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WICED Studio



# WICED™ Manufacturing Test User Guide

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# Contents

<b>About This Document</b> .....	<b>3</b>
Purpose and Scope .....	3
Acronyms and Abbreviations .....	3
IoT Resources and Technical Support .....	3
Document Conventions .....	3
<b>1 Demonstration Requirements</b> .....	<b>4</b>
1.1 Computer.....	4
1.2 RF Test Equipment.....	4
<b>2 Manufacturing Test Application</b> .....	<b>5</b>
2.1 Overview .....	5
2.2 Creating a Build Target.....	5
2.3 w/ PC application .....	6
2.3.1 Rebuilding w/ (ONLY IF REQUIRED!) .....	6
2.4 Using the Application.....	6
<b>3 Example Commands</b> .....	<b>8</b>
3.1 Transmit Testing.....	9
3.2 Receive Testing.....	10
3.3 Carrier Wave .....	11
3.4 Antenna Selection .....	11
3.5 Other .....	12
References .....	12
<b>Document Revision History</b> .....	<b>13</b>
<b>Worldwide Sales and Design Support</b> .....	<b>14</b>
Products .....	14
PSoC® Solutions.....	14
Cypress Developer Community .....	14
Technical Support.....	14

# About This Document

## Purpose and Scope

This document provides an overview of the Manufacturing Test application available for use with the Wireless Internet Connectivity for Embedded Devices (WICED; pronounced “wicked”) Software Development Kit. The document describes the purpose of this application and how to use it.

It is assumed that users of this guide have read the *WICED Quick Start Guide* document, *WICED-QSG2xx-R* [1], and have previously used the WICED SDK and Evaluation Board on a development computer. Users should also be familiar with the features of the WICED Evaluation Board described in the *WICED Evaluation Board User Guide*, *WICED-EUM2xx-R* [4].

For the purposes of manufacturing test, the WICED Evaluation Board may be referred to as the device under test (DUT).

This document applies to **WICED-SDK-2.4.x**.

## Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use.

For a comprehensive list of acronyms and other terms used in Cypress documents, go to [www.cypress.com/glossary](http://www.cypress.com/glossary).

## IoT Resources and Technical Support

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## Document Conventions

The following conventions may be used in this document

Convention	Description
<b>Bold</b>	Buttons, tabs, lists and other GUI items
Monospace	Command lines and application outputs: <code>test.mfg_test-FreeRTOS-LwIP-BCM943362WCD4-SDIO download</code>
< >	Placeholders for required elements: <WICED-SDK>
‘ ‘	Application Names, Configuration Parameters: 'YOUR_AP_SSID'

---

# 1 Demonstration Requirements

To demonstrate and use the WICED manufacturing test application, a computer with various software applications, as well as radio (RF) test equipment, is required. A description of how to setup individual tests using RF test equipment is not included in this document.

## 1.1 Computer

A computer, with at least one USB port, is required to attach to the WICED Evaluation Board and run the WICED SDK. The Cypress wireless LAN test utility may be run on various operating systems, but Cypress typically supports Windows® or Linux for manufacturing test. The commands in this document assume the computer runs the Windows® operating system.

## 1.2 RF Test Equipment

RF Test equipment assists in taking measurements resulting from executing commands using the application. Equipment such as spectrum analyzers, signal analyzers, signal generators, power supplies, RF cables, etc., are required to effectively test the DUT.

## 2 Manufacturing Test Application

### 2.1 Overview

The manufacturing test application is used to test the radio performance of the DUT and to assist with regulatory certification.

The application works in conjunction with a Cypress supplied wireless LAN manufacturing test utility, known as 'wl'.

The wl utility is provided with the manufacturing test application as part of the WICED SDK.

The utility reads packetized IOCTL commands from the PC via a serial UART and forwards the commands to the Cypress Wi-Fi device on the WICED module. Responses to the IOCTL's from the Wi-Fi device are returned over the UART to the PC.

