WDS CHIP CONFIGURATOR USER GUIDE

1. Introduction

WDC Chip Configurator is a member of the WDS suite of tools supporting the Silicon Labs line of ISM band RFICs. Users of the WDS Chip Configurator tool have direct access to EZRadio® and EZRadioPRO® registers, where they can configure the device to perform a variety of controlled lab experiments. When the appropriate configuration is found for a user's requirement, the tool can generate a c-header configuration file for use with the microcontroller of choice.

While the tool is primarily designed to assist RF engineers in a lab environment, it also provides a number of additional features allowing additional project team members to perform various field tests.

WDS Chip Configurator Version 3 builds on features available in earlier versions of WDS CC but enables multiple RF devices to be controlled simultaneously. Table 1 lists the current products supported by WDS CC.

Table 1. Supported Products

EZRadio®		EZRadioPRO®	
TX	Si4020 (or IA4220)	TX	Si4030
	Si4021 (or IA4221)		Si4031
	Si4022 (or IA4222)		Si4032
RX	Si4320 (or IA4320)	RX	Si4330
	Si4322 (or IA4322)	TRX	Si4430
TRX	Si4420 (or IA4420)		Si4431
	Si4221 (or IA4421)		Si4432

WDS CC-UG

2. Installation

Important Note: Before installing this software, local administration rights must be obtained from your network administrator.

1. Insert the installation media.
2. Double-click the WDS setup icon:

WDS3-Setup.exe
Installer
Silicon Laboratories Inc.

3. Follow the step-by-step instructions on the screen.
4. Click "Next" to start the installation process, or click "Cancel" to abort the installation and close the installer package. Some screen images may differ slightly between software revisions.
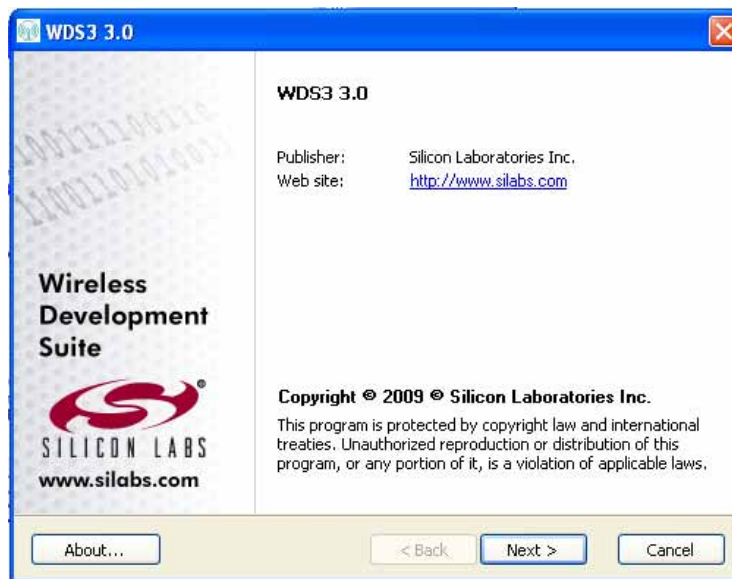
Figure 1. Initial Installation Screen

Having selected "Next", the software licence agreement screen shown in Figure 2 will appear. A copy of the licence can be found in this document and should be kept for your records. In order to install WDS, this licence must be accepted by clicking the check box; once accepted, the "Next" button will be made available, and installation can continue.
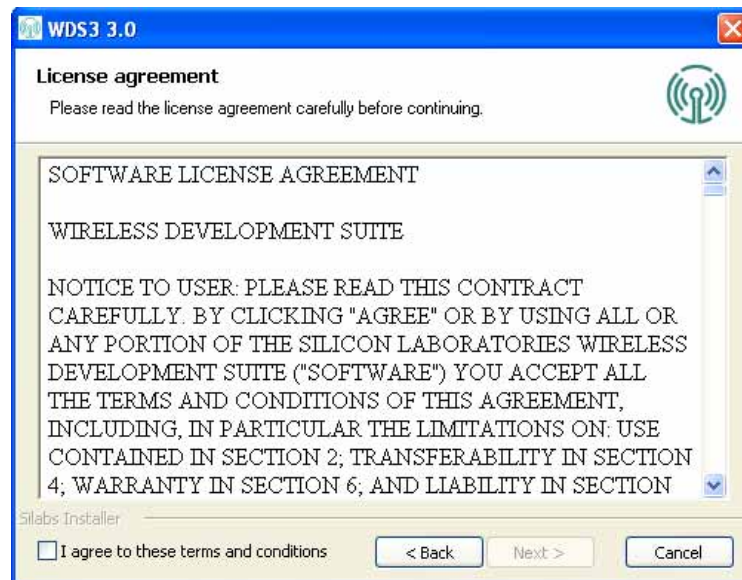

Figure 2. License Agreement

Having accepted the licence, the installer options are made available. Here, you can determine where the application is installed on your computer. You have the ability to select an installation folder that may better suit your requirements. However, Silicon Labs recommends using the default directory:

C:\Program Files\Silabs\WDS3

Note: New installations of WDS Chip Configurator may overwrite historical WDS data. Customers are advised to back up any data they may have. Project files may be found in *C:\Program Files\Silabs\WDS3\Project_Configurations*.
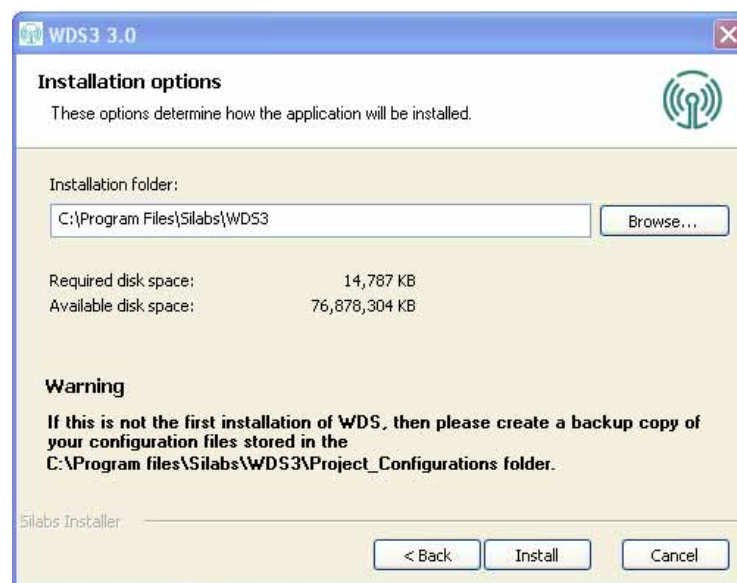

Figure 3. Installation Options

Note: Disc space is highlighted for your convenience.

When your settings are confirmed, click "Install" to continue. If an existing installation is found, the WDS installer will alert you as to its actions before continuing.
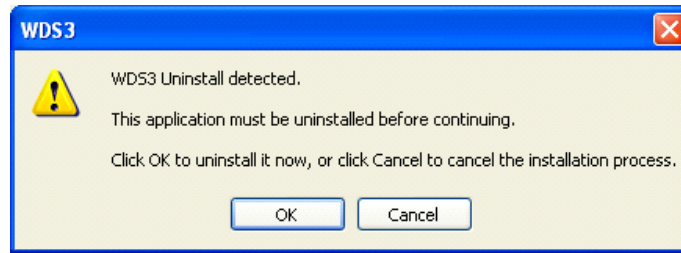

Figure 4. Uninstall Detected

Depending on your system configuration, the installation time may vary. When the installer has completed, the following screen will be shown.
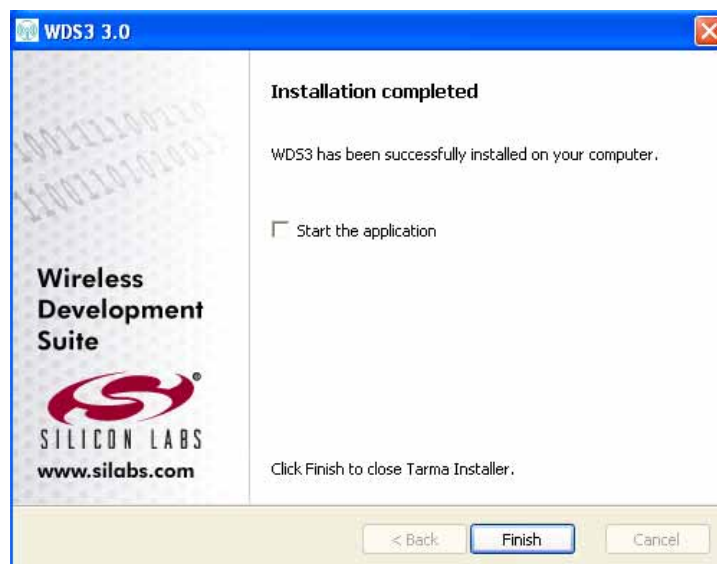

Figure 5. Installation Completed

If you want the installer to launch WDS upon closing, enable the "Start the application" check box before clicking "Finish."

3. WDS 3.0 Overview

The WDS 3.0 environment is a ground-up redesign of earlier versions with the aim of introducing a powerful new system architecture that enables many new features including the following:

- An improved look-and-feel for the WDS GUI
- Support for future extensions including new RF devices, demonstration programs, and test applications
- Support for various I/O connections including USB and TCP/IP
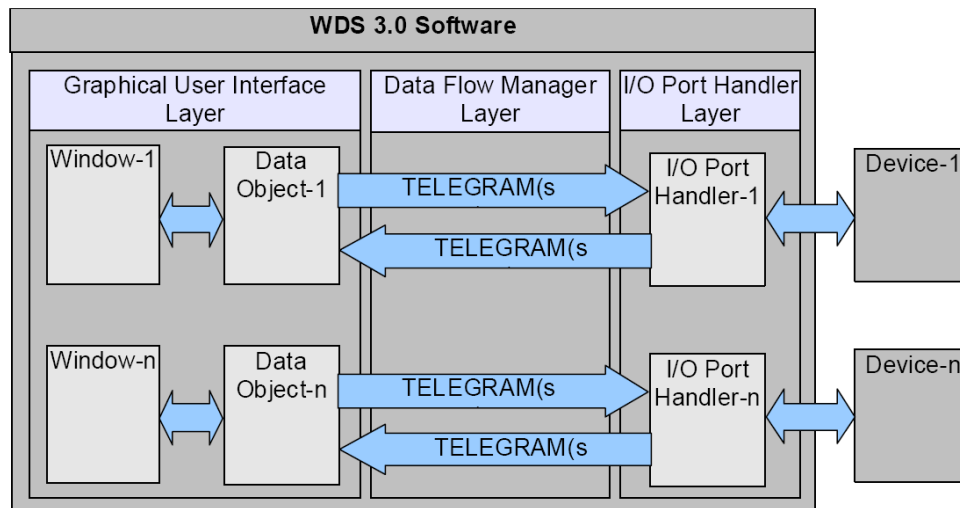- Improved Graphical User Interface (GUI) responsiveness

Figure 6. Software Overview

To achieve these goals, WDS has been split into three functional software layers as shown in Figure 6:

1. Graphical user interface (GUI) layer
2. Data Flow Manager layer, which can handle more than one parallel and bidirectional data flow channel between each GUI window and associated device pairs
3. I/O Port Handler layer, which carries out the physical data transfer (and implements communication protocols) with the devices (e.g., via USB, TCP/IP, etc.)

