5.
- **H/W status 1:** M-chip junction temperature, in Celsius
- **H/W status 2:** R-chip junction temperature, in Celsius

## 3.5 Manage docks

The user may manage docks that were previously connected to. For each dock, the user may delete the dock or remove the auto-connect option. To manage docks, click on the *Manage Remembered Dock* dialog box from the Settings button, as shown in Figure 3-24 and Figure 3-25.

**Figure 3-25 Choosing Manage Remembered Docks**

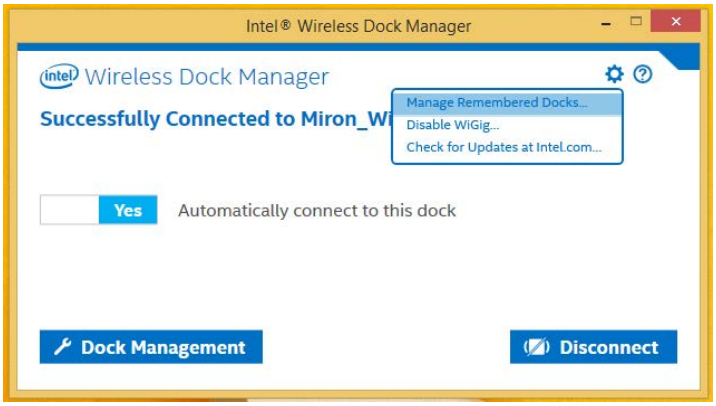
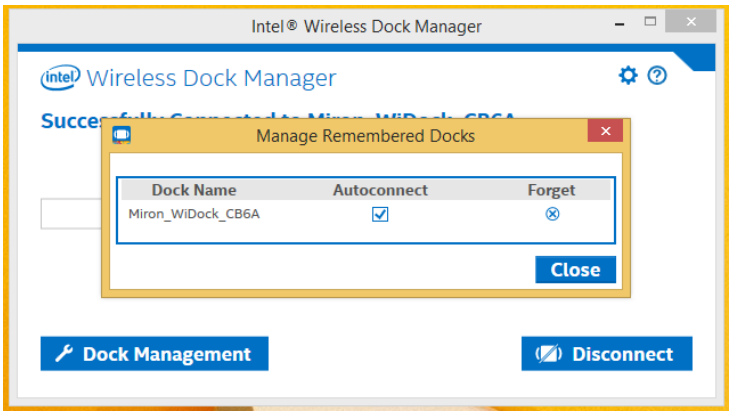



**Figure 3-26 Manage Remembered Docks auto-connect feature**



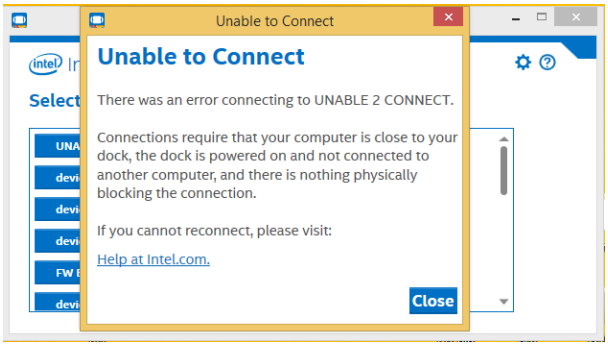
## 3.6 Notification messages

There are notification messages that inform the user about the different application activities, like possible limitations or errors.

### 3.6.1 Unable to Connect

The “Unable to Connect” message is displayed if there is an error during the connection or pairing process, as shown in Figure 3-26.

**Figure 3-27 Unable to Connect message**




### 3.6.2 No Available Docks Found

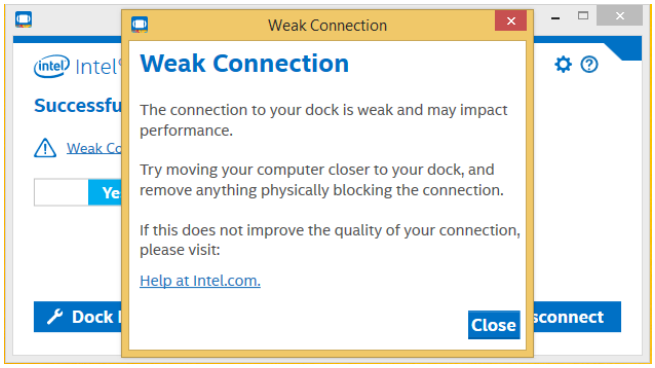
As shown in Figure 3-27, the “No Available Docks Found” message is displayed if scanning was done but no docks have been detected.

**Figure 3-28 No Available Docks Found message**

### 3.6.3 Weak Connection

The “Weak Connection” message is displayed if the connection is weak but connected, as shown in Figure 3-28.

**Figure 3-29 Weak Connection message**




### 3.6.4 WiGig is Not Working

The “WiGig is Not Working” message will be displayed if WiGig driver or device is not responding, as shown in Figure 3-29. The message will also provide an error code value. Table 3–1 provides a list of error code cases and possible recovery methods.

**Figure 3-30 WiGig is Not Working message (with example error code 0x1000)**

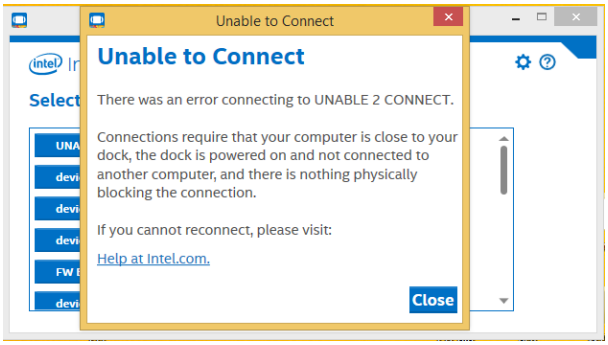


**Table 3–1 Error code cases and possible recovery methods**

| Item | Error Code | Description | Recovery Method |
|---|---|---|---|
| 1 | 0x1000 | Device is disabled | In Device Manager,<br>• If WiGig device is disabled, enable this device.<br>• If WiGig device is enabled, disable this device and then enable. |
| 2 | 0x100C | Device Version (OTP) is incompatible with SW Version. | Replace Device with compatible Device Version (OTP) or Install compatible SW Version |
| 3 | 0x1010 | FW continuous error | In Device Manager, disable this device and then enable.<br>In case this does not solve the problem, you may need to install other SW Version, containing a fix. Please contact Intel support. |
| 4 | 0x1014 | RTC Data corruption | Replace Coax Cable and/or RFEM |
| 5 | 0x1018 | RFEM Type is incompatible with SW Version | Replace RFEM with compatible RFEM Type or Install compatible SW Version |
| 6 | 0x101C | Device SKU is Incompatible with SW Version. | Replace Device SKU or Install compatible SW Version |
| 7 | 0x1021 | Device Product is Incompatible with SW Version. | Replace Device with compatible Device Product or Install compatible SW Version |
| 8 | 0x1020 | RTC disconnected, upon RF-On | Replace/Reconnect Coax Cable and/or RFEM |
| 9 | 0x1100 | Unrecognized fatal error | In Device Manager, disable this device and then enable.<br>In case this does not solve the problem, you may need to install another SW version, containing a fix. Please contact Intel support. |

### 3.6.5 WiGig disabled: critical temperature

The “WiGig is disabled due to overheating” message is displayed if the WiGig driver or device is disabled due to a critical temperature error, as shown in Figure 3-30.

