Intel® Maple Peak

User Guide

July 2014

Revision 2.1

Intel Confidential

Document Number: 537178-2.1

Notice: This document contains information on products in the design phase of development. The information here is subject to change without notice. Do not finalize a design with this information.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

A "Mission Critical Application" is any application in which failure of the Intel Product could result, directly or indirectly, in personal injury or death. SHOULD YOU PURCHASE OR USE INTEL'S PRODUCTS FOR ANY SUCH MISSION CRITICAL APPLICATION, YOU SHALL INDEMNIFY AND HOLD INTEL AND ITS SUBSIDIARIES, SUBCONTRACTORS AND AFFILIATES, AND THE DIRECTORS, OFFICERS, AND EMPLOYEES OF EACH, HARMLESS AGAINST ALL CLAIMS COSTS, DAMAGES, AND EXPENSES AND REASONABLE ATTORNEYS' FEES ARISING OUT OF, DIRECTLY OR INDIRECTLY, ANY CLAIM OF PRODUCT LIABILITY, PERSONAL INJURY, OR DEATH ARISING IN ANY WAY OUT OF SUCH MISSION CRITICAL APPLICATION, WHETHER OR NOT INTEL OR ITS SUBCONTRACTOR WAS NEGLIGENT IN THE DESIGN, MANUFACTURE, OR WARNING OF THE INTEL PRODUCT OR ANY OF ITS PARTS.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

Intel software products are copyrighted by and shall remain the property of Intel Corporation. Use, duplication, or disclosure is subject to restrictions stated in Intel's Software License Agreement, or in the case of software delivered to the government, in accordance with the software license agreement as defined in FAR 52.227-7013.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

The code names presented in this document are only for use by Intel to identify products, technologies, or services in development that have not been made commercially available to the public, i.e., announced, launched, or shipped. They are not "commercial" names for products or services and are not intended to function as trademarks.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an order number and are referenced in this document, or other Intel literature may be obtained by calling 1-800-548-4725 or by visiting Intel's website at *http://www.intel.com/design/literature.htm*.

Intel is a trademark of Intel Corporation or in the US and other countries.

* Other brands and names may be claimed as the property of others.

Copyright © 2014 Intel Corporation. All rights reserved.

Contents

1 Introduction 6
1.1 Scope 6
1.2 References 6
1.3 Introduction 6
1.3.1 Wireless docking 6
1.3.2 Wireless peripheral 7
1.3.3 Multi Gbps Device-to-Device 7
1.4 Key features 7
1.5 SW and HW deliverables 7
1.6 Notebook platform preparations for WiDock 7
1.7 Known limitations 7
2 Maple Peak Setup 8
2.1 Operational mode 8
2.1.1 IF setup description (dock installer only) 8
2.1.2 RF setup description 9
2.2 Test mode (OEM tool setup environment) 9
3 Software Install 11
3.1 NB side installation 11
3.2 Dock side installation 12
3.2.1 Overview 12
3.2.2 Dock host installation over PCIe 12
3.2.3 Burning the flash using DFB tool 15
4 WiGig Application User Manual 16
4.1 Turn WiGig on 16
4.2 Connect to a new dock 17
4.3 Manage the connections settings 19
4.4 Change dock settings 19
4.5 Disconnection 20
4.5.1 Managed undocking 20
4.5.2 Spontaneous undocking 21
4.6 Forget this dock 21
4.7 Docking 21
4.7.1 Automatic docking 21
4.7.2 Manual docking 22
4.8 Dock FW upgrade 22
4.9 Troubleshooting 23
5 WiGig Recording Tool (WiGRT) 24
5.1 WiGRT installation 24
5.2 How to use WiGRT 26
5.2.1 Generate Report menu 26
5.2.2 Settings menu 27

Figures

Figure 1-1 Use models 6
Figure 2-1 IF setup 8
Figure 2-2 RF setup 9
Figure 2-3 Maple Peak setup 9
Figure 5-1 XML settings 27

Tables

Table 2-1 IF setup description 8
Table 2-2 RF setup description 9

Revision History

Revision	Description	Date
2.1	Beta 1.5 update	June 30, 2014
2.0	Beta update	April 9, 2014
1.1	Alpha update	November 25, 2013
1.0	Initial release.	May 16, 2013

§

1 Introduction

This chapter provides an overview of the Maple Peak WiGig solution.

1.1 Scope

This document familiarizes customers with the Maple Peak hardware (HW) and software (SW) components and provides installation and configuration details.

1.2 References

Reference	Document	Revision
1	*Maple Peak OEM Tool User Guide*	
2	*WiGig Release Notes*	
3	*Maple Peak External Product Specification*	
4	*Maple Peak DFB User Guide*	

1.3 Introduction

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

1.3.1 Wireless docking

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.

1.3.1.1 "Place to Dock, Snap to Go" experience

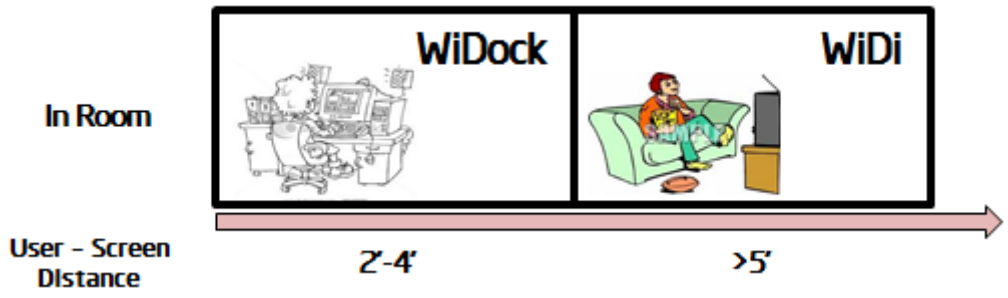
Wireless docking is designed to minimize user actions. After the initial WPS based pairing, the typical user is able to "auto-dock," meaning the device automatically connects to the dock and peripheral when in range of the dock. In other words, by the time the device is on the desk, it is already docked.

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

1.3.1.2 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 Use models



1.3.2 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 a Maple Peak 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.

1.3.3 Multi Gbps Device-to-Device

The Device-to-Device feature allows two peer devices (two PCs, two tablets, a PC and a tablet, etc.) to establish a fat IP pipe (> Gbps) to enable all other D2D capabilities.

1.4 Key features

See the *Maple Peak Release Notes*.

1.5 SW and HW deliverables

See the EPS document (Reference #3).

1.6 Notebook platform preparations for WiDock

- Operating system:
  - Microsoft* Windows* 7 32/64, Microsoft Windows 8.1U 64
- SW Pre-requisites **for OEM tools** (unnecessary with an operational stack):
  - VC++ 2010 Redistributable Package

1.7 Known limitations

See the *Maple Peak Release Notes*.

§

2 Maple Peak Setup

The Maple Peak setup consists of the following components:

- One WiGig link that contains Maple Peak on the NB side and Maple Peak SNK on the dock side.

Note: Note that each MpL-M card (the baseband) is connected to MpL-R card (the 60 Ghz radio)

- A PC that serves as the NB host

WiGig connectivity can be performed in two modes:

- **Test mode** – setup can perform a pre-defined set of traffic according to the accompanying OEM Tool application.
- **Operational mode** – real WiGig pairing, with WDE and WSE PALs.