In previous revisions of WDS Chip Configurator, the software enabled only one device and one control window to be opened at any one time, but, as the demand for wireless applications has grown, so has the need to work on multiple RF nodes during the development cycle.

WDS Chip Configurator's new GUI interface allows for a single WDS instance to be connected to one or more devices, and each device can be connected to different I/O ports on a PC.
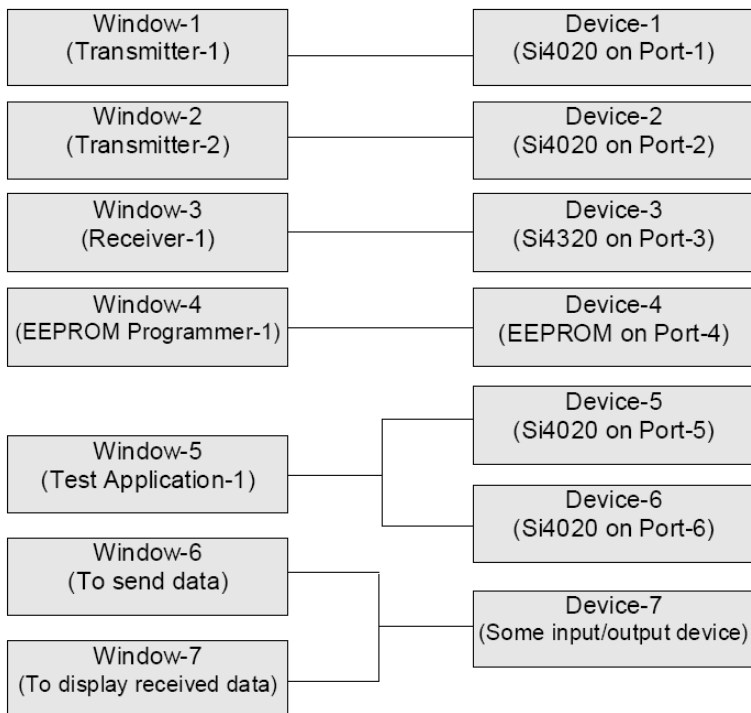

Figure 7. Connectivity Diagram

3.1. Using WDS for the First Time

3.1.1. Setting up WDS and Hardware

WDS is designed to support a number of hardware platforms (see Table 2); each is intended for the needs of particular users. Those using USB to connect to their hardware will need the appropriate USB driver software installed on their PC; this may have been installed during the installation.

Table 2. WDS Supported Platforms

Platform	Vendor
CP2102	Silicon Labs
FT232R	FTDI

If the required driver was not installed for your system, it should be obtained from the appropriate vendor's website.

3.1.2. Starting WDS Chip Configurator

WDS Chip Configurator can be started from the Microsoft Windows® start button.

start ➔ Program Files➔ Silicon Laboratories

Figure 8. Starting WDS Chip Configurator

Once the program has started, the Silicon Labs splash screen appears listing the software version and build numbers for future reference.

As shown in Figure 9, the version can be seen as Build 12/11/2009 of the 3.0 GUI. This information should be conveyed to Silicon Labs support teams if there is a need to open a technical support ticket via the Silicon Labs web support system.

Figure 9. WDS Welcome Screen

3.1.3. Introduction to the Main Screen

The main screen provides the main control interface to all simulations performed within the chip configurator environment. The main window control buttons are located at the top-left of the screen.
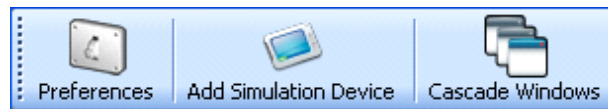

Figure 10. Main Window Control Buttons

■ **Preferences**—Global WDS environmental controls, such as log information, language control, and hardware prompting control

Figure 11. Global Preferences

■ **Add Simulation Device**—Launches the Application Manager (see "3.2. Working with WDS" on page 11)
■ **Cascade Windows**—Used to help clean up the arrangement of windows within WDS

Figure 12. Main Support Buttons

At the top right of the screen are the main support buttons:

■ **Send Feedback**—This button opens your mailbox editor and attaches the current WDS log file. You are then free to add dialogue to explain what you are trying to achieve with WDS. The log file is added such that we can try to reproduce your WDS instance to better support your needs.
■ **Supported Devices**—This button provides informative feedback about the currently-supported RFICs and hardware platforms supported by your WDS installation.
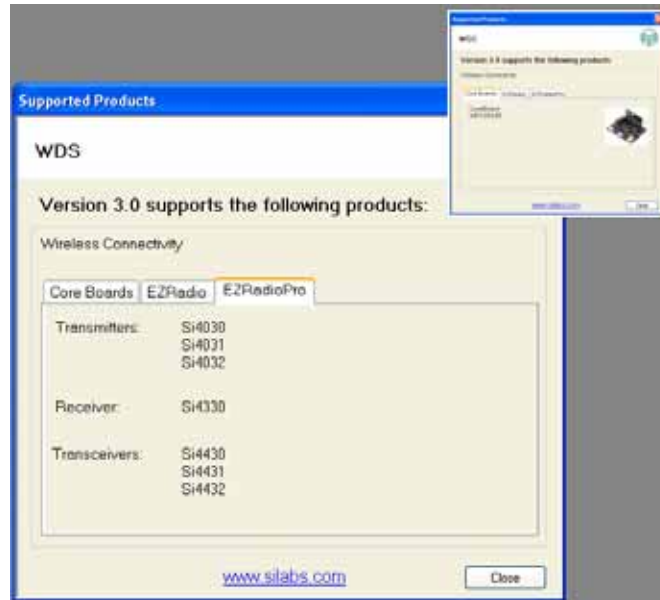
Figure 13. Supported Products

■ **About**—Provides WDS revision information, system information, and access to the WDS Licence Manager (discussed later).

Figure 14. About Screen

In the bottom left of the main screen is the "Logger". The logger is where WDS logs all use information so that the Silicon Labs technical support team can reproduce issues that you may be seeing. The file created by the logger is the file sent to Silicon Labs if you click the "Send Feedback" button covered earlier. To open the logger window, click the left-most icon shown in Figure 15.

Figure 15. Logger

Figure 16. Enable Logging

The data collected in the logger can be seen real-time as you progress with your experiments. Two controls are available within this utility:

- Enable/Disable Logging
- Clear Log

3.1.4. Licence Manager

For most users the licence manager is a feature that will not be required and is primarily used internally to Silicon Labs. By default, the standard licences are installed for users as part of the installation process.
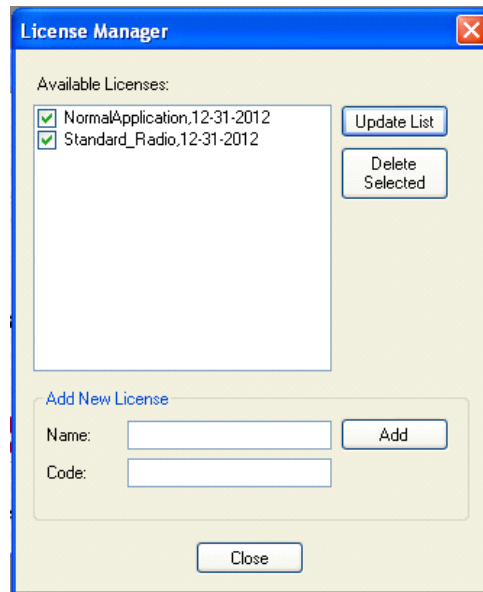

Figure 17. License Manager Screen

In the event Silicon Labs provides a feature code to customers, the Name and Code information should be entered into the appropriate fields. Licences typically have an expiration date to ensure users update WDS installations; this helps to ensure correct values are used for calculations.

3.1.5. Mode Selection

WDS operates in two ways:

Figure 18. WDS Modes

- Hardware Mode: Used when operating WDS with hardware connected (locally or remotely).
- Simulation Mode: Used when hardware is not connected to WDS. The use model of simulation mode is similar to that of an online data sheet.

Note: If WDS detects appropriate hardware connected to WDS via one of the USB ports, hardware mode is automatically started with USB support.

3.2. Working with WDS

WDS is designed to automate much of the configuration process by reducing menu items according to the mode selection and hardware connected.

3.2.1. Application Manager

In simulation mode, there is no hardware connected to WDS, and the use model for most users is that of an automated data sheet or script development environment.

Figure 19. Selecting an Application for Simulation

Filters are available to further optimize menus:

- **Show All**—Displays all available applications including radio setting panels, control panels, and demonstrations.
- **Radio Settings**—The Radio Settings filter reduces the application list to product development-related tools, such as the Radio Control Panel and the Register Control Panel (discussed later).
- **Demos**—Designed to provide users with an educational insight into radio operation. In "simulation mode," the available options are limited to theoretical examples.

Every application example has a brief description of its purpose provided in the "Description" dialogue box.
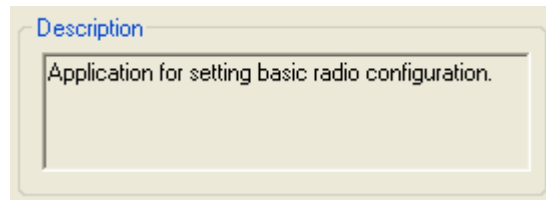
Figure 20. Application Example Description

When working within WDS, numerous windows may be open. For example, in your design, some may be related to transmitters and others to receivers. Entering a "nickname" into the reference field will tag all associated windows. If a nickname is not entered, a default name will be added.