**Figure 3-31 WiGig disabled due to overheating message**

### 3.6.6 WiGig disabled by hardware RF kill switch

The “WiGig is disabled” message is displayed if the WiGig driver or device is disabled by the physical radio on/off switch, as shown in Figure 3-31.

**Figure 3-32 WiGig disabled by hardware RF kill switch message**

### 3.6.7 WiGig disabled by airplane mode

The “WiGig is disabled” message is displayed if the WiGig driver or device is disabled because the device is in airplane mode, as shown in Figure 3-32.

**Figure 3-33 WiGig disabled by airplane mode message**

§

# 4 WiGig Application User Manual for Windows 10*

## 4.1 User manual

This chapter is very similar to the previous chapter and contains the WiGig behavior in the Windows 10* OS.

In Windows 10*, the OS controls the network-related functionality. This includes handling the radio state, scanning, connecting, and managing the profiles. The OS controls this via the setting and the action center pane, as described below.

The Intel® Wireless Dock Manager is a dedicated application that runs on the client and allows the user to do all the activities that are not related to network management, like manage the dock, get diagnostic info, do FWU, etc.

LEDs on the dock, and an on-screen display (OSD) on the monitor connected to the dock, provide further feedback about the dock status, and assist the user in performing actions.

The activity button on the dock is used in some of the flows (like pairing and connecting/disconnecting).

### 4.1.1 Launch the Intel® Wireless Dock Manager

The Intel® Wireless Dock Manager starts automatically with Windows.

To invoke the Intel® Wireless Dock Manager interface, double-click the icon on the desktop, labeled “Intel® Wireless Dock Manager”.

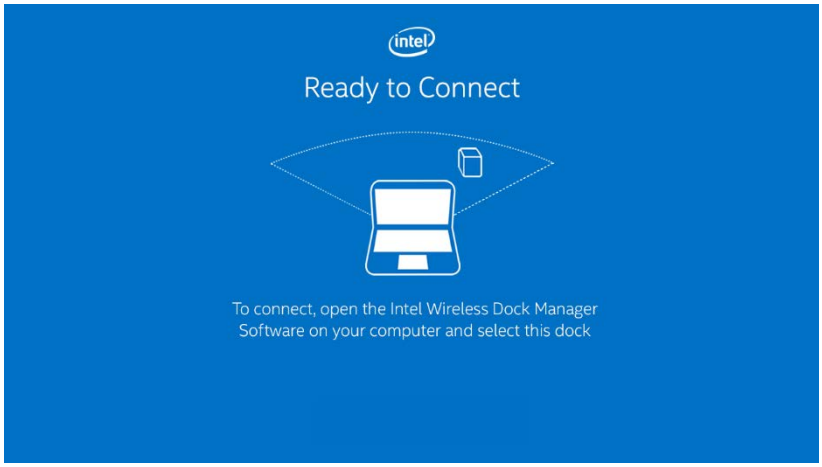
Alternatively, double-click the WiGig tray icon while the device is connected to a dock (the connected icon as shown in Figure 3-1.)

The Intel® Wireless Dock Manager application keeps running as an application even if you click the *X* (close window) icon on the application. To stop it, you must use the Windows Task Manager.

### 4.1.2 Make the first connection

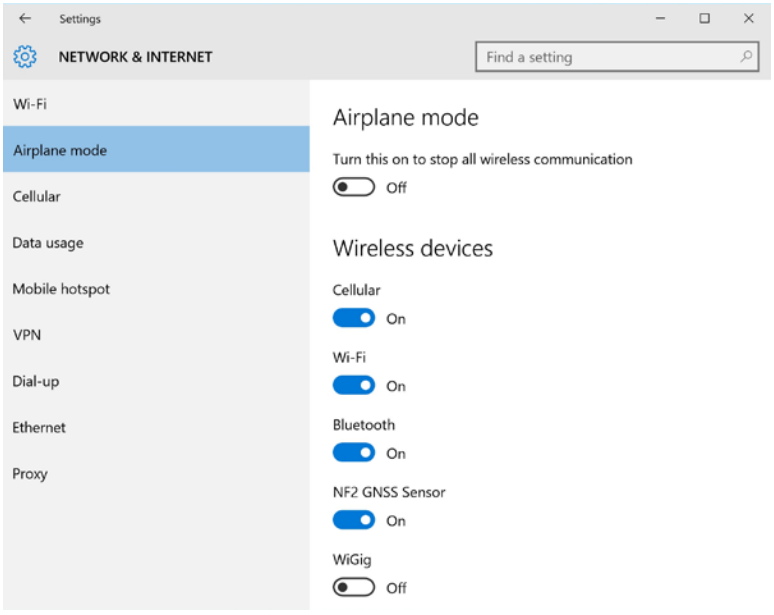
1. Turn on the power to your dock. When the dock is ready to accept connections, the external monitor lights up and shows the Welcome OSD message, as shown in Figure 4-1.

**Figure 4-1 Welcome OSD message**




2. This message persists until the connection is made. After a few minutes of inactivity, the monitor turns off to conserve power. Press the dock's Activity button to wake up the monitor and continue with the connection.
3. Click the *Wireless Settings* link to access the Airplane mode section of the Network & Internet page (Figure 4-2) containing controls that let you turn on (or off) the WiGig RF mode in addition to the RF state of other devices. WiGig will be ON by default.

**Figure 4-2 Network & Internet page showing Airplane mode settings**




4. An alternative way to get to this page is via *Settings -> Network & Internet -> Airplane mode*.
5. Once you set the WiGig radio button to *on*, you will find all docks in range. In Windows 10*, you won't be able to see the scan results in the Connect pane or in the Intel® Wireless Dock Manager.
6. To get to the Connect pane, click on the *Action Center* link (Figure 4-3) or press the keyboard shortcut *Win+k*; the Connect pane opens on the right side of the monitor (Figure 4-4).