2.1 Operational mode

2.1.1 IF setup description (dock installer only)

Figure 2-1 IF setup

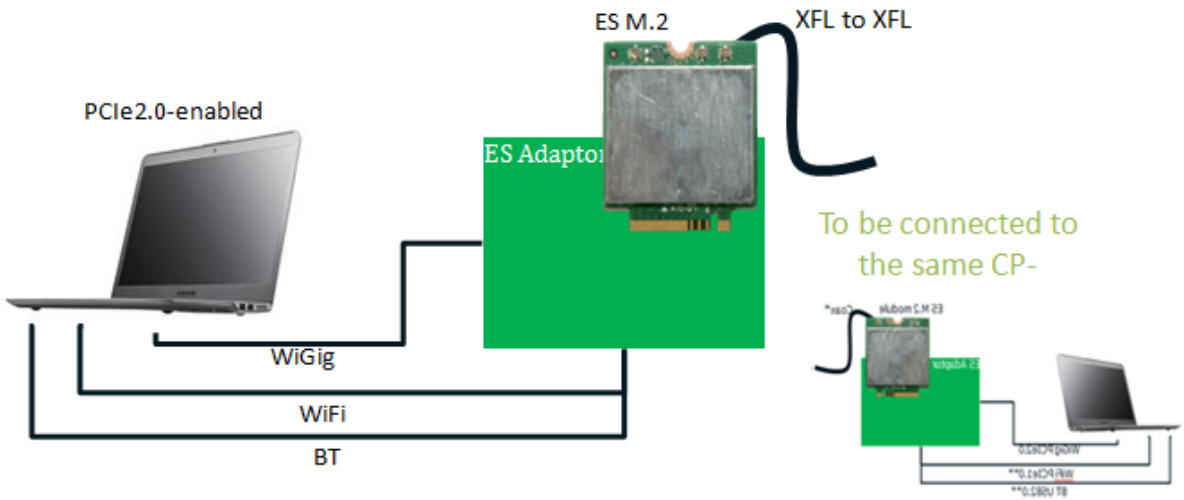


Table 2-1 IF setup description

Description	Table-top IF-to-IF (coaxial based) non-over-the-air reference-design setup for client side
Maple Peak HW	M.2 ES'; RFEM ES'
Capabilities	WSE; WDE
Wired / OTA	Wired (coaxial cable)*

2.1.2 RF setup description

Figure 2-2 RF setup

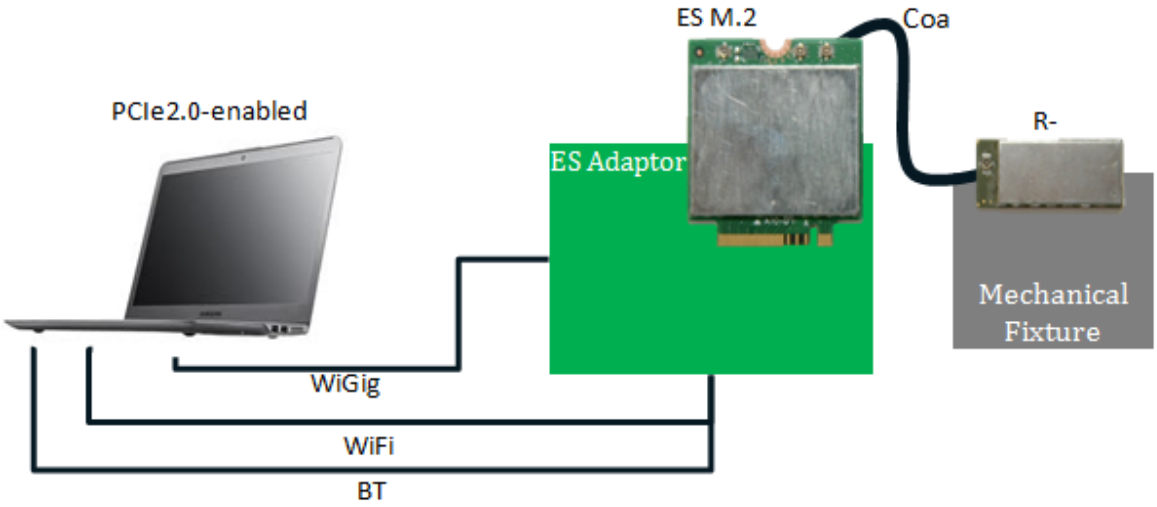
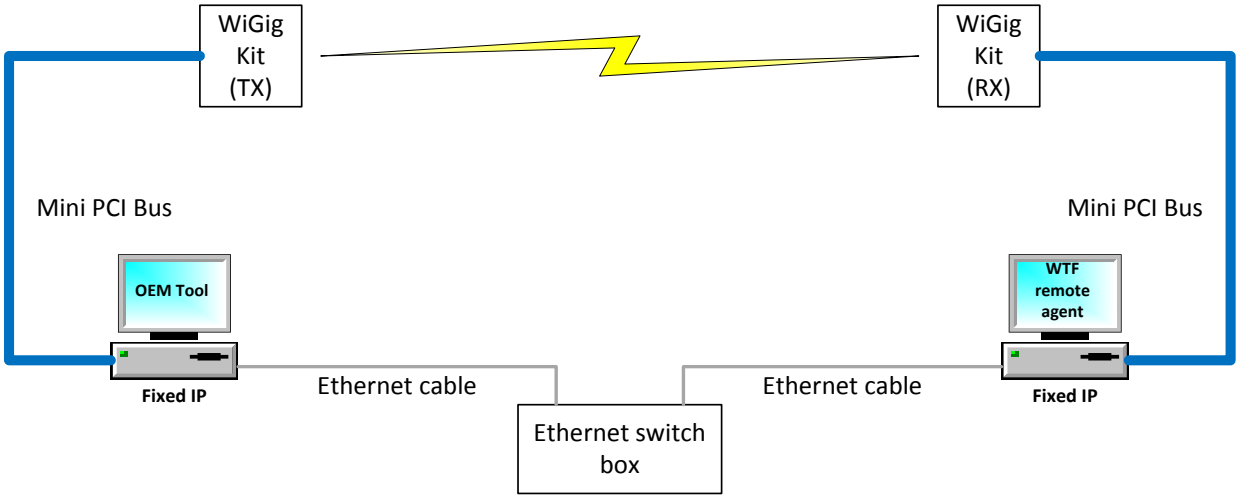


Table 2-2 RF setup description

Description	Table-top over-the-air reference design setup for client side
Maple Peak HW	WSE; WDE
Capabilities	M.2 ES'; RFEM ES'
Wired / OTA	OTA

2.2 Test mode (OEM tool setup environment)

Figure 2-3 Maple Peak setup



Intel Confidential

Figure 2 descriptions:

Two PCs (one per WiGig kit) are connected using a hub on the Ethernet NIC and can communicate over a WiGig link.

The OEM tool application is installed on the left PC, and a small agent is installed the right PC (details of how to install these can be found in the *OEM Tool User Guide*).

Note: A Test Mode setup should be installed to work in this configuration (see Section 3).

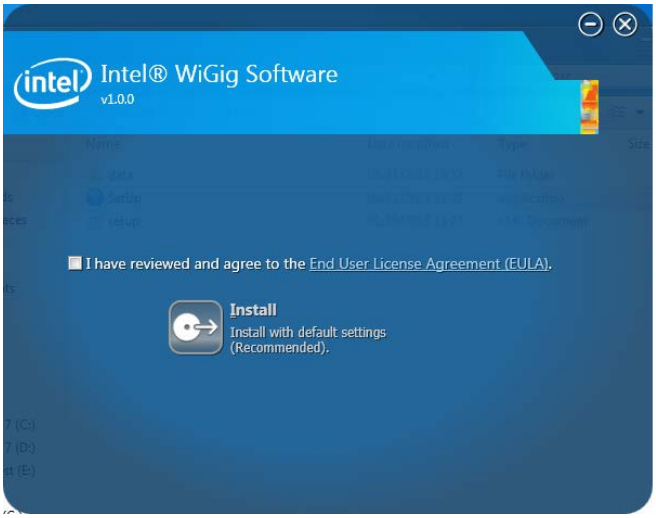
§

3 Software Install

3.1 NB side installation

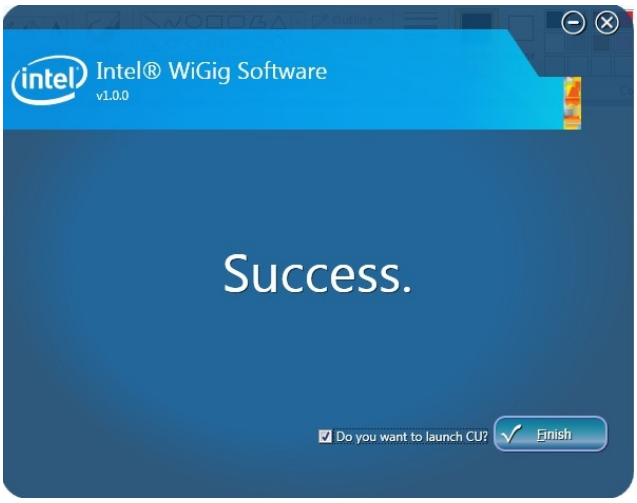
1. Go to *G Layout\Win7Plus* and run *Setup.exe*.