Figure 21. Example Nickname

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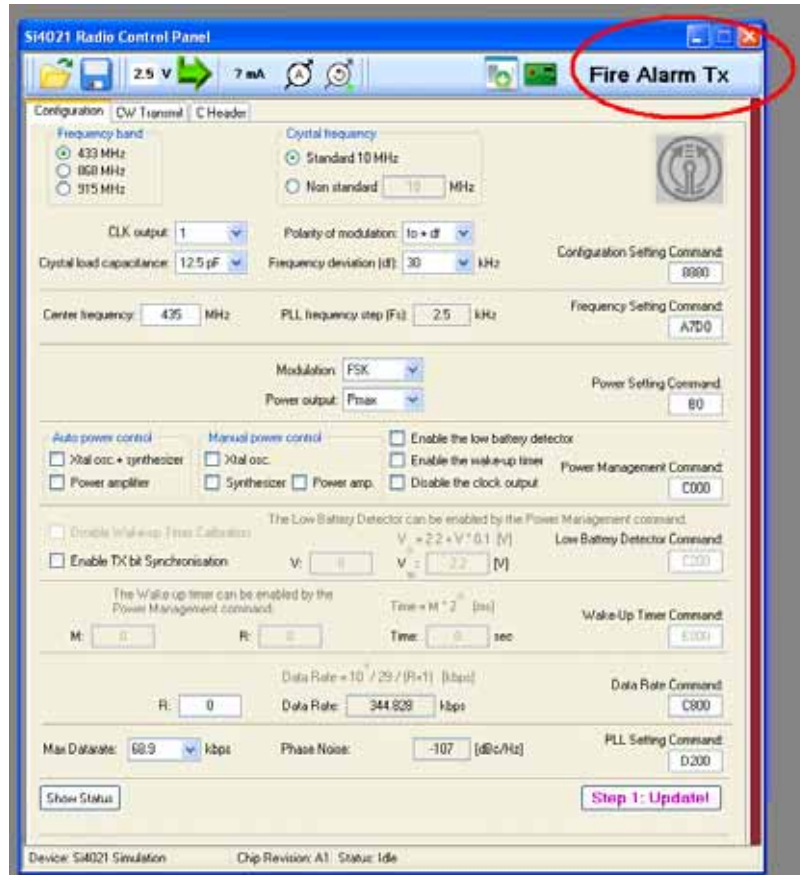
Figure 22. Radio Control Panel

In hardware mode, the application manager extends to provide further hardware-related information.

Figure 23. Select Application for Connected Hardware

The detected hardware is highlighted on the right-hand side of the application manager's window.

- **Hardware Type**—This is the name (part number) of the hardware connected.
- **Hardware Rev**—This is the version number of the hardware platform.
- **Firmware Type**—To be compatible with WDS, the firmware must contain a bootloader rather than a custom image or a standalone image. Firmware with a bootloader can be downloaded from the Silicon Labs website. The Firmware Type tells WDS the purpose of the firmware. If WDS detects the wrong type is loaded, it may recommend that the firmware be upgraded.
- **Firmware Rev**—This is the version of the firmware.
- **Radio Type**—If a radio is detected on the hardware platform, it may be displayed here.
- **Radio Rev**—If a radio is detected on the hardware platform, its revision may be displayed here.

Note: Population of these fields will occur only if the current firmware on the hardware platform allows.
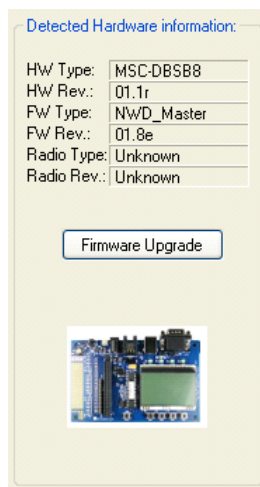
Figure 24. Detected Hardware Information

In some instances, WDS may recognize both the hardware platform and the firmware, but an application may require newer firmware before it is available. If no applications are available for your firmware, WDS will inform you.
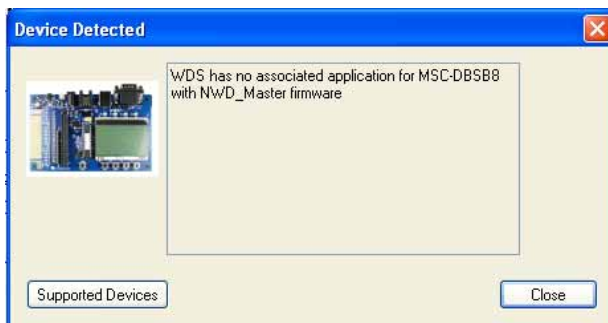
Figure 25. Device Detected Screen

In either case, a firmware upgrade may be possible via WDS.
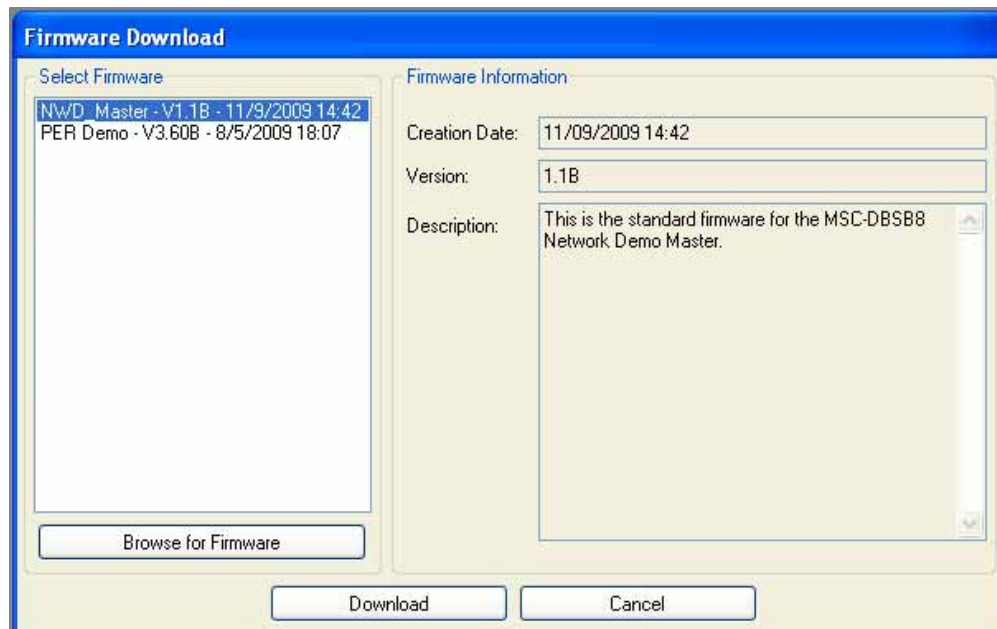
Figure 26. Detected Hardware Information

Selecting to upgrade/change firmware can unlock or restrict a number of features in WDS. In some instances, a licence may also be required (see licence manager).

The firmware download dialogue box lists all the default firmware images and allows you to browse for firmware on your computer. Standard release firmware from Silicon labs will also populate a number of informative fields.

Figure 27. Firmware Download

3.2.2. Connections Manager

Once the application is selected, users may be presented with the Connections Manager, shown in Figure 28.
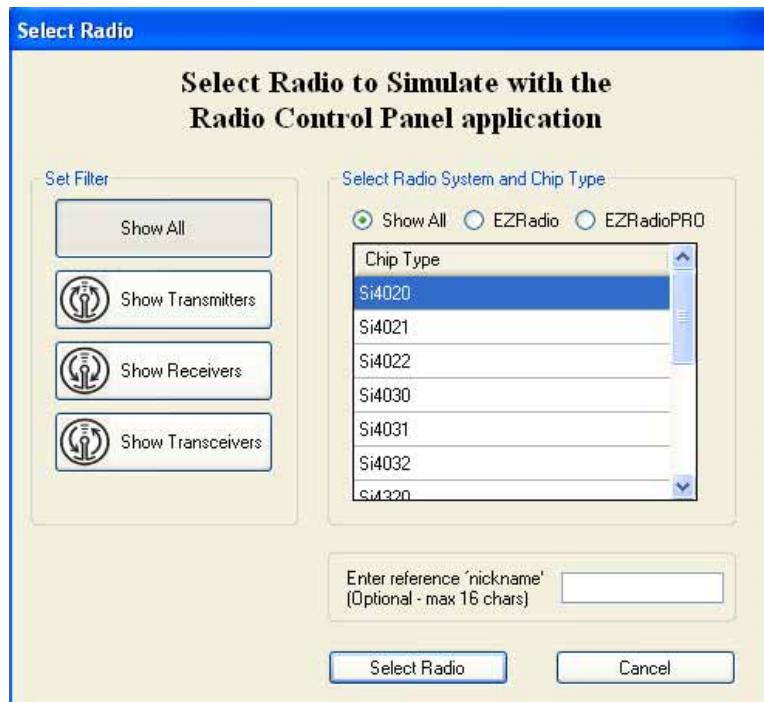
Figure 28. Connections Manager

The Connections Manager may or may not be presented in hardware mode but will always be presented in simulation mode. Radio Manager allows users to select the radio and revision of their choice from the Silicon Labs portfolio.

Two filter types are available:

- By Family: EZRadio/EZRadioPRO
- By Type: Transmitters, Receivers, or Transceivers

If a nickname has still not been selected, users still have the option to create one. If a nickname is already created, the nickname box will be removed.

4. Applications

4.1. Overview

Applications on the Applications Manager within WDS are split into two categories:

- Radio Settings
- Demos

Radio Setting applications are primarily used for development purposes with EZRadio and EZRadioPRO devices while demo applications are designed to aid in the understanding of particular issues or applications.

4.1.1. Radio Settings

Applications available in the Radio Settings category are as follows:

Radio Control Panel—The purpose of radio control panels is too enable quick manipulation of a number of radio registers through a single click/action (e.g., Configure radio for 915 MHz).