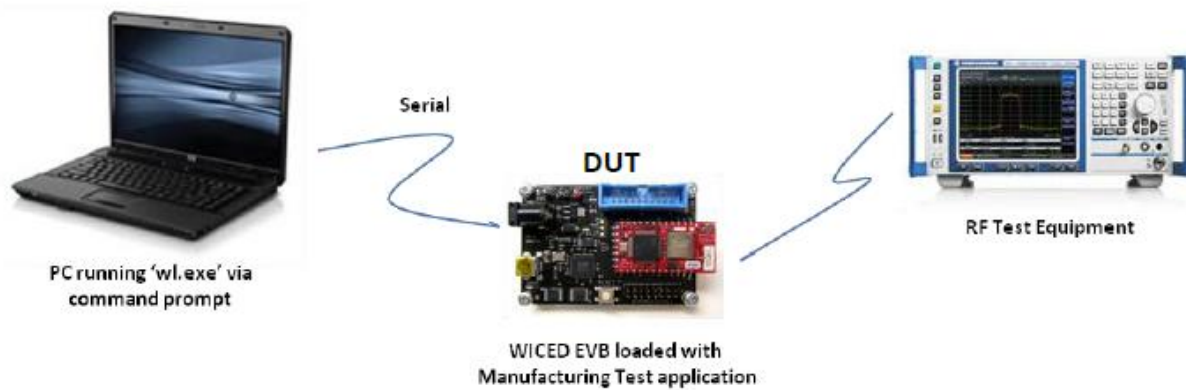


Figure 2-1. WICED Manufacturing Test Setup

### 2.2 Creating a Build Target

Similar to other WICED SDK example applications, the build target for the WICED manufacturing test application is constructed from a number of build components. The components used for the manufacturing test application are shown in Table 2-1.

Component	Available Options
Application Name	test.mfg_test
RTOS	FreeRTOS, ThreadX
Network Stack	LwIP, NetX, NetX_Duo
Platform	BCM943362WCD4, etc.
Interface	SDIO, SPI
Build type	debug

Table 2-1. Example Manufacturing Test Application Build Target Components

The following is an example manufacturing test build target:

```
test.mfg_test-FreeRTOS-LwIP-BCM943362WCD4-SDIO
```

Refer to the WICED Quickstart Guide [1] for a complete description of how to build an application and download the firmware image to the DUT.

## 2.3 wl' PC application

The manufacturing test application running on the DUT interacts via a serial communications interface with the Cypress wireless LAN manufacturing test utility running on a Windows® PC. The wl utility is provided with the WICED Manufacturing Test SDK and is located in the <WICED-SDK>\Apps\test\mfg\_test\src\wl\exe sub-directory.

For further information about wl, see [2].

### 2.3.1 Rebuilding wl (ONLY IF REQUIRED!)

**NOTE** : IT IS **NOT NECESSARY** TO REBUILD WL ON MOST WINDOWS® SYSTEMS

- Install MinGW from <http://www.mingw.org/>
- Open a MinGW shell and navigate to the following subdirectory  
 <WICED-SDK>\Apps\test\mfg\_test\src\wl\exe
- Type: make

## 2.4 Using the Application

The following steps describe how to use the manufacturing test application.