   Setup.exe installs the relevant installer for either a 32-bit platform or a 64-bit platform.



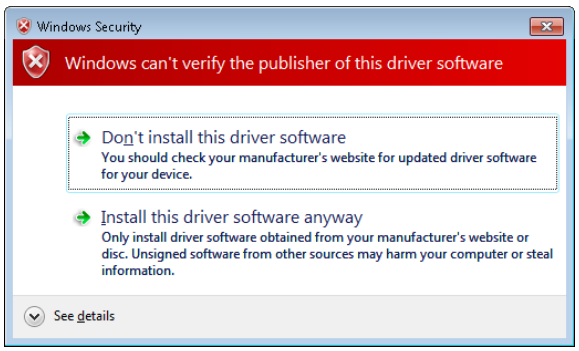
2. Check *I have reviewed and agree to the EULA* and click *Install*. This will install the operational WiGig software for the NB.
3. When the application is successfully installed check the *Do you want to launch CU?* option. Select *Finish*.

   You will be able to run the CU application from the desktop shortcut later if you do not check this option.



Intel Confidential

Note: During the first installation the device driver is installed and the following "Windows Security" pop-up may appear:



4. Choose *Install this driver software anyway* to continue the installation.

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

- Run **setup.exe –q** from a command line to run the installer in silent mode.

Note: The above installation is only for RF setup. See the following section (Dock Side Installation) and choose *NoteBook* to run an IF setup.

3.2 Dock side installation

3.2.1 Overview

The operational dock works without a host (hostless) and boots its FW from an inner flash memory. When working with the OEM tool a host must be connected. The flash should be burned to the updated version in one of two ways:

1. Over PCIe – A "local" setup, in which the dock is not assembled and is attached to a PCIe cable. The Dock Flash Burning (DFB) tool is used for flashing.
2. Over The Air (OTA) – A "remote" setup, in which the dock is connected to a client that can send the dock FW upgrade content OTA using the CU application.

Note: Beta 1.0 did not support OTA FW upgrade. When upgrading from this version you must first burn the flash using the DFB tool using the following steps:

1. Connect a host PC to the dock over PCIe and install the dock driver.
2. Use the DFB tool to burn the FW.
3. Disconnect the PCIe from the dock; work hostless.

When the FW version is higher than Beta 1.0, it can be upgraded OTA (see Section 4.8 for instructions) and no dock host installation is required.

3.2.2 Dock host installation over PCIe

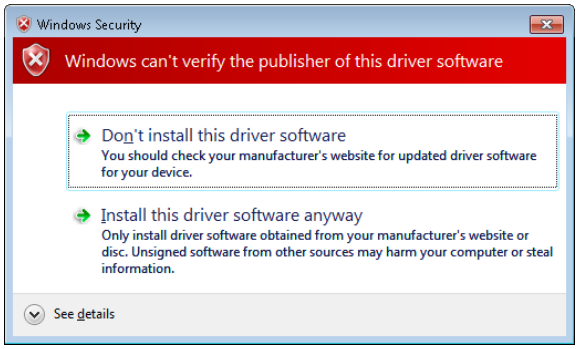
This installer sets up your Maple Peak in a few simple steps. Navigation between steps is possible using the *Back* and *Next* buttons. Select *Cancel* to close the installer.

1. Uninstall previous dock drivers.
2. Go to OEM Layout\WiGigInstaller\ and run the WiGigInstaller.exe application.

3. Verify the following files are located in the installer folder:
   a. WiGigInstaller_x**.msi
   b. WiGigInstaller_DbgStack_x**.msi

   The suffix x** means x86 for a 32-bit platform and x64 for a 64-bit platform.

Note: During the first installation the device driver is installed and the following "Windows Security" pop-up may appear:



4. Choose *Install this driver software anyway* and continue the installer.

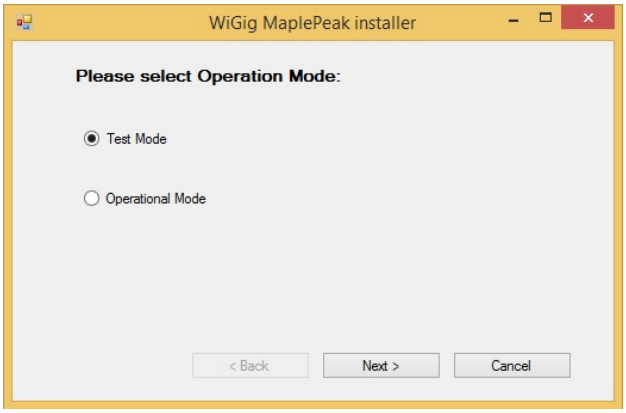
Select Operation Mode

There are two operation modes:

- Test mode: no broadcasting takes place. Primarily used for characterization by the OEM Tool.
- Operational mode: the Maple Peak card is fully active in either one of the types in the next step.

Note: A hostless dock is always in operational mode, no matter what was selected in the installation.

5. Choose Test Mode.

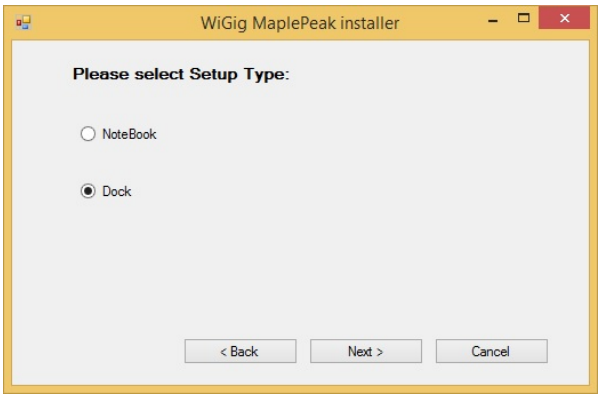


Select Setup Type

The Maple Peak card can be used for either notebook or dock:

- Notebook: the notebook transmits data to the dock.
  Dock: the dock receives and displays data from the notebook.

Intel Confidential



Select Hardware Type

Maple Peak can communicate with another device via:

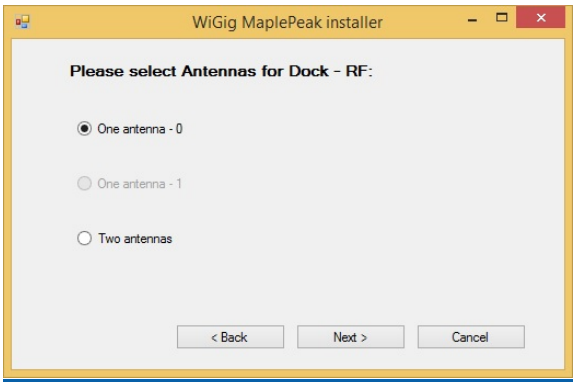
- IF (Intermediate Frequency): a cable is required between the card (XFL connector) and another device.
- RF: the M.2 card is connected to the RFEM.

6. Select the relevant mode.

   Choose IF mode if you have no RFEM connected to the M.2. This has no effect on the hostless setup; it is in RF mode after disconnecting the PCIe.