Figure 29. Si4432 Radio Control Panel

Register Settings Panel—The purpose of register setting panels is to allow users greater access to register level manipulation. Register level manipulation is designed to allow RF engineers to adjust radio parameters according to their specific need. RF engineers can also develop scripts so that they can compare the performance of different settings.
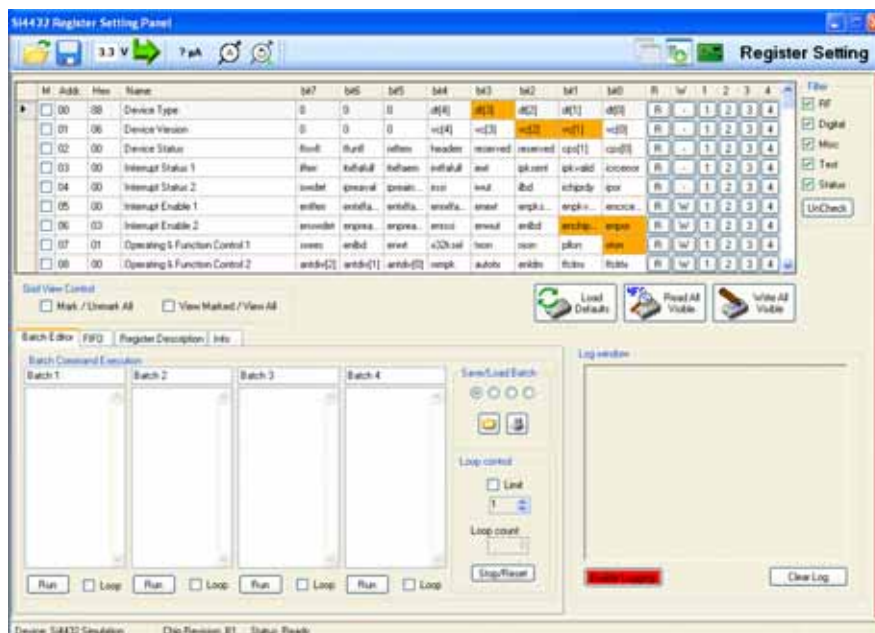

Figure 30. Si4432 Register Setting Panel

4.1.2. Demos

Applications available in the Demo category are as follows:

■ **Security Demo**—Designed to demonstrate EZRadioPRO used in a home/Industrial security type application. The demonstration is built upon the EZMac® protocol, and up to four nodes can join the network. In this demonstration, the hardware can operate in both a standalone or WDS GUI-based manner.
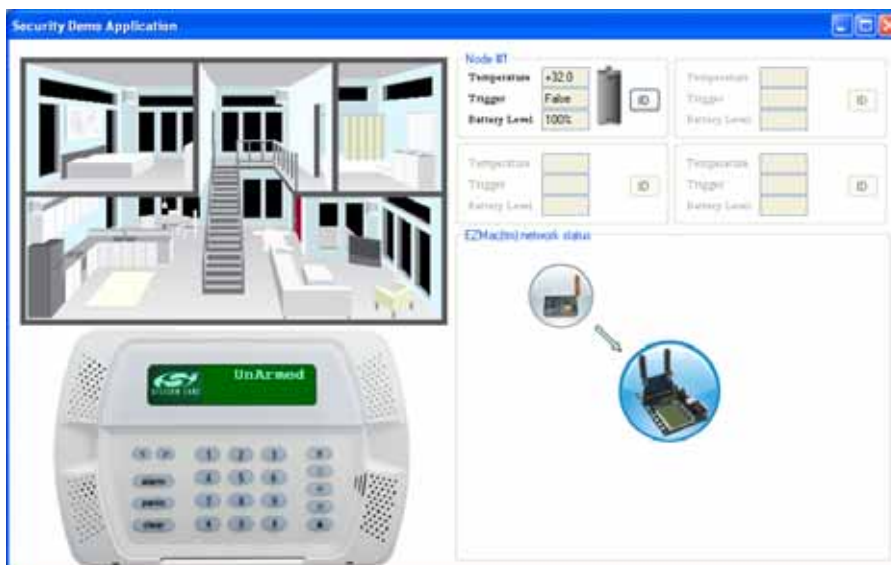
Figure 31. Security Demo

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5. Application User Guides

5.1. Radio Control and Register Setting Panels Overview

Hardware Mode and Simulation Mode are supported.

Table 3. Supported Hardware (Hardware Mode Only)

Supported Hardware	Sold With	Comments and Prerequisites
ISM-DKLB2	ISM-DK3	Often referred to as "the loadboard"
4xxx-DKDBx		Often referred to as "a testcard"
4xxx-T-xx x MHZ		Testcards from the newer part numbering scheme

The Radio Control Panel is very similar to that of previous versions of WDS; however, given that WDS can now support multiple hardware connections, many of the original pull-down options are integrated into the active window.

- **Control Tools**—allow users to load and save configurations, set hardware voltage levels, and look at snapshots of current consumption for connected hardware
- **Nickname**—displays the label associating a particular window to the appropriate hardware
- **Page Tabs**—Changes between tasks
- **Control Interface**—Used to calculate register values
- **Log Tab**—Double clicking the red bar extends the window to show log and scripting panels
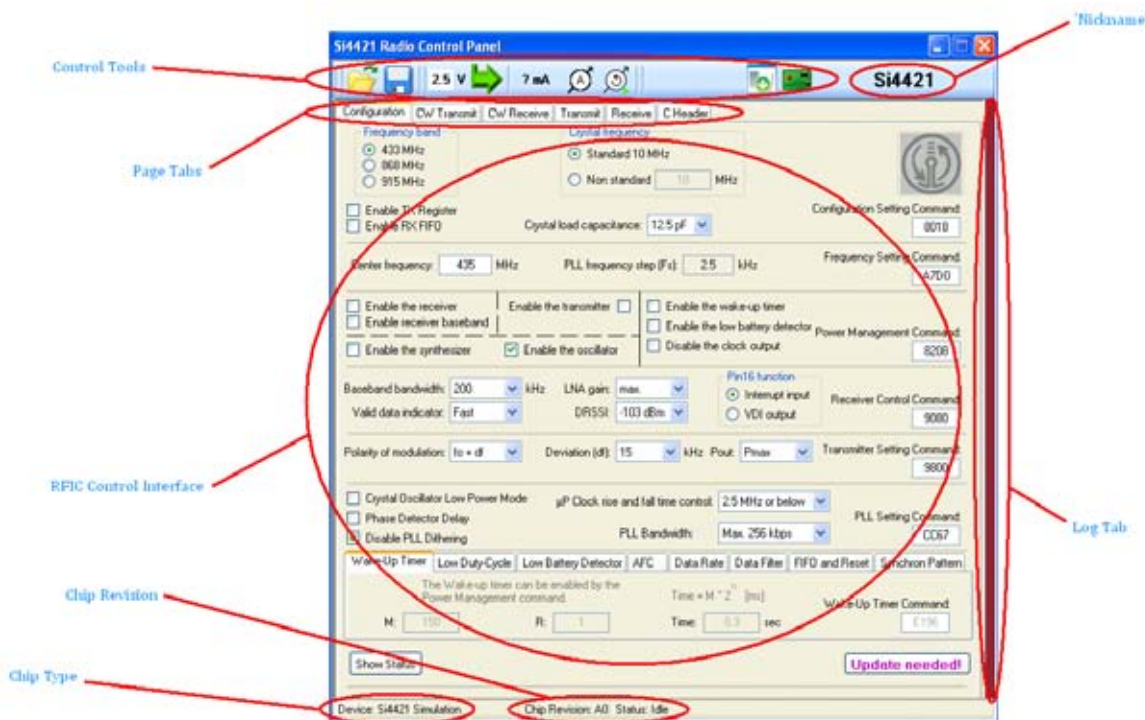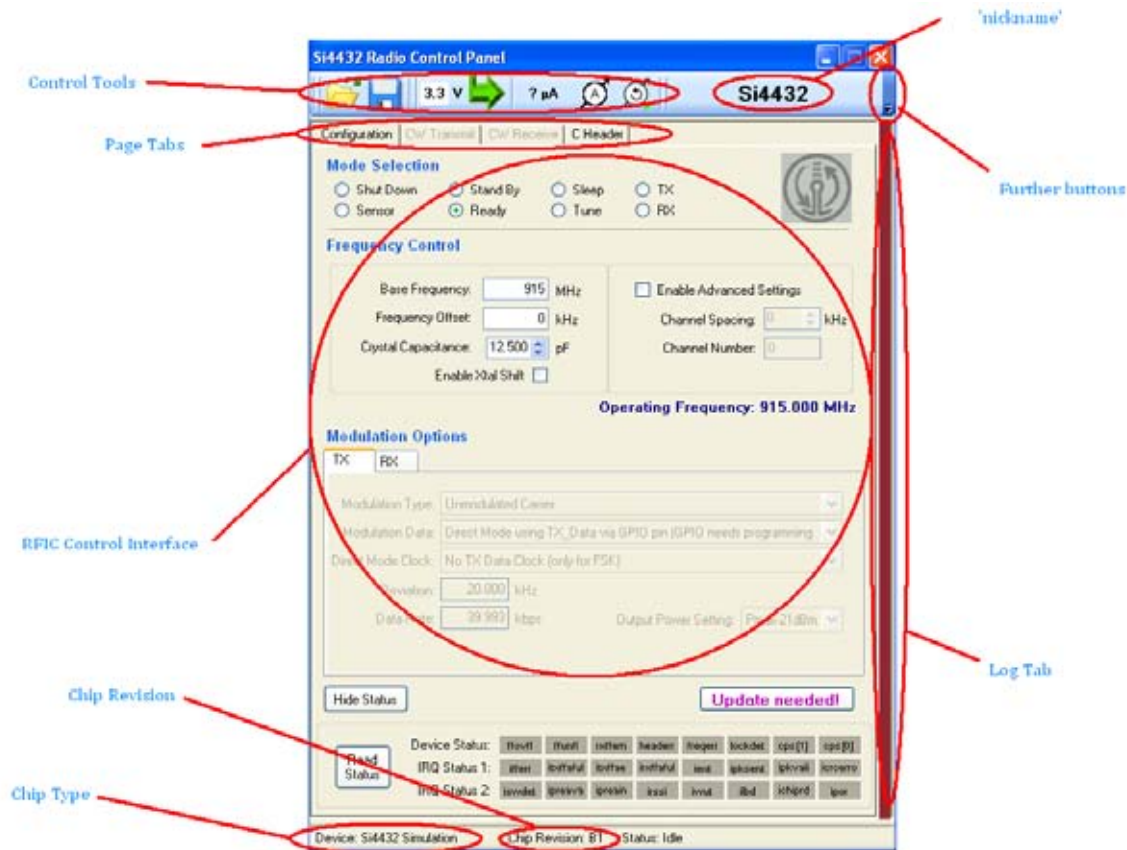

Figure 32. Example EZRadio Si4421 Control Panel

Figure 33. Example EZRadioPRO Control Panel

For EZRadioPRO, a new register settings panel is also available that allows greater in-depth manipulation of registers at a bit level. The register settings panel is explained in greater detail in a later chapter of this user guide.
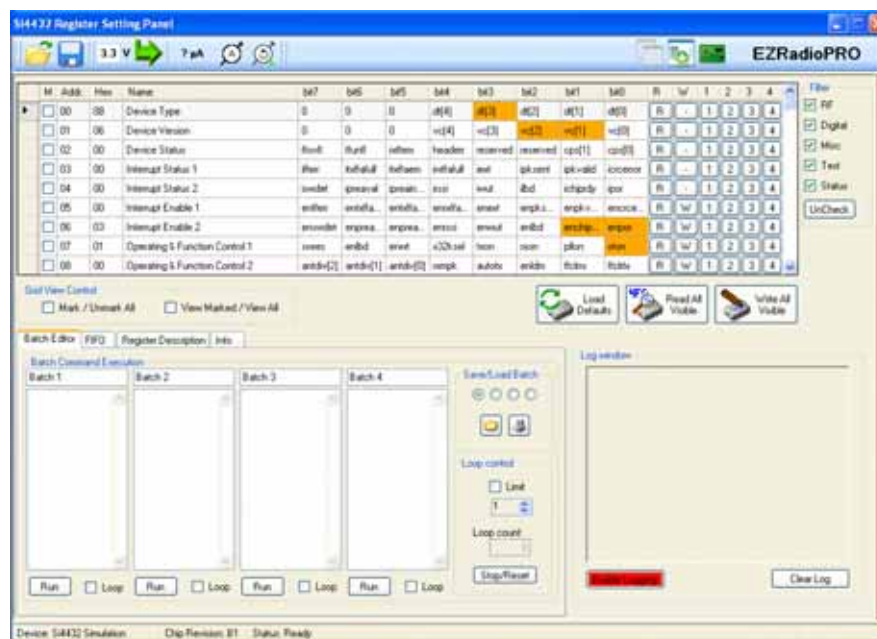