**Figure 4-3 Action Center link**

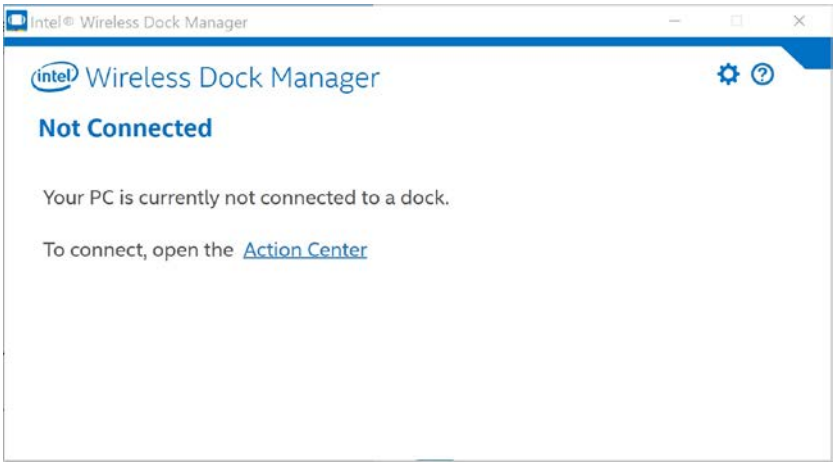
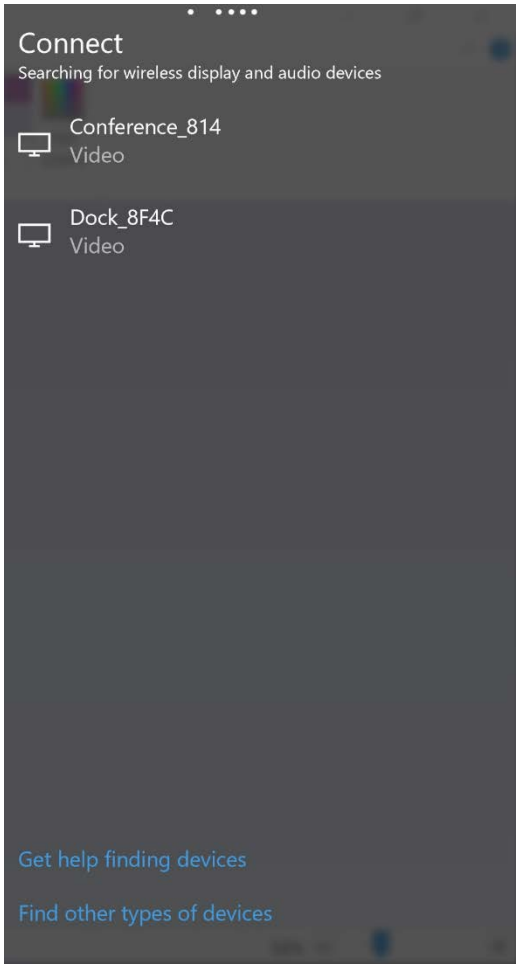



**Figure 4-4 Connect pane**

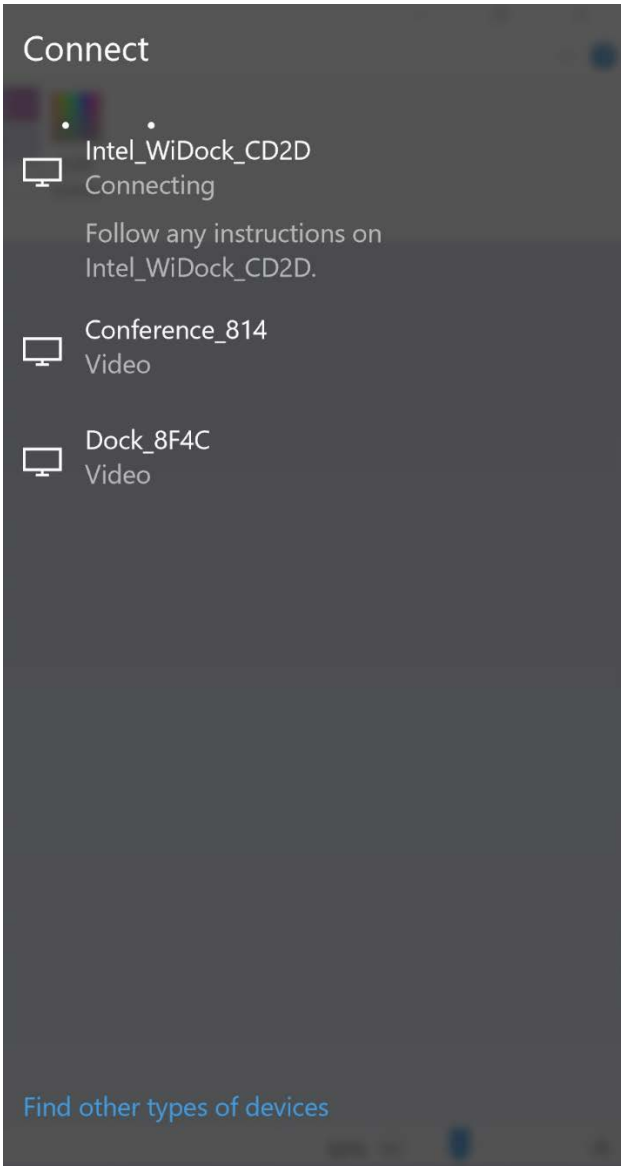



7. Choose the dock you wish to connect to by clicking it in the Connect pane.

***Note:*** Since this is the first time connecting to the dock, you need to pair with it. Pairing creates a set of authentication keys that uniquely identify your client and dock pair, and allows them to communicate in a secured, encrypted manner over the air.

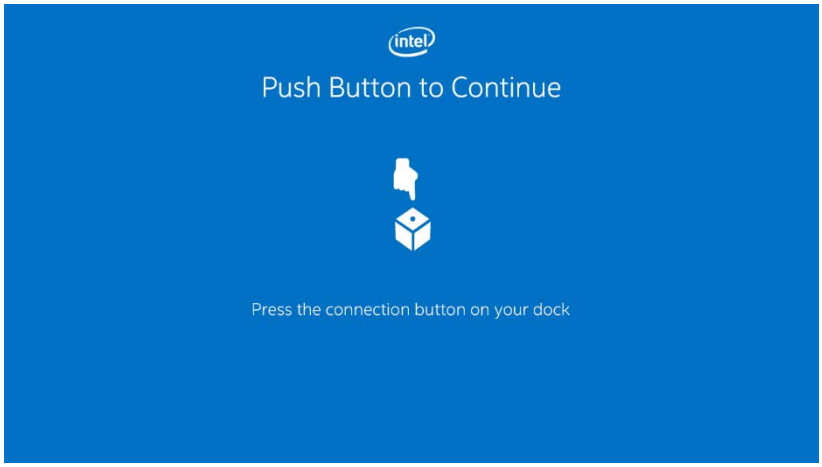
8. After connecting, the Connect pane directs you to follow the instructions on the dock, as shown in Figure 4-5.