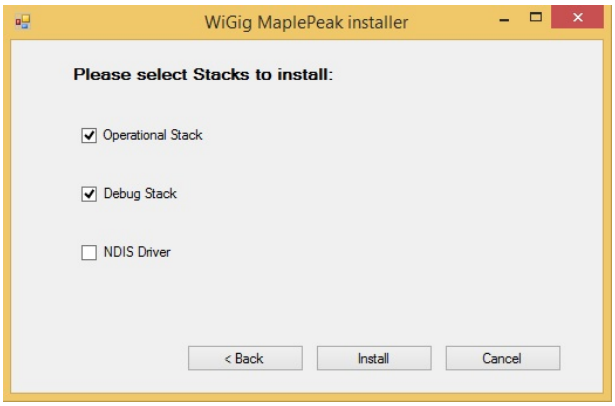
Select Number of Antennas

7. Select one antenna.



Select Stacks

8. Select stacks to install:
   - Operational stack – Select
   - Debug stack – Select
   - NDIS driver – Don't Select



9. Click *Install*.

   The installer installs and configures the card based on user specifications.

   This process takes up to two minutes; a verification popup appears when successfully completed.

Note: If you want to change any selection in the installation, such as hardware type or setup type, you will need to uninstall the SW package (*Windows->Control Panel->Uninstall a program*) and install the application again.

3.2.3 Burning the flash using DFB tool

The DFB tool can be found at *C:/Program Files/Intel/WiGig/DFB/WiGigDockFlashBurner.exe.*

Run the DFB application on the host to burn the dock Flash with the relevant FW version.

Run the application from the command line with the relevant parameters:

- For factory slot:

  WiGigDockFlashBurner.exe --factory --package "C:\Program Files\Intel\WiGig\Drivers\Dock_Image_Production.pack"
- For current slot:

  WiGigDockFlashBurner.exe --package "C:\Program Files\Intel\WiGig\Drivers\Dock_Image_Production.pack"

Note: Burn both the factory slot and the current slot.

- See DFB document (Reference #4) for detailed instructions on how to use the DFB tool.

§

Intel Confidential

4 WiGig Application User Manual

The WiGig Connection Utility (CU) is a dedicated application that runs on the NB, lists available docks, and creates a WiGig link with a selected dock.

The activity button and LEDs are used for connection/disconnection flows on the dock side.

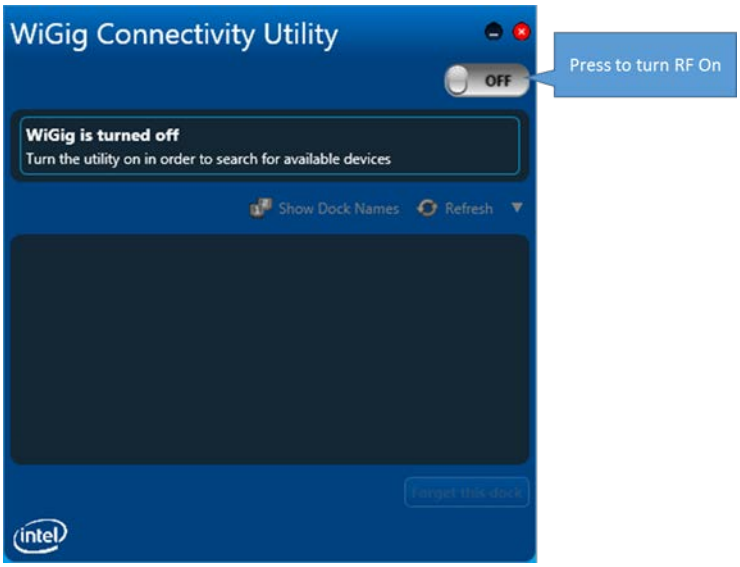
Double click the WiGig CU icon on the desktop to activate the CU application on the NB side unless you checked the option to launch CU after installation (see Section 3.1 Step 3).

Note: The CU application keeps running from the system tray even if you click the X (close window) icon on the application. Double-click the CU icon in the system tray to open the CU again.

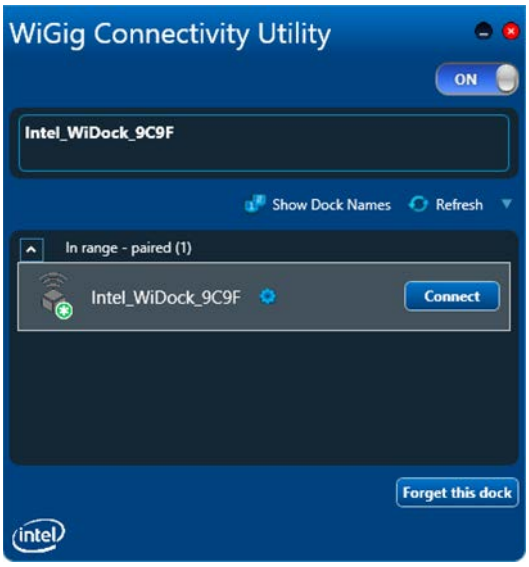
Note: The current WiGig CU is not the final version and will be changed in later releases.

4.1 Turn WiGig on

1. Click the grey OFF button to toggle the WiGig on once the CU application is running.



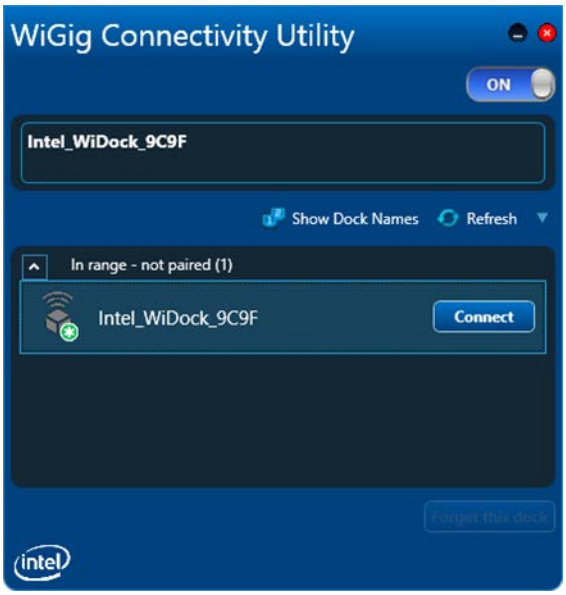
2. The CU scans for available docks and shows a list of docks with the following four statuses:
   a. *In range – paired*: docks that are in range of the NB (for example in the room or cubicle) and are already paired.
   b. *In range – not paired*: docks that are in range of the NB but did not pair with it.
   c. *Incompatible*: docks that are incompatible (incompatible FW version or non-interoperable dock) and cannot be paired with this NB.
   d. *Out of range – paired*: docks that were paired before but are currently not in range.



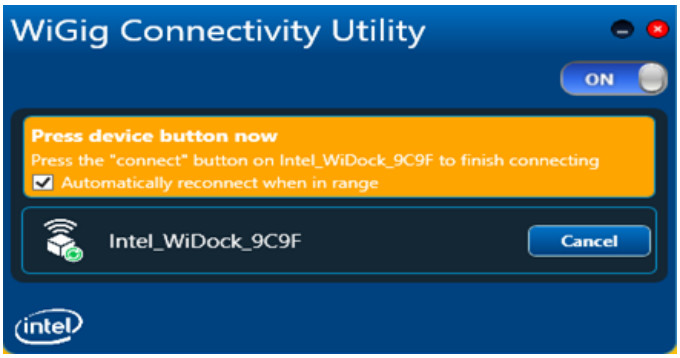
3. The dock name shown in the list (before pairing) is the out-of-box device name and is derived from its MAC address.
4. A *Connect* button appears when a listed dock is selected.

4.2 Connect to a new dock

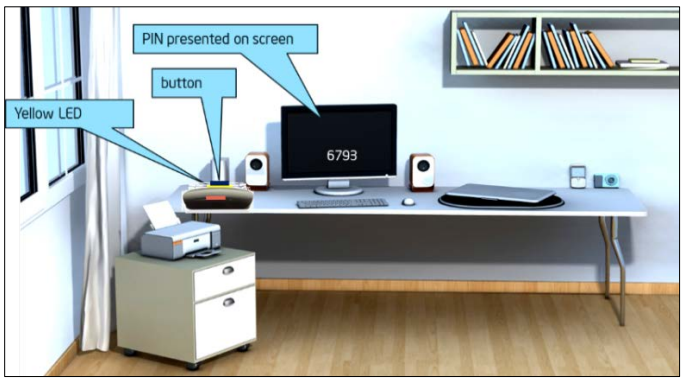
1. Select a non-paired dock and click *Connect*.
   e. Connecting to a dock for the first time (or to a dock that is set to Always Pair) initiates pairing with the dock.