Figure 34. Example EZRadioPRO Register Settings Panel

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In WDS 3.x a powerful logging feature allows users to record what has been done on any given control panel, allowing for better debug and scripting capabilities. To access the individual control panels log, simply double-click on the red bar at the side of the given window.
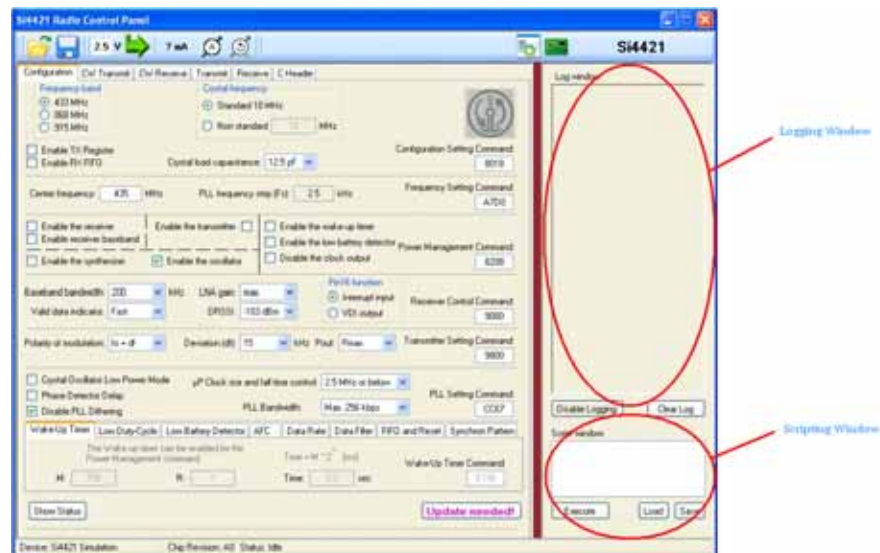
Figure 35. Radio Control Panel

5.1.1. Control Toolbar

In WDS 3.x, the control toolbar was added to enable designers to load/save configurations for future use; the load/save buttons are available on every control panel. By default, configuration files are located in a "project configuration" folder within the WDS directory structure; however, designers can opt to save and load files from locations of their choice. When saving files, designers can add comments to their file to help identify the purpose of a file in the future.
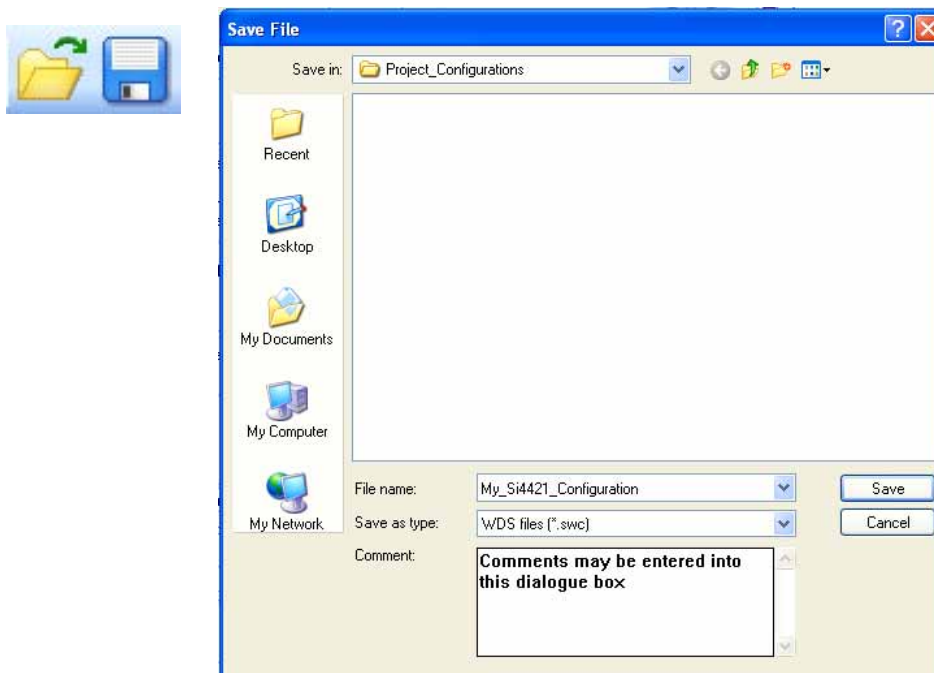
Figure 36. Load/Save Configuration Files

The control tool bar also comes with snapshot voltage and current consumption tools.

Figure 37. Voltage and Current Consumption Tools

5.1.2. IC Voltage Setting

To configure connected hardware, such as "the loadboard", to provide the RFIC a given voltage, the designer must enter the voltage into the voltage box and click the green arrow.

Figure 38. Configure Connected Hardware

5.1.3. Current Monitor

The control toolbar comes with two current monitoring features. *In both cases, the current displayed is a snapshot rather than a continual monitor.* The purpose of the tool is to act as a guide for designers who want to understand how certain register settings can affect current consumption.

Figure 39. Current Consumption Tools

Table 4. Icon Functions

Icon	Function
	Measure chip current. (Warning—this is a snapshot, not a continual measurement.)
	Measure chip current on update. (Warning—this is a snapshot, not a continual measurement.)

The control tool bars provides users with a number of extended utility controls.

Figure 40. Extended Utility Controls

5.1.4. Soft Reset

In earlier versions of WDS, many designers simply turned off external hardware to reset the RFIC under test. Due to the plug-and-play capabilities of WDS 3.0, this method is no longer recommended since users will be prompted by the connections manager upon reconnection.
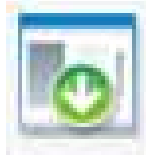

Figure 41. Soft Reset

WDS 3.x implements a new soft reset button. Depending on the type of RFIC under test, the soft reset button will either apply a "reset" or default register values will be loaded into the device.

5.1.5. Hardware ID

With the ability to handle multiple connections from one WDS tool, it is possible that designers could become confused between which windows are connected to which hardware. To help avoid these issues, a system of "nicknames", designed to tie windows and hardware together, is implemented. However, some hardware platforms do not have LCDs to display the nickname. To overcome this, a Hardware ID button has been implemented.

Figure 42. Hardware ID

If users are running hardware, such as the loadboard, and it contains the latest firmware, then clicking the Hardware ID button will make LEDs on the hardware flash.

Note: In older versions of firmware, this command will be ignored.

5.1.6. Switch Application

The EZRadio product line requires very few registers to be modified by users. The EZRadioPRO product line on the other hand, often needs multiple registers to be changed for certain tasks to be accomplished. For this reason, it is often the case that designers using EZRadioPRO may wish to switch between the radio control panel and the register settings panel (discussed later) while operating on the same device. Using the telegram service (as discussed earlier), WDS can pass settings from the radio control panel to the register settings panel. The switch application button allows users to switch views between these panels.

Figure 43. Switch Application

Note: This Is currently a one-way process.

Modifications in the register settings panel will not be reflected in a Radio Control Panel; as such the ability to launch the Radio Control Panel from the Register Settings Panel is disabled.

5.1.7. Page Tabs

The page tabs allow for various tasks to be performed within a radio panel.
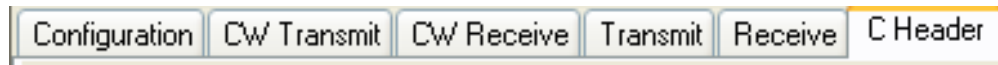

Figure 44. EZRadio Page Tabs

Figure 45. EZRadio Page Tabs EZRadioPRO Page Tabs

- **Configuration Tabs**—This tab allows users to adjust top level radio parameters, such as center frequencies, crystal load capacitance, and deviation (δf).
- **CW Transmit**—Creates a basic CW link between a transmitter and a receiver for test purposes only. The tab uses default register values to ensure users are working from a known state.
- **CW Receive**—This tab enables configuration of the transmit side of the link. Creates a basic CW link between a transmitter and a receiver for test purposes only. The tab uses default register values to ensure that users are working from a known state.
- **Transmit**—This tab allows users to configure the receive side of the link. It has a function similar to that of the CW Transmit and CW receive tabs but, additionally, allows users to create a custom packet that includes preamble, synch pattern, and payload.
- **Receive**—This tab allows configuration of the transmit side of the link. It has a function similar to that of the CW Transmit and CW receive tabs but, additionally, allows users to create a custom packet that includes preamble, synch pattern, and payload.
- **C-Header**—This tab allows configuration of the transmit side of the link. The C-Header tool converts all register settings into a simple c header file for use in compiler environments, such as the Silicon Labs IDE.

Figure 46. C-Header Tab

5.1.8. Register Settings Panel

The register settings panel (available for EZRadioPRO devices) is a powerful scripting development and register manipulation tool. The register settings panel is recommended for intermediate to advanced radio product designers.

Figure 47. Typical EZRadioPRO Register Settings Panel

Register Manipulation Window—Contains a list of all registers appropriate to the DUT (Device Under Test). The list provides users the register address and name but also access to individual bit(s). Users can set bits either high or low and then click the "W" button of the scripting buttons to immediately write that value to the device. Clicking "R" allows users to immediately read a registers value.

Grid View Control—Allows users to select/deselect all registers or view all or only marked registers in the register manipulation window.

Function Tabs—Switches the mode of operation of the lower left part of the register setting panel (discussed later).

Function Window—Configures per the function tab selection.

Device Information—Indicates the DUT, the mode of operation, and IC revision.

Scripting Buttons—Allows users to either "R" (read) or "W" (write) to registers in real time or, alternatively, load settings into one of four scripts.

Register View Filters—Helps reduce clutter by showing only pertinent registers in the register manipulation window.

Control Buttons—Helps users reset all registers to their default state or read/write all registers to/from the device.

Log Window—On-screen log functionality.