**Figure 4-5 Connect pane during connecting stage**



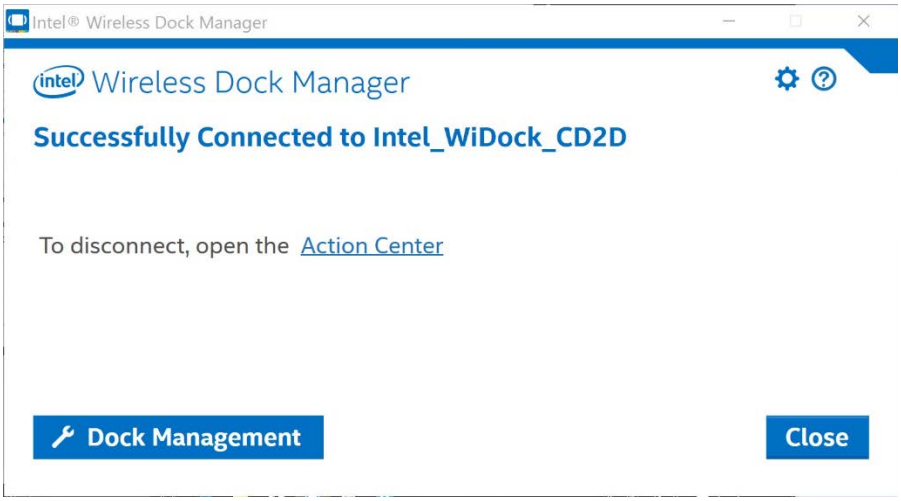

9. A corresponding OSD will appear on the external monitor, as shown in Figure 4-6.
10. Unlike in Win7/8/8.1, you won't see the indication to push the dock button on Intel® Wireless Dock Manager.

**Figure 4-6 Connect OSD message**




11. Press the activity button on the dock to complete the pairing process. The “Successfully Connected” message appears shortly after, as shown in Figure 4-7.

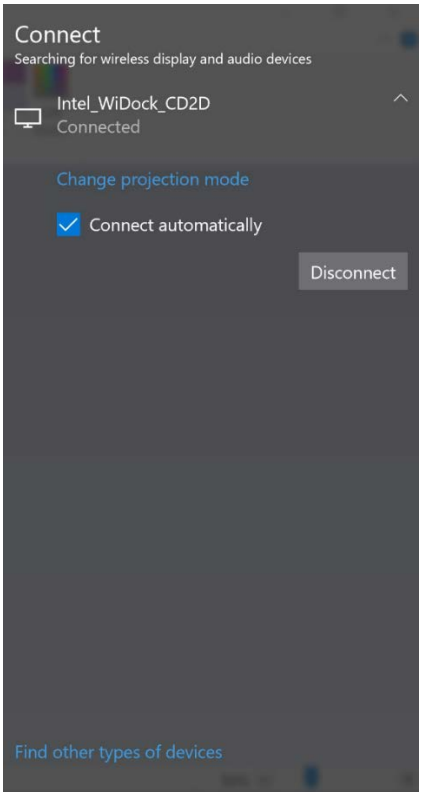
**Figure 4-7 Dock connected message**




***Note:*** A successful connection is indicated by the dock LED (if available), and the external monitor and USB devices being connected and enumerated on your client (you will hear the Window’s gling-gling hot-plug audio cues).

In addition you are also able to see that you are connected via the Connect pane by clicking the *Action Center* link, or by pressing the keyboard shortcut *Win+K*, as shown in Figure 4-8.

**Figure 4-8 Dock connected OSD message**




Congratulations! You have made your first wireless docking connection.

### 4.1.3 Automatic connection default

This section is not applicable to Win10* as in Win7*/8*/8.1*. In Windows 10*, the dock is in automatically connect mode.

### 4.1.4 Automatic connections

If a dock is set to connect automatically, WiGig attempts to automatically connect to the dock once in range. To this end, WiGig keeps scanning in the background, while consuming very little power.

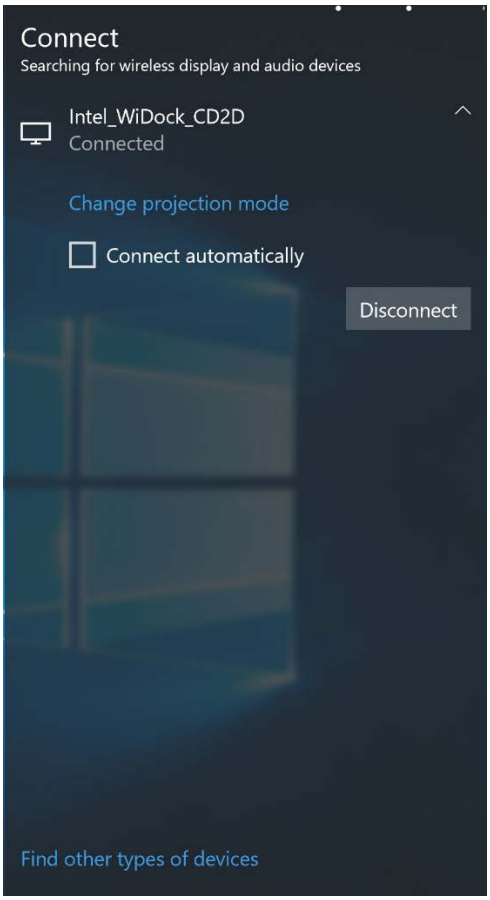
To connect, simply place your client (assumed to be in S0) near the dock. Within several seconds, WiGig will discover the dock and connect to it automatically. You do not have to invoke the Wireless Dock Manager, open the lid or take any action; just wait until the external screen comes up and USB devices are enumerated, and you can start working.

When successfully connected to a dock, the dock LED changes color (specific to the dock vendor).

***Note:*** For the connection to be fully completed automatically, as described above, the client needs to be powered on and active (such as in S0). If the client is in S3, WiGig will automatically discover the dock, and then you can use the dock button to wake up the client and complete the docking procedure. See Section 3.1.6 for more details. Ability to wake up the client from the dock is vendor specific and is configured in the BIOS.

You can disable auto connect by deselecting the *Connect automatically* check box while connected, as shown in Figure 4-9.

**Figure 4-9 Disable the auto connect setting**




You can change a dock between automatic and manual connection only when you are actively connected to the dock.

Once auto-connect is disabled, the client no longer connects automatically, and you have to manually select the dock from the client as described in Section 3.1.5.

### 4.1.5 Manually connect to a dock

When the dock is defined as manual, the connection is done similarly to the connection flow that was describe above, without the stage where the user is requested to push the button.