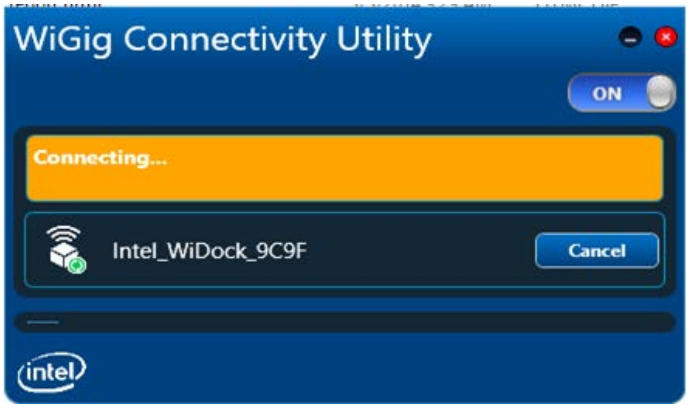
2. The CU is now waiting for the user to press the function button on the device.



3. The dock's LED turns yellow.



4. Press the functional button on the dock to complete pairing. A connecting message shows on the CU during the pairing process indicating that a connection is in progress.



5. When connected, the status in the CU changes to *Connected* and the dock's LED turns green.

Note: The pairing process can take up to seven seconds. Future connections that don't require additional pairing take less time.

4.3 Manage the connections settings

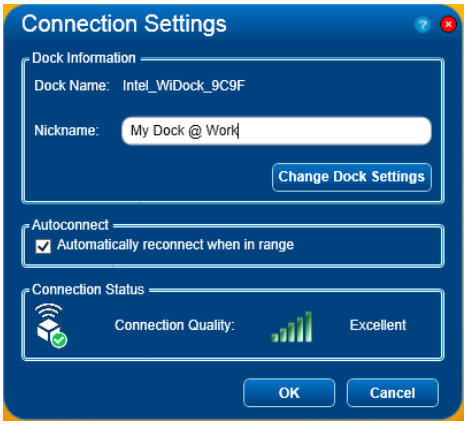
Edit the connection settings by clicking the icon when the dock is connected. These are settings for the specific Dock-NB connection.

The following can be set:

- Nickname: a personalized name that represents the specific NB-Dock connection.

  The profile name can be modified by the user to a meaningful name such as "Joe office", "Joe home" etc. The profile name is shown in the docks list.

- Auto-connect: default; when checked the NB connects automatically whenever it is in range of the dock.

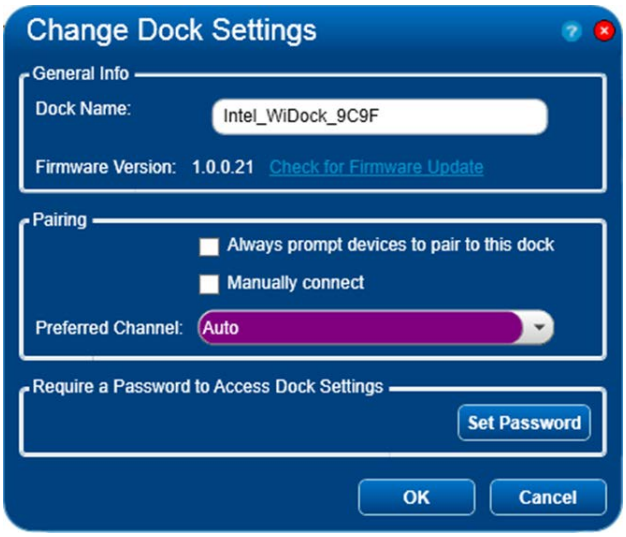


4.4 Change dock settings

The dock settings can be changed over-the-air after connecting a NB to the dock.

From the *Connection Settings* menu (see previous image) click *Change Dock Settings* (see following image).

Intel Confidential



1. General Info
   a. *Dock Name*: the name that appears in the docks list in the CU application.
   b. *Check for Firmware Update* (**Not supported in this release**): check if an updated FW version is available for the dock.
2. Pairing
   a. *Always prompt devices to pair to this dock*: The dock will force pairing each time a device is connecting
   b. *Manually connect*: when checked the client has to manually connect (using the CU) with this dock each time.

      This setting is useful for public docks (for example in airports), to prevent a situation where a NB that connected to the dock now automatically connects (unintentionally) and prevents other devices from connecting.
   c. *Preferred Channel*: the preferred channel to work on (Automatic, 1, 2, 3 or 4). The default is Automatic, the device will choose the relevant channel based on the allowed channels (under regulation constraints). This information is burnt in the OTP.
3. Password

   Prevents non-authorized users from changing dock settings.

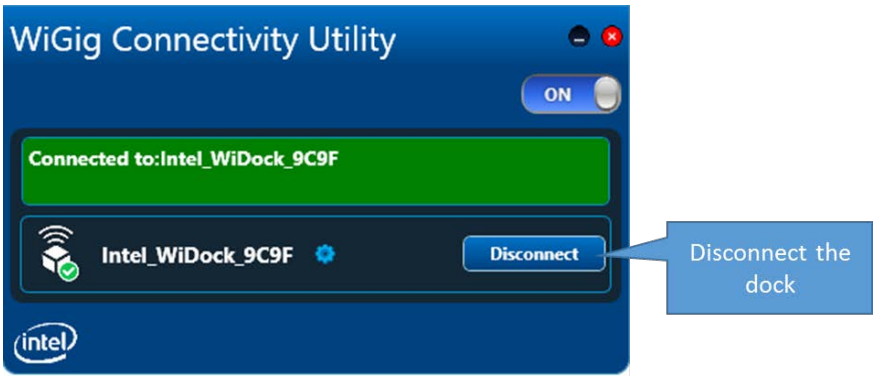
4.5 Disconnection

4.5.1 Managed undocking

The user can disconnect from the dock through the following steps:

1. Press the FUN_BUTTON on the dock for more than two seconds (long press).

2. Click *Disconnect* in the CU.



The dock's LED turns off and the dock's monitor and devices disconnect.

In auto-connect profiles undesired auto-connection will be blocked after a managed undocking until one of the following conditions apply:

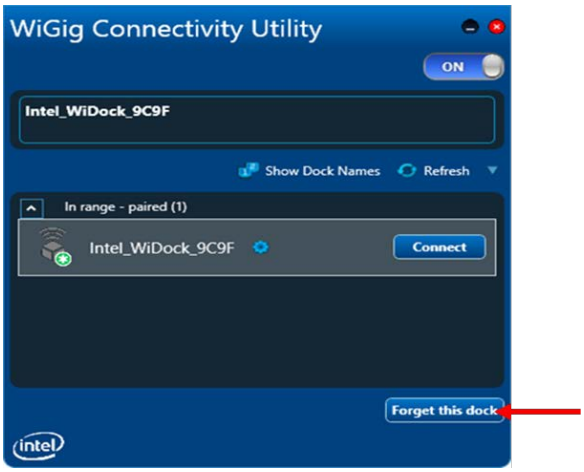
- User exits the dock's range
- Client resumes from a low-power mode (S3/S4/S5 → S0) (not currently supported).

4.5.2 Spontaneous undocking

When the user exits the range of the dock without making a managed disconnection, the link drops after attempts to recover. The dock's LED powers off after the link drops.

4.6 Forget this dock

Choose the dock and click *Forget this dock* to delete a dock profile. This deletes the profile of the dock and requires a manual connection and pairing for the next connection. (This option is only available when the relevant dock is not connected).



4.7 Docking

4.7.1 Automatic docking

A connection to the dock begins automatically when the dock is configured to auto-connect and the user enters the dock's range. The NB's lid can be open or closed.