5.1.9. Register Setting Panel Function Tabs

There are four tabs available in the register settings panel that change the functionality of the lower left portion of the panel.
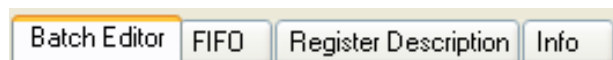
Figure 48. Tabs on the Register Settings Panel

- **Batch Editor**—Up to four scripts can be created at one time allowing minor variations between configurations to be compared. The scripts can be loaded by directly typing in the window or by using the scripting buttons. Batches can also be named for future reference.
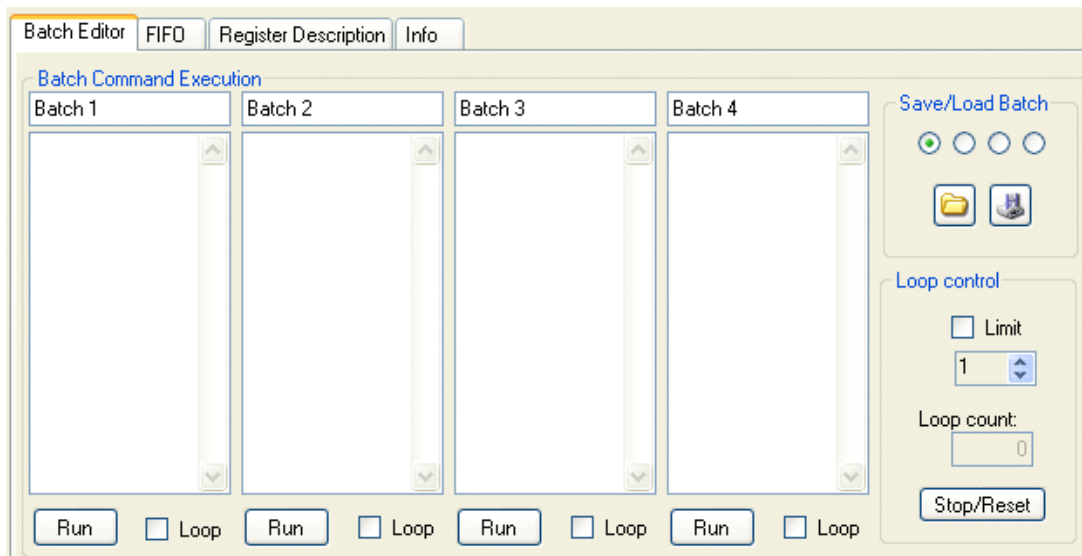
Figure 49. Batch Editor

The loop control function allows users to run scripts indefinitely or for a limited number of iterations. Users can save or load scripts from disc using the archiving control.

- FIFO

Using the FIFO tabs, users can Read/Write FIFO data while evaluating packet data corruption.
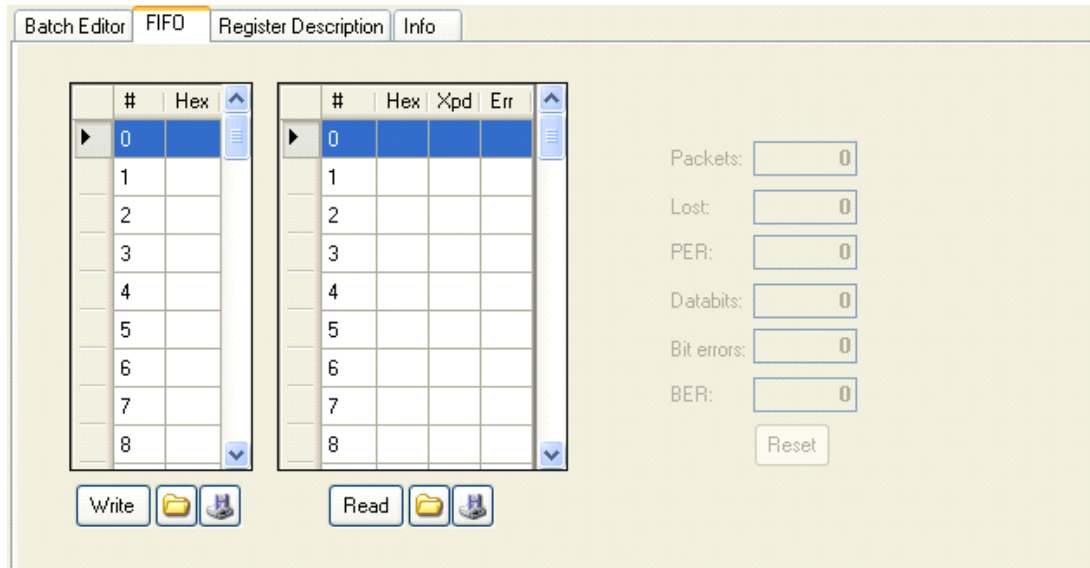
Figure 50. FIFO

- Register Description

The register description tab allows users to quickly look up the purpose and structure of a register without referring to the data sheets.
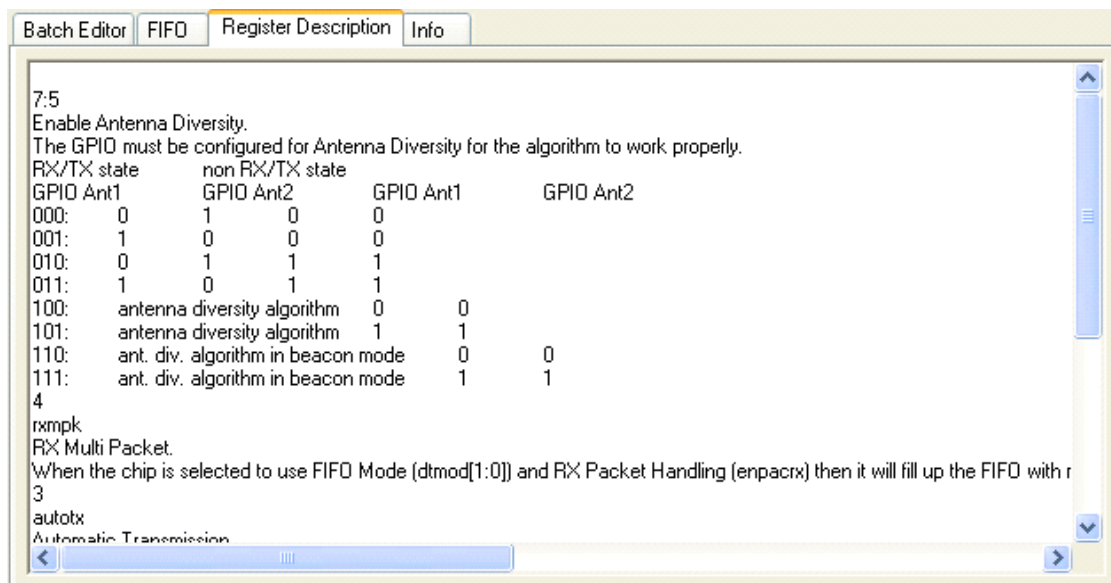

Figure 51. Register Description

- Info

Reserved for future use.

5.1.10. Script Files and the Script Window

As explained earlier, engineers can create, save, and run script files. These script files can be used to configure multiple registers through a single click.

The script file is constructed as a simple text file with some basic rules that have to be followed in order to ensure that the batch file executed correctly by WDS. An example batch file is shown below:

```
#BATCHNAME IA4432_RevX2 CW F:917.5MHz
# Set power supply to 3.3V
VA1
# Set SDN pin to LOW
L6
# Operating & Function Control 2 : Register 07H.
# Write data swres= '1' (To write the data, MSB of the command should be set # to
'1'. To read the data, MSB of the command should be set to '0'
S2 8780
# Operating & Function Control 2 : Register 07H.
# Read Status from 07H (To read the data, MSB of the command should be set
# to '0'.
S2 0700
```

A batch file can consist of comments and hardware commands:

- If a line starts with the # character, the line is parsed as a comment and used for user reference only.
- If a line starts with #BATCHNAME, the text in this line will appear as the title of the script just above the batch command textbox.
- If a line starts with a valid hardware command, such as those used to change the value of an radio's register or to set the power supply, the given command will be sent to the hardware through the USB interface.

Table 5. Basic Command Descriptions

Command	Description
Vxx	Set supply voltage (64: 2.0 V–C1: 5 V).
Ln	Set output bit "n" to low. (**Note**: SDN pin of the EZRadio PRO device is connected to output 6)
S2xxxx	Send xxxx (hex) command to EZRadioPRO device via SPI port.

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6. Loading Existing Batch Files

Perform the following steps to load an existing batch file:

1. Select the Batch Editor tab.
2. Select one of the four batch boxes and load the batch file from disk. The batch editor will allow for up to four scripts to be loaded at any one time.
3. The batch file is loaded into the selected batch script box.
4. Batch files are executed by clicking the Run button and can be looped by selecting the Loop checkbox.
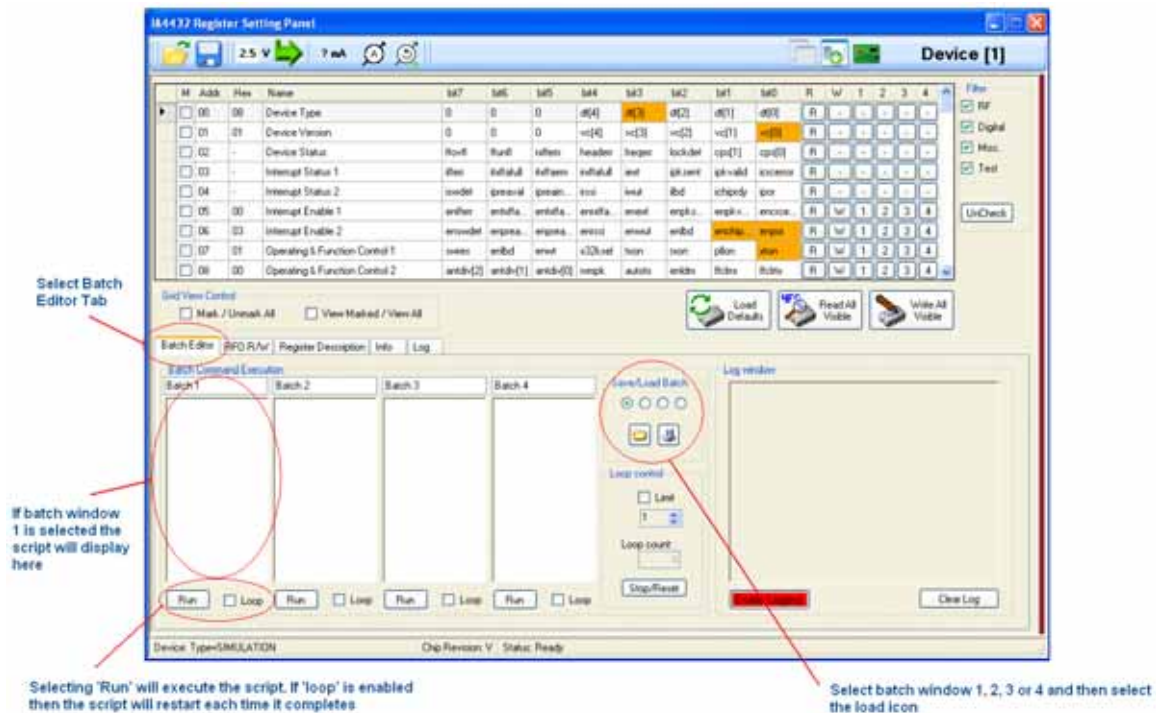
Figure 52. Register Setting Panel

7. Creating a Batch File

The scripts in the WDS batch files are simple ASCII text files; so, simple text editors can be used to create them. However, batch files may also be created from within the WDS environment.