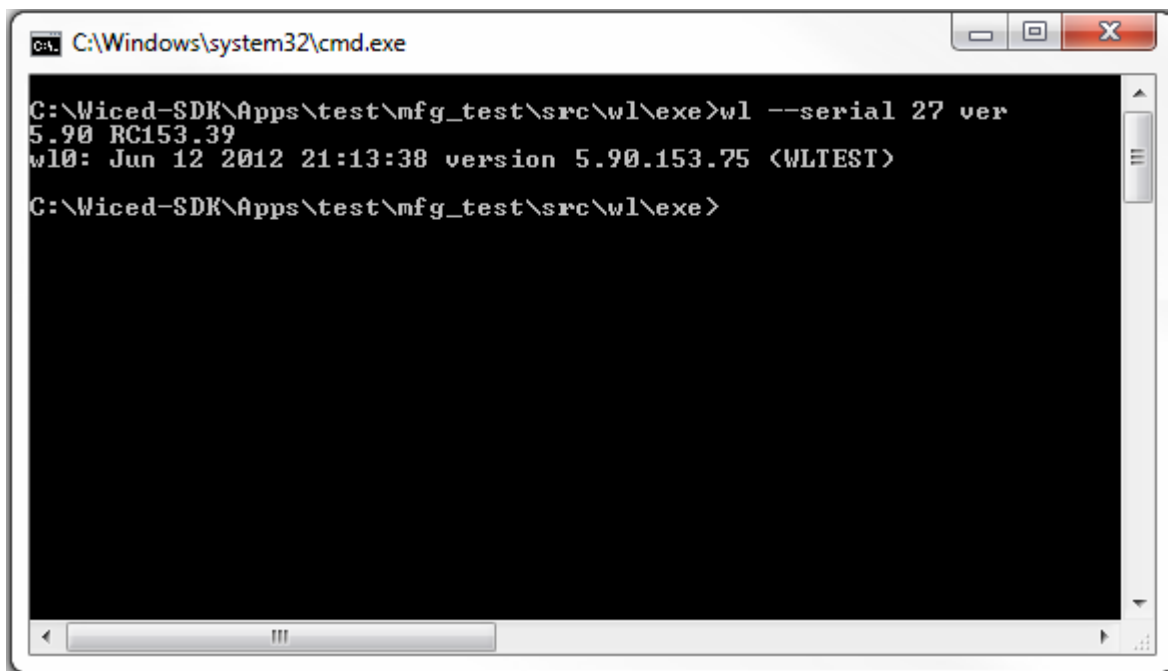
1. Ensure that the WICED Evaluation board is connected to the PC and loaded with the WICED manufacturing test application, then press the reset button.
2. Using Windows® Device Manager, look in the section "Ports (COM & LPT)" and note the COM port in use by the WICED EVB (e.g. COM99).
3. Open a command prompt and navigate to the following directory

```
<WICED-SDK>\Apps\test\mfg_test\src\wl\exe
```

4. Verify that the application is working by entering the following command at the command prompt (where 99 corresponds to the COM port number of the DUT).

```
<WICED-SDK>\Apps\test\mfg_test\src\wl\exe> wl --serial 99 ver
```

Figure 2-2 shows an example response to the version command.



```

C:\Windows\system32\cmd.exe
C:\Wiced-SDK\Apps\test\mfg_test\src\wl\exe>wl --serial 27 ver
5.90 RC153.39
wl0: Jun 12 2012 21:13:38 version 5.90.153.75 <WLTEST>
C:\Wiced-SDK\Apps\test\mfg_test\src\wl\exe>
  
```

Figure 2-2. Example Manufacturing Test Output

A list of available commands is displayed using the command : `wl --serial 99 cmds`

Detailed help is available by entering the command : `wl --serial 99 -h`

**Note:** The wl utility was originally designed to work with high performance host processors that have access to megabytes of memory. Accordingly, a very small subset of wl commands (the general scan command, for example) may not work on a microcontroller with a very limited amount of RAM.

For a detailed description of the Cypress wl manufacturing test utility, please refer the following documents:

- 802.11-TI2xx-R, WL Tool for Embedded 802.11 Systems [2]
- 802.11-TI3xx-R, WLAN Client Utility Command Set [3]



### 3 Example Commands

This section provides example command sequences with appropriate `wl` commands that may be used to test basic Wi-Fi transmit and receive functionality of the DUT. These commands are provided as scripts at the following location `<WICED-SDK>/Apps/test/mfg_test/scripts`

Table 3-1 provides a brief description of commands used in the manufacturing test scripts.

Command	Brief Description
<code>ampdu</code>	Enables ampdu transmission. Used to maximize transmit duty cycle
<code>antdiv</code>	Used with <code>txant</code> command to control antenna selection
<code>band</code>	Sets radio band
<code>bi</code>	Sets beacon interval
<code>channel</code>	Sets radio channel
<code>chanspec</code>	Sets channel using <code>chanspec</code> . <code>chanspec -c 1 -b 2 -w 20 -s 0</code> sets channel=1, bandwidth=2.4GHz, channel bandwidth=20MHz, lower sideband
<code>counters</code>	Returns packet counter statistics (use <code>reset_cnts</code> to reset statistics)
<code>country</code>	Selects country specific power and channel restrictions
<code>disassoc</code>	Disassociates the WLAN device (if associated)
<code>down</code>	Brings the wireless interface down
<code>frameburst</code>	Used to maximize transmit duty cycle
<code>iscanresults</code>	Returns results of the last <code>iscan</code>
<code>iscan_c</code>	Continues an incremental scan
<code>iscan_s</code>	Initiates an incremental scan
<code>fqacurcy</code>	Used to control continuous wave (CW) transmission
<code>mpc</code>	Sets minimum power consumption mode
<code>nrate</code>	Sets band specific rate override. <code>nrate -m 7 -s 0</code> sets MCS=7, SISO PHY
<code>phy_watchdog</code>	Controls 802.11 PHY recalibration
<code>pkteng_start</code>	Starts transmission of a continuous stream of packets
<code>pkteng_stop</code>	Stops packet transmission
<code>rateset</code>	Returns or sets the supported basic 802.11 rates
<code>scansuppress</code>	Suppress 802.11 scanning functionality
<code>reset_cnts</code>	Reset packet counter statistics
<code>txant</code>	Used with <code>antdiv</code> command to control antenna selection
<code>txpwr1</code>	Sets transmit power output
<code>up</code>	Brings the wireless interface up