- The dock LED turns green, docking is completed within a few seconds, and the dock monitor shows the display.

4.7.2 Manual docking

No connection is initiated when the dock is configured to manually connect and the user enters the dock's range. The dock's LED stays off.

Clicking *Connect* in the CU next to the dock's name begins the docking process. Once docking is complete the dock's LED turns green and the docking monitor shows the display.

4.8 Dock FW upgrade

The dock FW can be upgraded using the CU application. The dock's FW upgrade does not occur automatically; it requires the user's initiation to allow for user control of the process.

Upgrade the FW from the CU *Dock Settings* screen.

Click the *Upgrade* button and choose the *Dock Image*.

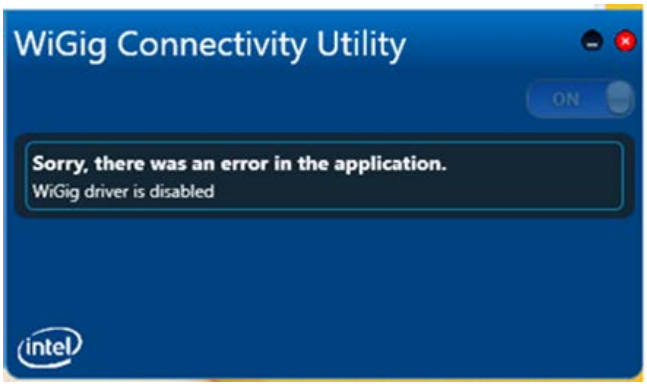
To choose the same version installed on the NB side go to *C:/ProgramFiles/Intel/WiGig/Drivers* and choose *Dock_Image.pack.*

A progress indication for the process displays in the CU. If the upgrade fails, the previous version remains and the user is notified.

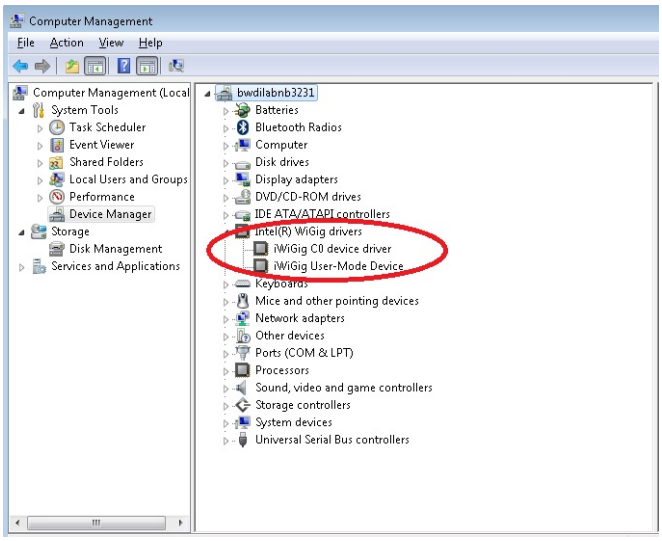
When completed, a reset is performed and the device is up with the new version. Close the window.

4.9 Troubleshooting

Follow these steps for a *"WiGig driver is disabled"* error:



- Exit the CU application (right-click in the tray icon)
- Disable the WiGig device driver in the Device Manager
- Enable the device driver again
- Run the CU application



§

Intel Confidential

5 WiGig Recording Tool (WiGRT)

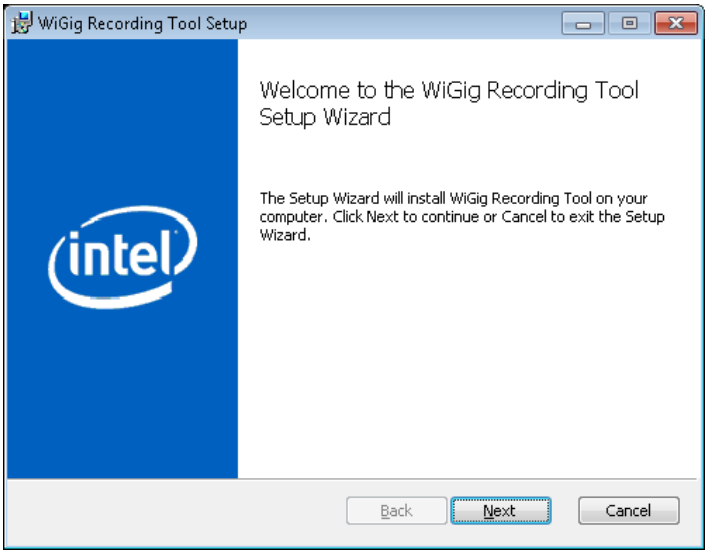
The WiGRT is a tool that enables fast and easy debugging of the WiGig product by continuously capturing information from the WiGig device and driver.

The WiGRT tool captures information continuously, allowing debug of an issue without (necessarily) the need to reproduce it. The information is collected in a cyclic manner, saving sufficient data and consuming a limited amount of memory. The user can “Generate a report” at any time and send the zip file to Intel engineers for debug.

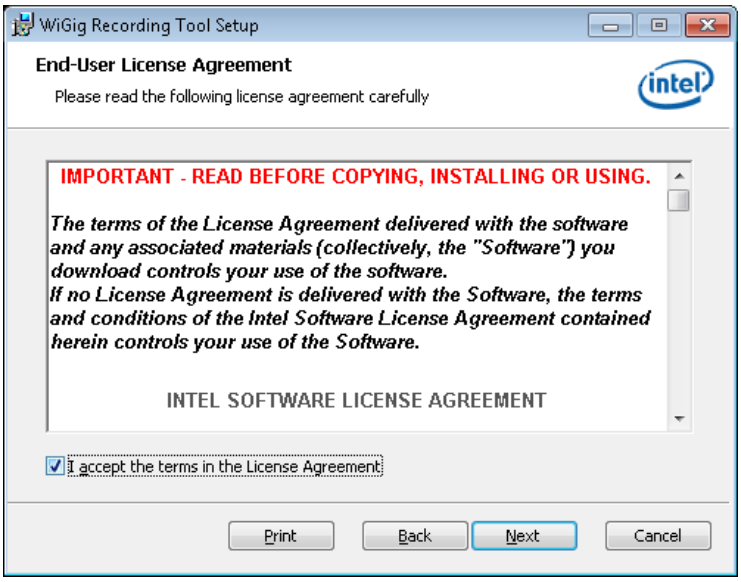
5.1 WiGRT installation

The WiGRT tool installer is not part of the operational installer. It should be installed and run after installation of the WiGig operational installer, to start capturing information immediately.

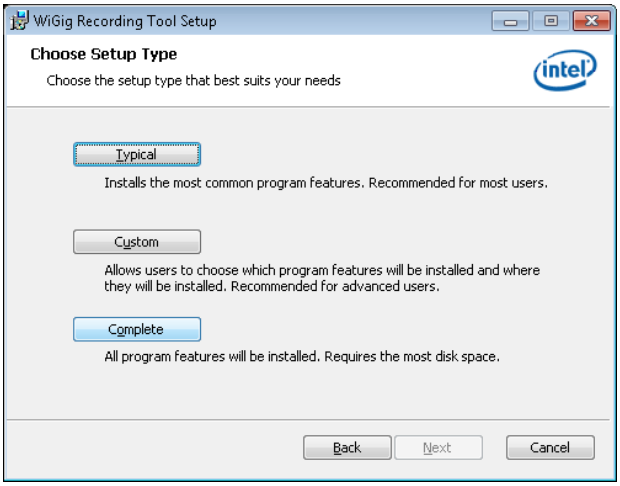
1. From the diagnostics layout, run the *Diagnostics.exe* self-extracted file. Then run *WiGRT.bat* from the root path. It will run the relevant installer for your OS, either for 32-bit or 64-bit.
2. Click *Next.*