1. Select the Batch Editor tab.

2. Select the register that requires manipulation
   (note that the register's description can be found in the Register Description tab).

3. Set the register content by clicking on the relevant bits.
   (A bit is set to 1 when orange and 0 when white).

4. Allocate the register to a batch window by clicking 1, 2, 3, or 4.

5. Repeat Steps 3 and 4 until all the required registers are set.

6. Comments or additional Loadboard commands can be typed directly into the batch textbox for future reference.

7. Save your batch files for future use.

8. Run the batch (select Loop if required).
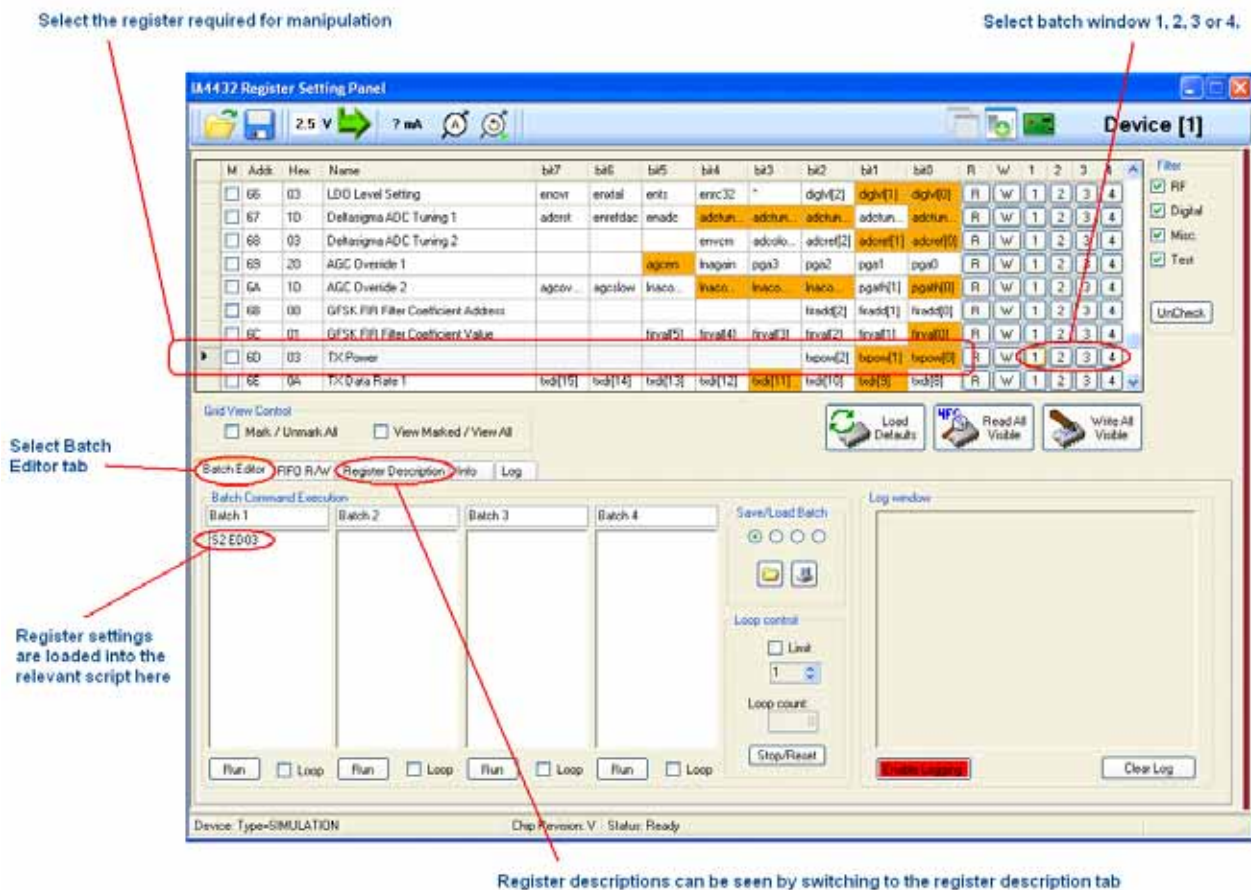
Figure 53. Creating a Batch File

Table 6. Full S2 Protocol Command Table Demos

Command	Description
Ex	Echo mode
S1xx	Send xxh via SPI
S2xxxx	Send xxxxh via SPI
SXxx,yy,..	Send xxh, yyh, .. via SPI
Ln	Set output bit n to low (**Note**: SDN pin of an EZRadioPRO device is connected to pin 6—e.g., L6)
Hn	Set output bit n to high
Zn	Allow output bit n to float
RI	Read input bits
RO	Read status of the output bits
RSn	Read n byte(s) from SPI (no SEL control)
WSxx,yy,..	Write xxh, yyh, .. to SPI (no SEL control)
Vxx	Set supply voltage (64:2.0V - C8:5.5V)
Fe,c,n,r	Setup receiver IT to read an ASCII packet, where:
	e: read until 1:EOP or PL, 2:EOP, 3:PL, 0:disable read
	c: End Of Packet character (EOP)
	n: Packet Length (PL)
	r: Si4320 revision (1:C,D,E; 0:F and above)
T "..."	Transmit packet (transceiver only)
AO	Set the gain of the current sense amplifier to 50
A1	Set the gain of the current sense amplifier to 100
AD	read the data from the current sense A to D converter
Mx	Select multichip mode:
	x=0: Multichip mode disabled
	x=1: Multichip mode enabled
Xx	Select data direction:
	x=0: External FSK input (SMA)
	x=1: LB microcontroller controls the FSK input of the radio
	x=2: FSK I/O of the radio is connected to the PC

Table 6. Full S2 Protocol Command Table Demos (Continued)

Command	Description
Yxy	Select the modulation mode:
	x=0: chip modulated by 0
	x=1: chip modulated by 1
	x=2: chip modulated by PN15 sequence
	x=3: stop modulation
	y=0: Si4021 is used
	y=1: Si442x is used
Dx	Select the function of LEDs:
	x=0: CPU1: blinks at 100ms, CPU2: ON - data mode, OFF - command mode
	x=1: CPU1: shows the IRQ pin, CPU2: shows the VDI pin
	x=2: CPU1: ON if the FSK pin is 0, CPU2: ON if the FSK pin is 1
	x=3: both CPU1, CPU2: blinks fast (50ms ON, 50ms OFF)
U1xx	Send xxh via the Second Serial Port
I	Print firmware version information

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7.1. Overview

The current application available in the Demos category is the Security Demo.

7.1.1. Security Demo

The Security Demo is designed to demonstrate EZRadioPRO® used in a home/Industrial security type application. The demonstration is built upon the EZMac® protocol, and up to four nodes can join the network.

In this demonstration, the hardware can operate in both a standalone or WDS GUI-based manner.

Table 7. Supported Hardware Comments and Prerequisites

Supported Hardware		Sold with	Comments and Prerequisites
	MSC-DBSB8 With appropriate test card	SDBC-DK3	Often referred to as "the software development kit'"
			The MSC-DBSB8 is required to contain a bootloader. The bootloader was added to the PER/range demo since firmware revision 3.6r. If you are using an older version of firmware please download the updated version from http://www.silabs.com or from the WDS CDROM.
	4xxx-DKDBx		Often referred to as "a testcard"
	4xxx-T-xx x MHZ		Testcards from the newer part numbering scheme
	4432-DAELC HB with MSC-DBSB11 peripheral board (max 4 nodes are supported)	EZLC-4432 HB	**Note**: requires firmware bootloader installed. If required, updated firmware may be found on the WDS CDROM set or at http://www.silabs.com

Perform the following steps to set up the Security Demo:

Note: DO NOT CONNECT ANY HARDWARE UNTIL INSTRUCTED

1. Start WDS 3.x (build 12/17/09 or greater).
2. Screw antenna (MSC-AN50 915) on to testcard (4432-DKDB2).
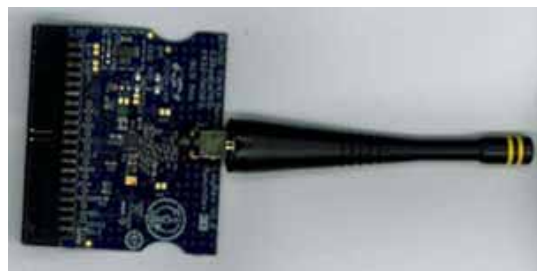
Figure 54. Antenna and Test Card

3. Plug testcard/antenna into LCD board (MSC-DBSB8).

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Figure 55. Test Card/Antenna and LCD Board

4. Connect square USB connector into LCD board (MSC-DBSB8).

Figure 56. USB Connector and LCD Board

5. Connect rectangular USB connector into spare PC USB socket.
   WDS will inform you that
   'New hardware found on Port: Com ##'.
   If not, try another USB port as the port you have selected is busy.

Figure 57. New Hardware Found

6. If your hardware/firmware is recognized, the Applications Manager will start. The menu will contain a list of applications that support your hardware.