### 4.1.6 Automatic connection in S3 (depends on BIOS configuration)

Same as in Section 3.1.6.

### 4.1.7 Automatic connection in connected standby

Same as in Section 3.1.7.

### 4.1.8 Disconnect from the dock

Same as in Section 3.1.8.

The only differentiation is that to manually disconnect, the user cannot disconnect from the Intel® Wireless Dock Manager, but instead has to do it from the Connect pane.

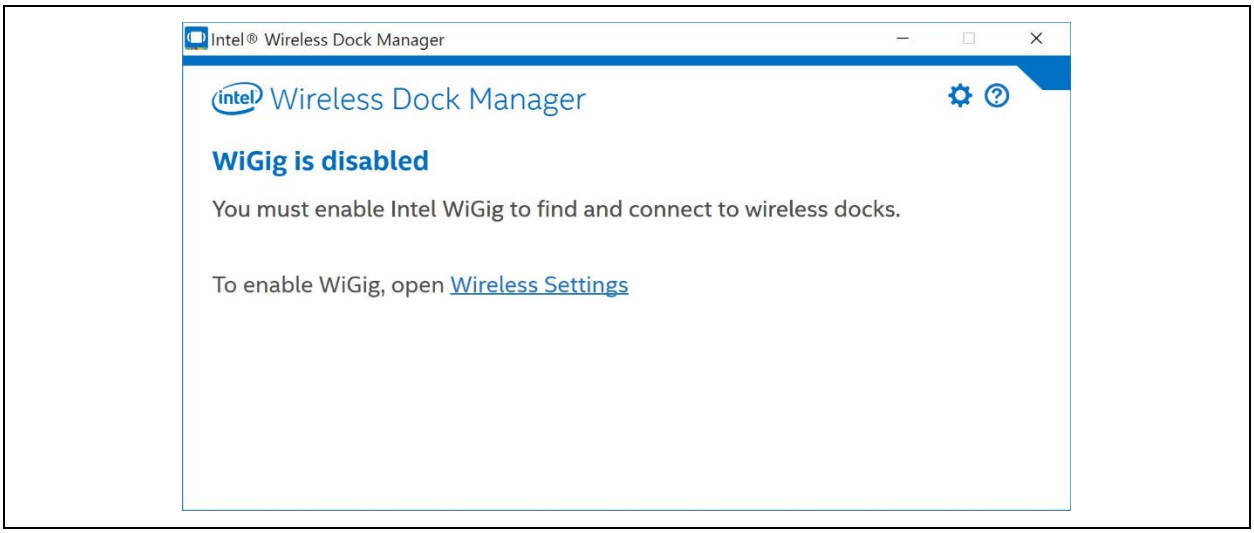
### 4.1.9 PIN-based pairing

Same as in Section 3.1.9

### 4.1.10 Disable and enable WiGig

1. In Win10, the ability to disable WiGig is available only from the Windows Airplane mode settings page (*Settings-> Network & Internet -> Airplane mode*).
2. When WiGig is disabled, you cannot find and connect to wireless docks; the screen shown in Figure 4-10 comes up in case the Intel® Wireless Dock Manager is open. Disabling minimizes the power consumption of the WiGig radio in the client.

**Figure 4-10 WiGig disabled confirmation message**




3. To enable WiGig, go to the Airplane mode settings page by clicking the *Wireless Settings* link or by clicking *Settings -> Network & Internet -> Airplane mode* and turning on WiGig.

## 4.2 Change dock settings

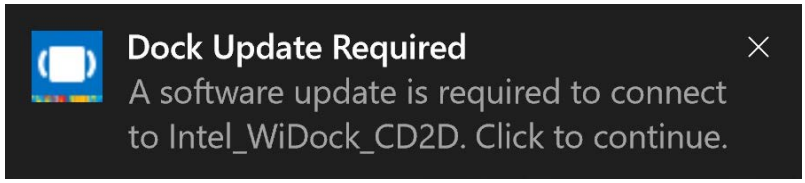
Same as in Section 3.2.

## 4.3 Dock software update

Your dock software can be upgraded over the air, from the client.

1. When connecting to the dock, the Wireless Dock Manager might inform the user of mandatory dock software update.
2. For mandatory dock software updates, you will get a toast notifying you that the dock update is required, as shown in Figure 4-11.

**Figure 4-11 Dock update required toast**




3. Clicking on this toast will pop up the Intel® Wireless Dock Manager application.
4. From this point forward, the process of updating the dock is similar to the process described in Section 3.3.

## 4.4 Diagnostic information

Same as in Section 3.4.

## 4.5 Manage docks

User may delete connected docks that are no longer needed.

1. To delete docks, go to Connected devices (*Settings ->Devices -> Connected devices*), click on the dock you want to remove, and then click the *Remove device* button, as shown in Figure 4-12. Then, you can approve it as shown in Figure 4-13.

**Figure 4-12 Remove device button**

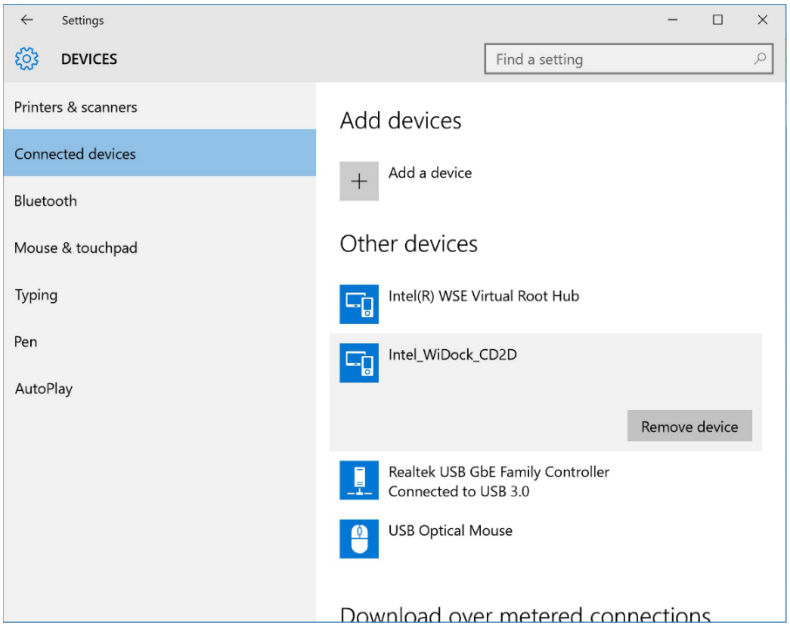
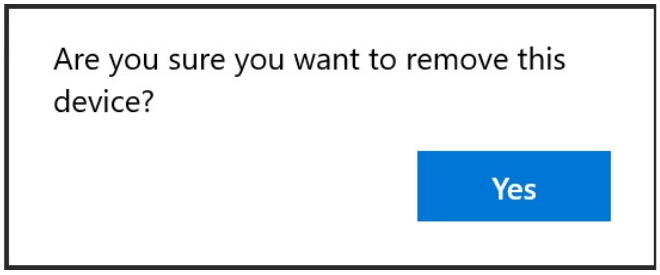


**Figure 4-13 Remove device approval dialog box**




## 4.6 Notification messages

This section lists the messages that show possible device limitations or errors.