Table 3-1. Brief description of manufacturing test commands

### 3.1 Transmit Testing

For 802.11b transmit testing, an example command sequence is shown in [Table 3-2](#).

```
wl --serial 99 down
wl --serial 99 country ALL
wl --serial 99 band b
wl --serial 99 chanspec -c 1 -b 2 -w 20 -s 0
wl --serial 99 mpc 0
wl --serial 99 ampdu 1
wl --serial 99 bi 65000
wl --serial 99 frameburst 1
wl --serial 99 rateset 11b
wl --serial 99 up
wl --serial 99 txant 0
wl --serial 99 antdiv 0
wl --serial 99 nrate -r 11
wl --serial 99 phy_watchdog 0
wl --serial 99 disassoc
wl --serial 99 txpwr1 -1
sleep 3
wl --serial 99 pkteng_start 00:90:4c:aa:bb:cc tx 40 1000 0
To stop transmitting:
wl --serial 99 pkteng_stop tx
```

*Table 3-2. Manufacturing Test Application: 802.11b Tx Test Commands*

For 802.11g transmit testing, an example command sequence is shown in [Table 3-3](#).

```
wl --serial 99 down
wl --serial 99 country ALL
wl --serial 99 band b
wl --serial 99 chanspec -c 6 -b 2 -w 20 -s 0
wl --serial 99 mpc 0
wl --serial 99 ampdu 1
wl --serial 99 bi 65000
wl --serial 99 frameburst 1
wl --serial 99 rateset 11b
wl --serial 99 up
wl --serial 99 txant 0
wl --serial 99 antdiv 0
wl --serial 99 nrate -r 54
wl --serial 99 phy_watchdog 0
wl --serial 99 disassoc
wl --serial 99 txpwr1 -1
sleep 3
wl --serial 99 pkteng_start 00:90:4c:aa:bb:cc tx 40 1000 0
To stop transmitting:
wl --serial 99 pkteng_stop tx
```

*Table 3-3. Manufacturing Test Application: 802.11g Tx Test Commands*

For 802.11n transmit testing, an example command sequence is shown in [Table 3-4](#).

```
wl --serial 99 down
wl --serial 99 country ALL
wl --serial 99 band b
wl --serial 99 chanspec -c 11 -b 2 -w 20 -s 0
wl --serial 99 mpc 0
wl --serial 99 ampdu 1
wl --serial 99 bi 65000
wl --serial 99 frameburst 1
wl --serial 99 rateset 11b
wl --serial 99 up
wl --serial 99 txant 0
wl --serial 99 antdiv 0
wl --serial 99 nrate -m 7 -s 0
wl --serial 99 phy_watchdog 0
wl --serial 99 disassoc
wl --serial 99 txpwr1 -1
sleep 3
wl --serial 99 pkteng_start 00:90:4c:aa:bb:cc tx 40 1000 0
To stop transmitting:
wl --serial 99 pkteng_stop tx
```

*Table 3-4. Manufacturing Test Application: 802.11n Tx Test Commands*

## 3.2 Receive Testing

For receive testing, an example command sequence is shown in [Table 3-5](#).

```
wl --serial 99 down
wl --serial 99 mpc 0
wl --serial 99 country ALL
wl --serial 99 scansuppress 1
wl --serial 99 channel 1
wl --serial 99 bi 65535
wl --serial 99 up
sleep 10
wl --serial 99 counters
```