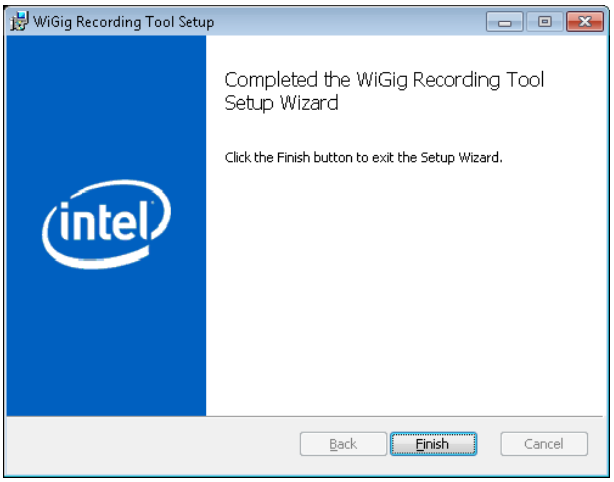
3. Check *“I accept the terms in the License Agreement.”*



4. Choose *Complete.*



5. Click *Finish*.

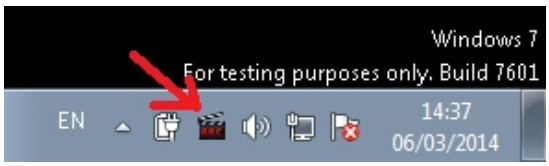


See the following icon on your desktop:

Note: The application starts running automatically. The icon is in the system tray.

5.2 How to use WiGRT

The WiGRT tool runs in the background from the system tray and requires minimum intervention of the user.



It starts capturing information immediately.

Right-click the WiGRT icon to show a menu with three options:

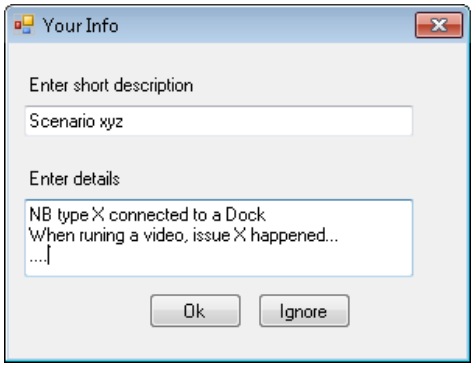
- Generate Report
- Settings
- Exit (to close the application and stop capturing data)

5.2.1 Generate Report menu

Click *Generate Report* from the WiGRT menu to document an issue to report to Intel's engineers.

Enter details about the specific issue in the popup window (example image follows).

Note: Adding your information is highly recommended but is not mandatory.



Selecting *Ok* (or *Ignore* if you didn't enter details) saves a zip file under *%ProgramData%\Intel\WiGig\WiGRT\logs*.

The name of the zip file includes the computer name, the date and the time to easily identify the relevant report (zip format example: COMPUTERNAME323-060314-144436).

This zip file should be sent to Intel's engineers for further investigation.

5.2.2 Settings menu

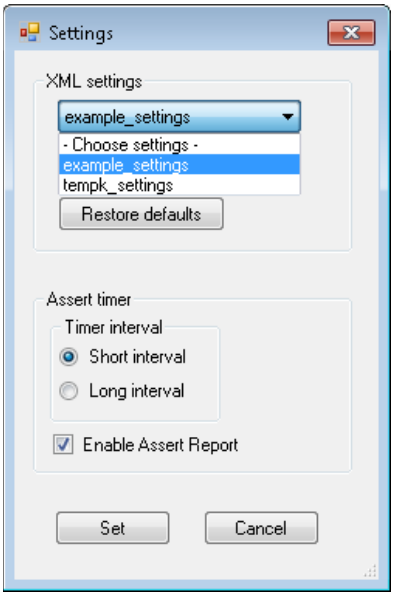
The Settings menu is available to provide additional debugging capabilities and **should only be used when instructed by Intel's engineers**.

5.2.2.1 XML settings

When additional or different information is required for a specific scenario, you might have to choose settings from the list and click *Set*. This will send the device the info in the XML file with the relevant settings.

The WiGRT tool installer provides a few XML files for pre-defined scenarios. If you are working with an Intel engineer on a specific issue, you might receive a proprietary XML file; place the XML file under: *%ProgramData%\Intel\WiGig\WiGRT\Settings*.

Figure 5-1 XML settings



§

Regulatory Information

This section provides regulatory information for the following wireless adapters:

- Intel® Wireless Gigabit Sink W13100

NOTE: Due to the evolving state of regulations and standards in the wireless LAN field (IEEE 802.11 and similar standards), the information provided herein is subject to change. Intel Corporation assumes no responsibility for errors or omissions in this document.

INFORMATION FOR THE USER

Safety Notices

USA FCC Radio Frequency Exposure

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. The wireless adapter meets the Human Exposure limits found in OET Bulletin 65, supplement C, 2001, and ANSI/IEEE C95.1, 1992. Proper operation of this radio according to the instructions found in this manual will result in exposure substantially below the FCC's recommended limits.

The following safety precautions should be observed:

- Do not touch or move antenna while the unit is transmitting or receiving.
- Do not hold any component containing the radio such that the antenna is very close or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate the radio or attempt to transmit data unless the antenna is connected; this behavior may cause damage to the radio.
- Use in specific environments:
    - The use of wireless adapters in hazardous locations is limited by the constraints posed by the safety directors of such environments.
    - The use of electronic devices equipped with wireless adapters on airplanes is governed by rules for each commercial airline operator.
    - The use of wireless adapters in hospitals is restricted to the limits set forth by each hospital.

Explosive Device Proximity Warning

Warning: Do not operate a portable transmitter (including this wireless adapter) near unshielded blasting caps or in an explosive environment unless the transmitter has been modified to be qualified for such use.

Use On Aircraft Caution

Draft

Caution: Regulations of commercial airline operators may prohibit airborne operation of certain electronic devices equipped with radio-frequency wireless devices (wireless adapters) because their signals could interfere with critical aircraft instruments.

Other Wireless Devices

Safety Notices for Other Devices in the Wireless Network: See the documentation supplied with wireless adapters or other devices in the wireless network.

Local Restrictions on 802.11a, 802.11b, 802.11g, 802.11n, and 802.16e Radio Usage

Caution: Due to the fact that the frequencies used by 802.11ad wireless devices may not yet be harmonized in all countries, 802.11ad products are designed for use only in specific countries, and are not allowed to be operated in countries other than those of designated use. As a user of these products, you are responsible for ensuring that the products are used only in the countries for which they were intended and for verifying that they are configured with the correct selection of frequency and channel for the country of use. Any deviation from the permissible power and frequency settings for the country of use is an infringement of national law and may be punished as such.

The Wireless Adapter and Your Health

The wireless adapter, like other radio devices, emits radio frequency electromagnetic energy. The level of energy emitted by the wireless adapter, however, is less than the electromagnetic energy emitted by other wireless devices such as mobile phones. The wireless adapter operates within the guidelines found in radio frequency safety standards and recommendations. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature. In some situations or environments, the use of the wireless adapter may be restricted by the proprietor of the building or responsible representatives of the applicable organization. Examples of such situations may include:

- Using the wireless adapter on board airplanes, or
- Using the wireless adapter in any other environment where the risk of interference with other devices or services is perceived or identified as being harmful.

If you are uncertain of the policy that applies to the use of wireless adapters in a specific organization or environment (an airport, for example), you are encouraged to ask for authorization to use the adapter before you turn it on.

REGULATORY INFORMATION

USA - Federal Communications Commission (FCC)

Draft

No configuration controls are provided for Intel® wireless adapters allowing any change in the frequency of operations outside the FCC grant of authorization for U.S. operation according to Part 15 of the FCC rules.

- Intel® wireless adapters are intended for OEM integrators only.
- Intel® wireless adapters cannot be co-located with any other transmitter unless approved by the FCC.

This wireless adapter complies with Part 15 of the FCC Rules. Operation of the device is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference that may cause undesired operation.