### 4.6.1 Not found

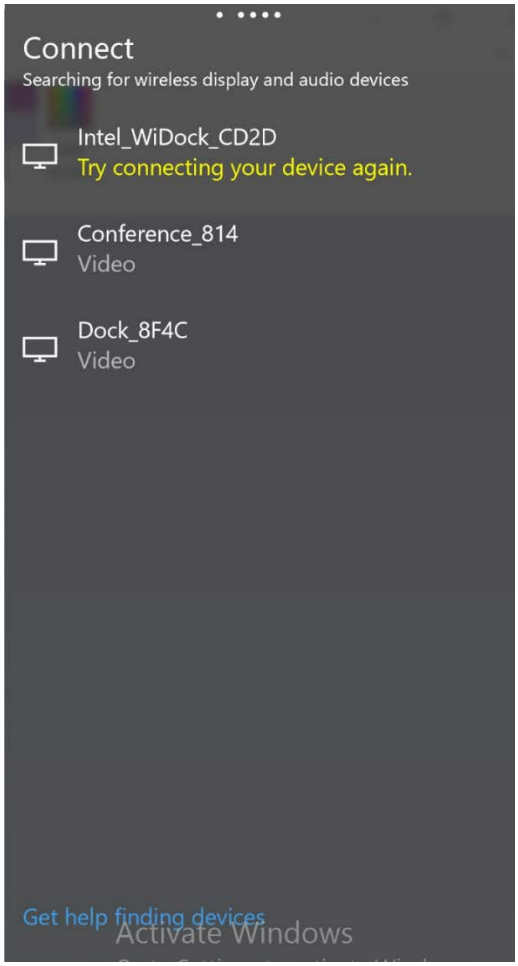
When no device can be found, the Connect pane appears with a request to verify that the RF is on, as shown in Figure 4-14.

**Figure 4-14 Device not found message**

### 4.6.2 Try connecting your device again

When there is a problem in the pairing flow (before the user has the dock profile) the Connect pane returns the error “Try connecting your device again”, as shown in Figure 4-15.

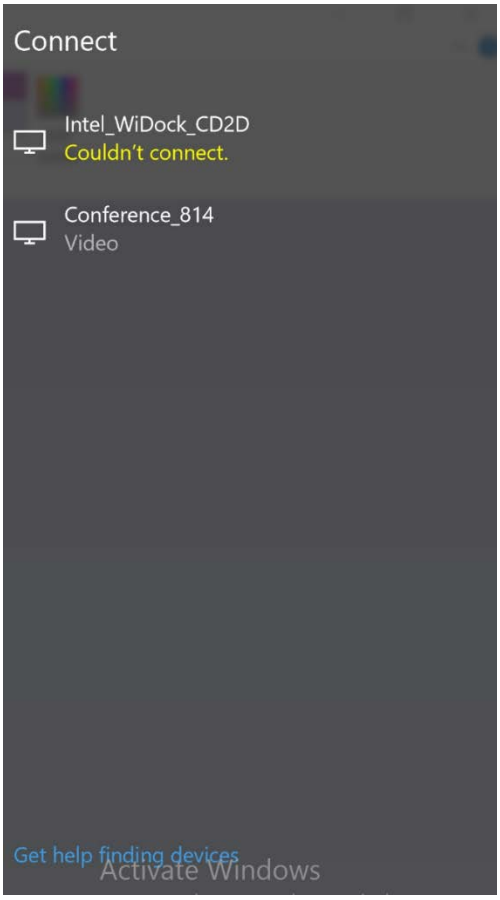
**Figure 4-15 Try connecting your device again message**



### 4.6.3 Couldn't connect

When there is a problem in the connecting flow (after the user has the dock profile), the Connect pane returns the error "Couldn't connect", as shown in Figure 4-16.

**Figure 4-16 Couldn't connect message**




### 4.6.4 Weak connection

The weak connection message displays if the connection is weak, as shown in Figure 4-17. If the Intel® Wireless Dock Manager application is open, it also notifies the user about this state, as shown in Figure 4-18.

**Figure 4-17 Weak connection toast**

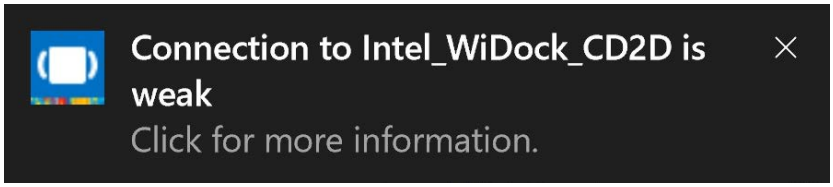
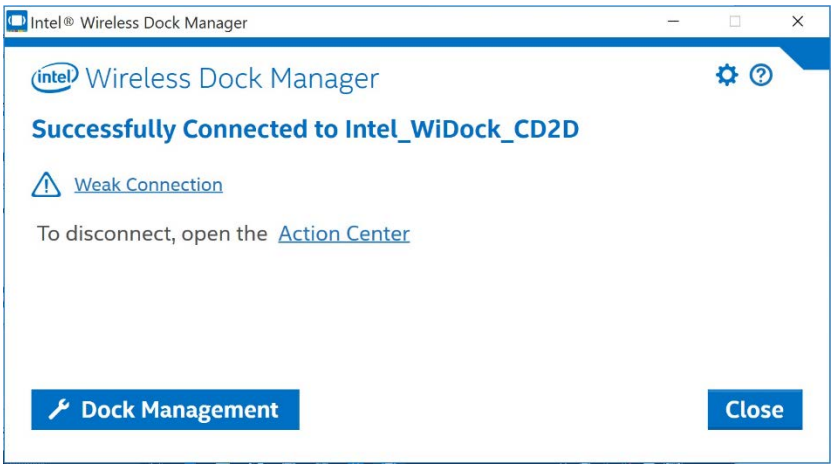



**Figure 4-18 Weak connection message in Dock Manager**




## 4.6.5 WiGig disabled: critical temperature

When the WiGig is disabled due to overheating, the message shown in Figure 4-19 will popup. Also, when the Intel® Wireless Dock Manager application is open it will notify the user about this state, as shown in Figure 4-20.