*Table 3-5. Manufacturing Test Application: 802.11 Rx Test Commands*

### 3.3 Carrier Wave

To transmit a carrier wave, an example command sequence is shown in [Table 3-6](#).

```
wl --serial 99 down
wl --serial 99 country ALL
wl --serial 99 band b
wl --serial 99 mpc 0
wl --serial 99 up
wl --serial 99 out
wl --serial 99 fqacurcy 6
[To stop transmitting]
wl --serial 99 fqacurcy 0
wl --serial 99 down
wl --serial 99 up
```

*Table 3-6. Manufacturing Test Application: Carrier Wave Commands*

### 3.4 Antenna Selection

Antenna selection and diversity is controlled using the `txant` and `antdiv` commands as shown in [Table 3-7](#).

```
[Select antenna 0]
wl --serial 99 txant 0
wl --serial 99 antdiv 0
[Select antenna 1]
wl --serial 99 txant 1
wl --serial 99 antdiv 1
[Enable antenna diversity]
wl --serial 99 txant 3
wl --serial 99 antdiv 3
```

*Table 3-7. Manufacturing Test Application: Antenna Selection*

**Note:** The `txant` and `antdiv` commands will not have any effect unless the `nvr` (Wi-Fi variable image) and Wi-Fi firmware image are enabled for diversity.

### 3.5 Other

Listed below are other commands that may be useful.

- To perform a scan for an Access Point with an SSID = YOUR\_AP\_SSID  

```
>wl --serial 99 iscan_s YOUR_AP_SSID
```
- To retrieve iscan\_s results  

```
>wl --serial 99 iscanresults
```
- To get the MAC address of the WICED module, use:  

```
>wl --serial 99 cur_etheraddr
```
- To associate with an open Access Point, use:  

```
>wl --serial 99 join <SSID_OF_AP>
```
- To verify association status, use:  

```
>wl --serial 99 status
```
- To get the received signal strength (RSSI) after association, use:  

```
>wl --serial 99 rssi
```
- To disassociate from Access Point, use:  

```
>wl --serial 99 disassoc
```
- To set the transmit power to +15dBm, use:  

```
>wl --serial 99 txpwr1 -d 15
```
- To read the contents of the NVRAM, use:  

```
>wl --serial 99 nvram_dump
```

**Note:** After executing the `wl --serial 99 mpc 0` command, ensure that a subsequent `wl --serial 99 up` command is issued. To verify that the device is up, a value of 1 is returned when a `wl --serial 99 isup` command is executed.

### References

The references in this section may be used with this document.

**Note:** Cypress provides customer access to technical documentation and software through the WICED website ([community.cypress.com](http://community.cypress.com)). Additional restricted material may be provided through the Customer Support Portal (CSP) and Downloads.

For Cypress documents, replace the 'xx' in the document number with the largest number available to ensure you have the most current version of this document.

Document (or Item) Name	Number	Source
[1] WICED Quickstart Guide	WICED-QSG2xx-R	Refer: 002-19359, 002-19360
[2] WL Tool for Embedded 802.11 Systems	802.11-TI2xx-R	<a href="http://community.cypress.com">community.cypress.com</a>
[3] WLAN Client Utility Command Set	802.11-TI3xx-R	<a href="http://community.cypress.com">community.cypress.com</a>
[4] WICED Evaluation Board User Guide	WICED-EUM2xx-R	002-19353

# Document Revision History

Document Title: WICED™ Manufacturing Test User Guide

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Revision	ECN	Issue Date	Description of Change
**	-	11/14/2011	<b>WICED-MFG100-D1</b> : Initial Draft Release
		11/23/2011	<b>WICED-MFG100-D2</b> : Draft 2 Release; Mfg test app is now provided as a standalone installer together with WICED SDK Added notes about antenna selection
		03/07/2012	<b>WICED-MFG100-D3</b> : Draft 3 Release; Mfg test app included with WICED-SDK-1.2
		12/14/2012	<b>WICED-MFG200-R</b> : Updated for WICED-SDK-2.2.0
		04/19/2013	<b>WICED-MFG201-R</b> : Updated for WICED-SDK-2.3.0
		08/20/2013	<b>WICED-MFG202-R</b> : Added iscan command Updated for WICED-SDK-2.4.0
*A	5686309	04/06/2017	Converted to Cypress template format

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