Class B Device Interference Statement

This wireless adapter has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This wireless adapter generates, uses, and can radiate radio frequency energy. If the wireless adapter is not installed and used in accordance with the instructions, the wireless adapter may cause harmful interference to radio communications. There is no guarantee, however, that such interference will not occur in a particular installation. If this wireless adapter does cause harmful interference to radio or television reception (which can be determined by turning the equipment off and on), the user is encouraged to try to correct the interference by taking one or more of the following measures:

- Reorient or relocate the receiving antenna of the equipment experiencing the interference.
- Increase the distance between the wireless adapter and the equipment experiencing the interference.
- Connect the computer with the wireless adapter to an outlet on a circuit different from that to which the equipment experiencing the interference is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE: The adapter must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Any other installation or use will violate FCC Part 15 regulations.

Canada – Industry Canada (IC)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil se conforme aux normes Canada d'Industrie de RSS permis-exempt. L'utilisation est assujetti aux deux conditions suivantes: (1) cet appareil ne peut pas causer

Draft

d'interférences, et (2) cet appareil doit accepter des interférences , y compris des interférences qui peuvent causer desopérations non désirées de l'appareil.

Caution: When using IEEE 802.11a wireless LAN, this product is restricted to indoor use due to its operation in the 5.15- to 5.25-GHz frequency range. Industry Canada requires this product to be used indoors for the frequency range of 5.15GHz to 5.25GHz to reduce the potential for harmful interference to co-channel mobile satellite systems. High power radar is allocated as the primary user of the 5.25- to 5.35-GHz and 5.65 to 5.85-GHz bands. These radar stations can cause interference with and/or damage to this device. The maximum allowed antenna gain for use with this device is 6dBi in order to comply with the E.I.R.P limit for the 5.25- to 5.35 and 5.725 to 5.85GHz frequency range in point-to-point operation. To comply with RF exposure requirements all antennas should be located at a minimum distance of 20cm, or the minimum separation distance allowed by the module approval, from the body of all persons.

Attention: l'utilisation d'un réseau sans fil IEEE802.11a est restreinte à une utilisation en intérieur à cause du fonctionnement dans la bande de fréquence 5.15-5.25 GHz. Industry Canada requiert que ce produit soit utilisé à l'intérieur des bâtiments pour la bande de fréquence 5.15-5.25 GHz afin de réduire les possibilités d'interférences nuisibles aux canaux co-existants des systèmes de transmission satellites. Les radars de puissances ont fait l'objet d'une allocation primaire de fréquences dans les bandes 5.25-5.35 GHz et 5.65-5.85 GHz. Ces stations radar peuvent créer des interférences avec ce produit et/ou lui être nuisible. Le gain d'antenne maximum permissible pour une utilisation avec ce produit est de 6 dBi afin d'être conforme aux limites de puissance isotropique rayonnée équivalente (P.I.R.E.) applicable dans les bandes 5.25-5.35 GHz et 5.725-5.85 GHz en fonctionnement point-à-point. Pour se conformer aux conditions d'exposition de RF toutes les antennes devraient être localisées à une distance minimum de 20 cm, ou la distance de séparation minimum permise par l'approbation du module, du corps de toutes les personnes.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Selon les règlements de Canada d'Industrie, cet émetteur de radio peut seulement fonctionner en utilisant une antenne du type et de gain maximum (ou moindre) que le gain approuvé pour l'émetteur par Canada d'Industrie. Pour réduire lesinterférences radio potentielles avec les autres utilisateurs, le type d'antenne et son gain devraient être choisis de façon à ce que la puissance isotrope rayonnée équivalente(P.I.R.E.) ne soit pas supérieure à celle qui est nécessaire pour une communication réussie.

European Union

This equipment complies with the essential requirements of the European Union directive 1999/5/EC. See Statements of European Union Compliance.

European Union Declarations of Conformity

To view the European Union Declaration of Conformity for your adapter, perform these steps.

1. Open this web site: http://developer.intel.com/design/litcentr/ce_docs/index.htm.
2. Under the **Wireless Products** menu select your adapter.
3. Click **Go**.

To view additional regulatory information for your adapter, perform these steps:

1. Open this web site: http://www.intel.com/support/wireless/wlan/
2. Click on the link for your adapter.
3. Click **Document and Guides**.
4. Under **Regulatory Information**, click Regulatory documents for your adapter.

Waste Electrical and Electronic Equipment Directive (WEEE)

Restriction of Hazardous Substances Directive (RoHS) Compliant

All products described herein are compliant with the European Union's RoHS Directive.

For CE Mark-Related Questions related to the wireless adapter, contact:

Intel Corporation Attn: Corporate Quality 2200 Mission College Blvd. Santa Clara, CA 95054-1549 USA

Safety Approval Considerations

This device has been safety approved as a component and is for use only in complete equipment where the acceptability of the combination is determined by the appropriate safety agencies. When installed, consideration must be given to the following:

- It must be installed into a compliant host device meeting the requirement of UL/EN/IEC 60950-1 2nd edition including the general provisions of enclosure design 1.6.2 and specifically paragraph 1.2.6.2 (Fire Enclosure).
- The device shall be supplied by a SELV source when installed in the end-use equipment.
- A heating test shall be considered in the end-use product for meeting the requirement of UL/EN/IEC 60950-1 2nd edition.

Draft

Low Halogen

Applies only to brominated and chlorinated flame retardants (BFRs/CFRs) and PVC in the final product. Intel components as well as purchased components on the finished assembly meet JS-709 requirements, and the PCB / substrate meet IEC 61249-2-21 requirements. The replacement of halogenated flame retardants and/or PVC may not be better for the environment.

Mexico

La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Modular Regulatory Certification Country Markings

A list of countries requiring regulatory markings is available. Note that the lists include only countries requiring marking but not all certified countries. To find the regulatory country marking information for your adapter, perform these steps:

1. Open this web site: http://www.intel.com/support/wireless/wlan/
2. Click on the *link for your adapter*.
3. Click **Document and Guides**.
4. Under **Regulatory Information**, click Regulatory documents *for your adapter*.

INFORMATION FOR OEMs and HOST INTEGRATORS

The guidelines described within this document are provided to OEM integrators installing Intel® wireless adapters in notebook and tablet PC host platforms. Adherence to these requirements is necessary to meet the conditions of compliance with FCC rules, including RF exposure. When all antenna type and placement guidelines described herein are fulfilled the Intel® wireless adapters may be incorporated into notebook and tablet PC host platforms with no further restrictions. If any of the guidelines described herein are not satisfied it may be necessary for the OEM or integrator to perform additional testing and/or obtain additional approval. The OEM or integrator is responsible to determine the required host regulatory testing and/or obtaining the required host approvals for compliance.

- Intel® wireless adapters are intended for OEMs and host integrators only.
- The Intel® wireless adapter FCC Grant of Authorization describes any limited conditions of modular approval.
- The Intel® wireless adapters must be operated with an access point that has been approved for the country of operation.

Draft

- Changes or modification to Intel® wireless adapters by OEMs, integrators or other third parties is not permitted. Any changes or modification to Intel® wireless adapters by OEMs, integrators or other third parties will void authorization to operate the adapter.

Simultaneous Transmission of Intel® Wireless Adapters with Other Integrated or Plug-In Transmitters

Based upon FCC Knowledge Database publication number 616217 https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=33240&switch=P, when there are multiple transmitting devices installed in a host device, an RF exposure transmitting assessment shall be performed to determine the necessary application and test requirements. OEM integrators must identify all possible combinations of simultaneous transmission configurations for all transmitters and antennas installed in the host system. This includes transmitters installed in the host as mobile devices (>20 cm separation from user) and portable devices (<20 cm separation from user). OEM integrators should consult the actual FCC KDB 616217 document for all details in making this assessment to determine if any additional requirements for testing or FCC approval is necessary.

Information To Be Supplied to the End User by the OEM or Integrator

The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating the Intel® wireless adapter, in compliance with local regulations. Host system must be labeled with "Contains FCC ID: XXXXXXXX", FCC ID displayed on label.

The Intel® wireless adapter must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Intel Corporation is not responsible for any radio or television interference caused by unauthorized modification of the devices included with the wireless adapter kit or the substitution or attachment of connecting cables and equipment other than that specified by Intel Corporation. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. Intel Corporation and authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

Draft