**Figure 4-19 WiGig disabled due to overheating toast**

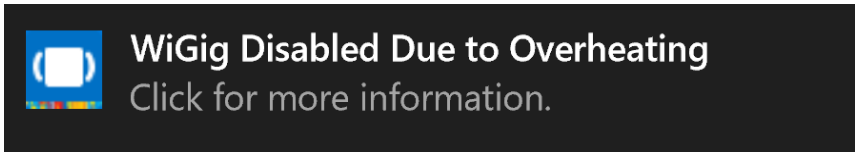
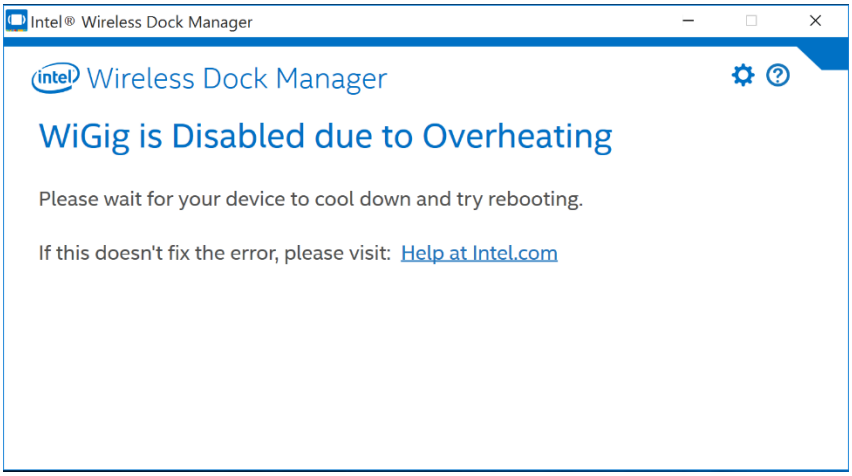


**Figure 4-20 WiGig disabled due to overheating message in Dock Manager**




### 4.6.6 WiGig is Not Working

Same as in Section 3.6.4.

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# 5 The Wireless Dock and Multiple Displays

## 5.1 Intel® WiGig A/V wireless capabilities

Intel® WiGig is seen by the Intel® Display Driver as a DP V1.2 Branch device. It advertises its capabilities to the driver using standard DisplayPort V1.2a tools.

The capabilities include A/V bandwidth, as well as other capabilities related to the internal A/V subsystem.

Intel® WiGig HW can support up to two A/V streams. This limitation is advertised to the Intel DisplayPort Driver, which then limits the number of active streams sent over the Intel® WiGig DP interface.

When the user connects three displays to the MST hub at the output of the Intel® WiGig-based dock, only two out of the three displays connected can be active at the same time.

### 5.1.1 Intel® WiGig DisplayPort Bandwidth and other limitations

The DisplayPort V1.2a standard defines mechanisms that allow branch devices to advertise their capabilities and limitations to the Display Driver. There are two main limitations which may affect the user experience:

1. **DisplayPort Bandwidth (AKA PBN):** Intel® WiGig DP interface operates at 4 × 2.7 gbps speed. This results in an ability to support single display resolutions of up to 2560×1600@60 Hz or Dual Display Resolutions of 1920×1200@60 Hz.

   For example, if the user connects 2 1600p60 capable displays to the dock, it cannot drive the native resolution to both displays due to the DP BW limitation. The Display Driver will remove some of the video modes from one of the displays while allowing native resolution to the 2nd display.
2. **Wireless Branch Device Limitations (AKA CCS):** Intel® WiGig DP interface advertises Wireless Branch Device limitations related to the capabilities of the integrated video Encoders and Decoders.

   Currently the advertised limitations are as follows:

   a. Frame Width <= 2560
   b. Frame Height <= 1600
   c. Max Frame Rate = 60 Hz
   d. Min Frame Rate = 59 Hz
   e. Max Pixel Clock = 268 MHz
   f. RGB: Only color space modes supported
   g. Progressive only modes supported

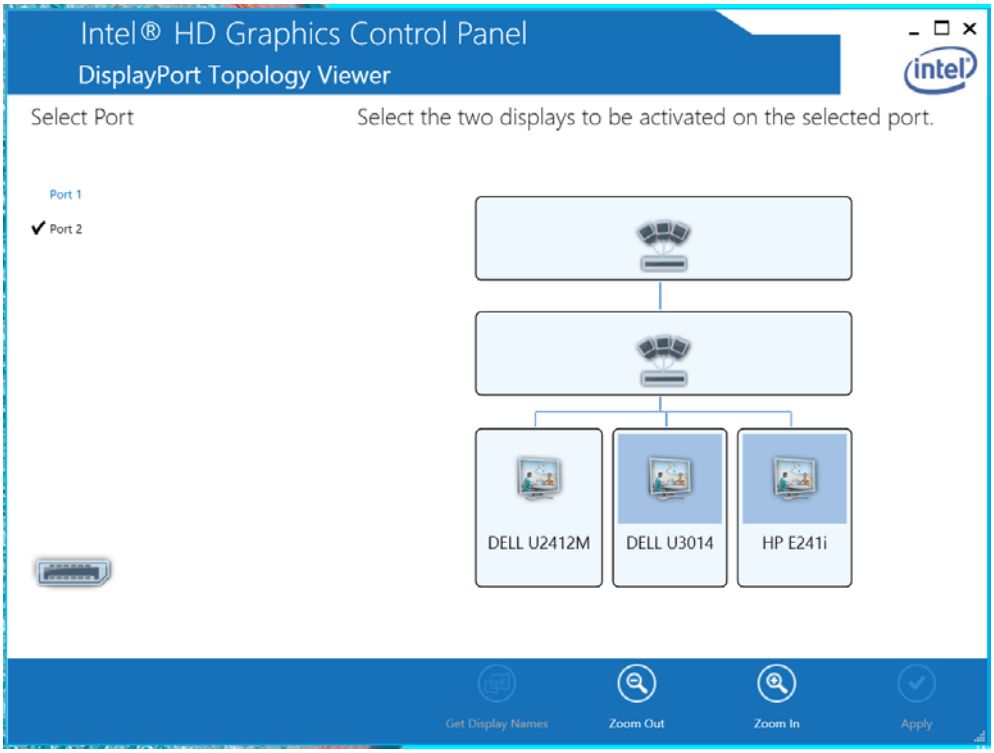
   All display modes not meeting the criteria above will be removed by the display driver and not shown by the Resolution Manager.

## 5.2 User experience when connecting more than two displays to the wireless dock

The driver initially selects two default displays. These will be the displays connected to the output ports #1 and #2 of the MST hub device. The display connected to port #3 will not be used and will not appear in the Windows Screen Resolution control panel.

The Intel® Display Driver generates a pop-up window, stating “DisplayPort Topology Notification. A new DisplayPort Topology has been identified”. Click the window to open the Intel® HD Graphics control panel’s DisplayPort Topology Viewer (see Figure 5-1). The user is requested to select the two displays to be activated for the Intel® WiGig selected port. Selected displays are marked in light blue.

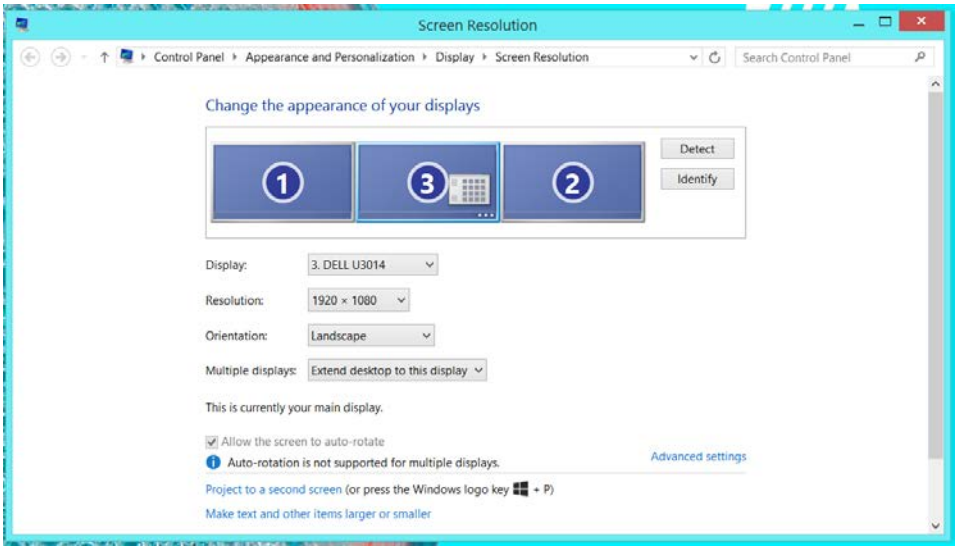
**Figure 5-1 DisplayPort topology viewer**




Once the user selects the active displays, the display driver will re-initiate the A/V link setup process and activate the selected displays.

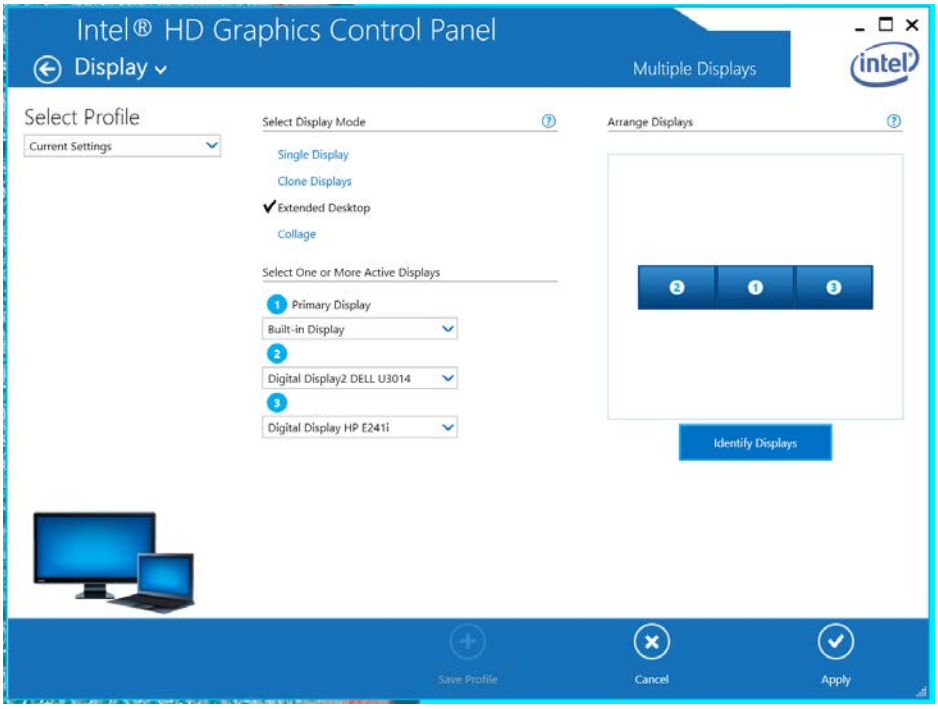
Only the selected displays will be seen in the Windows Screen Resolution control panel. The unselected display will not be shown (see Figure 5-2). The user can select the operating mode (duplicate/extend), and activate and deactivate the screens using the Screen Resolution control panel.

**Figure 5-2 Windows Screen Resolution control panel**




The same behavior occurs when the user uses the Intel® Graphics Control Panel's Display tab (see Figure 5-3). In this window, only the two displays selected in the Topology Manager will be seen.

**Figure 5-3 Graphics control panel**

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# 6 WiGig events in Windows Event Viewer

WiGig SW provides logging information to Windows Event Viewer, both for local client machine and for the connected WiGig dock. This information appears in Windows Event Viewer under *Applications and Services Logs -> Intel® WiGig.*

## 6.1 WiGig Event Properties

The events are distinguished by the following list of properties:

- Log Name: Intel® WiGiG
- Level: can be
  - Information – Events with this level provides informative data of WiGig flow.
  - Error - Event with this level provides data for erroneous WiGig flow.
- Source: can be
  - iWiGig-Local – Events logged from local Client side
  - iWiGig-Remote – Events logged from remote Docking side, that is, WiGig connected to the Client
- Event ID: Will be always 256
- Task Category: The index for this parameter may belong to the groups listed in Table 6–1.

**Table 6–1 List of groups for Task Category parameter in WiGig Events**

| | ***Task Category* index range** | **Group type** |
|---|---|---|
| 1 | 0-199 | General Infra & Platform Events |
| 2 | 200-299 | Dock FW-Update Events |
| 3 | 300-399 | MAUSB Events |
| 4 | 600-699 | WDE Events |

## 6.2 WiGig Event Data

The data per each event provides the following information:

- Release: WiGig SW release version
- Self MAC Address: WiGig MAC Address value of Client side
- Peer MAC Address: WiGig MAC Address of connected peer docking station
- The next information presented is low-level debug data, per each event.

## 6.3 Accessing WiGig Events Log

The steps to access the WiGig Events log are

1. Open the Windows Event Viewer.

2. On the left-hand pane, Go to *Applications and Services Logs->Intel® WiGig*.

   The middle pane displays the list of WiGig events.

3. The user can click on each event and see its specific details on the bottom pane.

4. By right-clicking on *Applications and Services Logs->Intel® WiGig* (on the left-hand pane), user may save the WiGig Events log or perform other operations as allowed by the Event Viewer.