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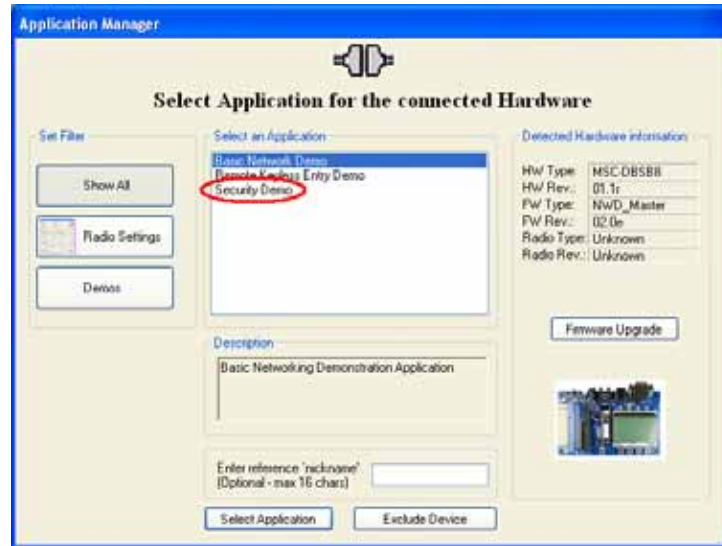
Figure 58. Applications List

7. Select Security Demo from the list, and click Select Application.

Figure 59. Application Selection

8. Select Radio version. (This step may be omitted depending on installed firmware.)
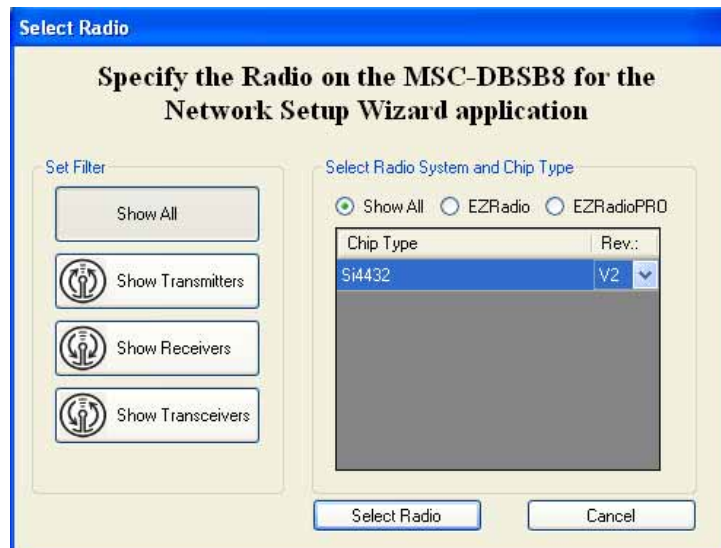
Figure 60. Select Radio Version

9. The Application Wizard will now start to prepare your hardware for the application.
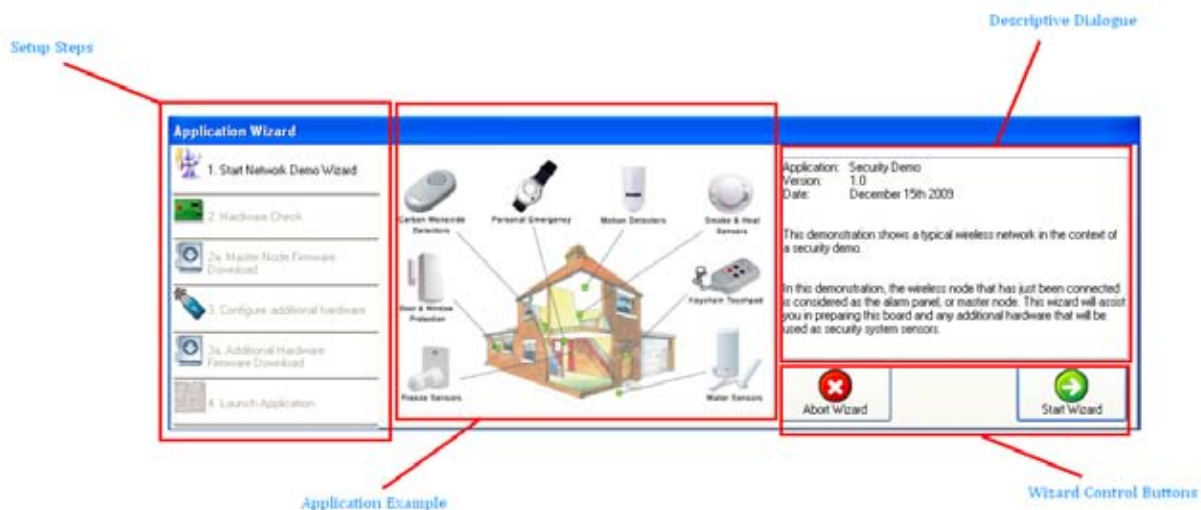
Figure 61. Application Wizard

10. Instructions for using the wizard can be seen in the top right corner of the wizard. Review the version information and ensure you are running the appropriate wizard. When ready, click Start Wizard.

11. The wizard will now review your hardware and firmware. At this point, the hardware is locking WDS to the selected application. The current hardware should no longer be removed; doing so will close the application.

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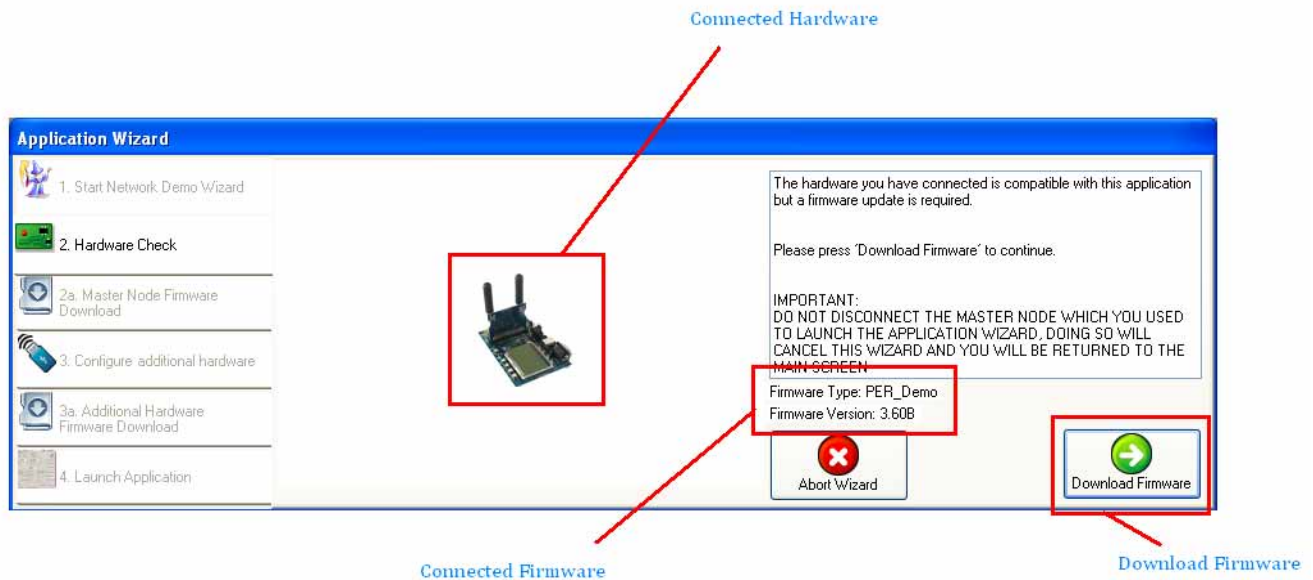
Figure 62. Application Wizard (Hardware Check)

If the firmware is incorrect for the selected application, you will be guided through the process to update the firmware by clicking Download Firmware.
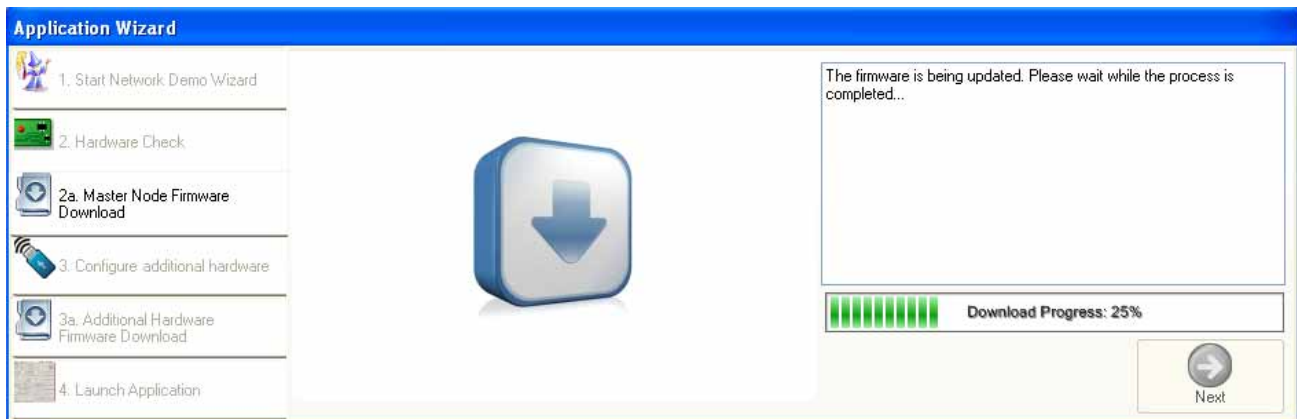
Figure 63. Application Wizard (Firmware Download)

Once complete, click Next.

12. Once the firmware is correct, you will be offered the opportunity to prepare your nodes.

Figure 64. Application Wizard (Secondary Hardware Check)

If your EZLink module contains the appropriate firmware or if you have already configured your nodes, click Skip Node Setup. If your node requires configuration, select Download Firmware.

Note: EZLink™ users: EZLink modules using revisions A0 and V2 EZRadioPRO silicon will need to manually load firmware into the microcontroller using a debug adapter. Users of modules with Rev B silicon can update the modules using the Application Wizard.

13. Once your nodes are set up and the wizard is ready to complete, you may launch the application.
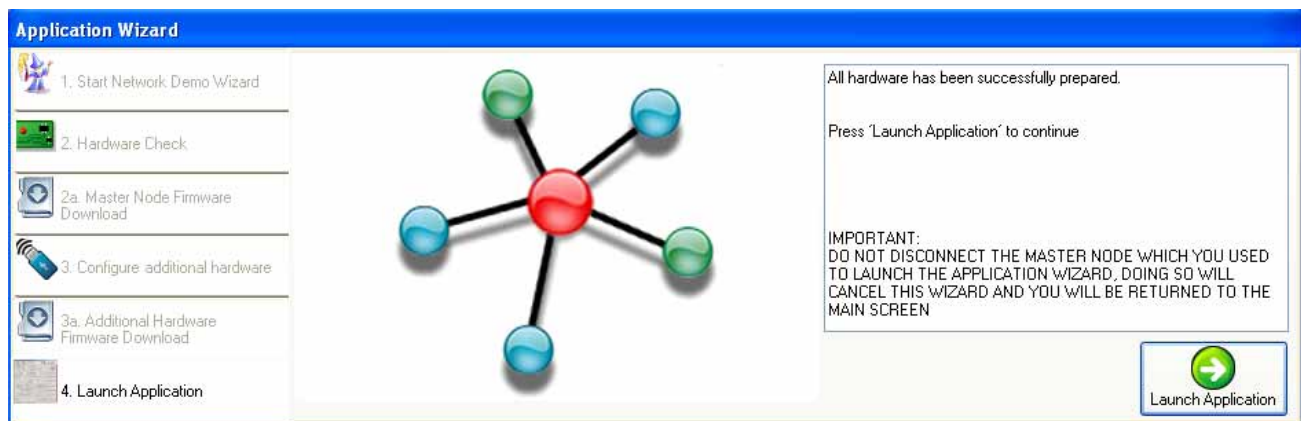
Figure 65. Application Wizard (Launch Screen)

Click Launch Application.

14. The application screen will now be displayed.
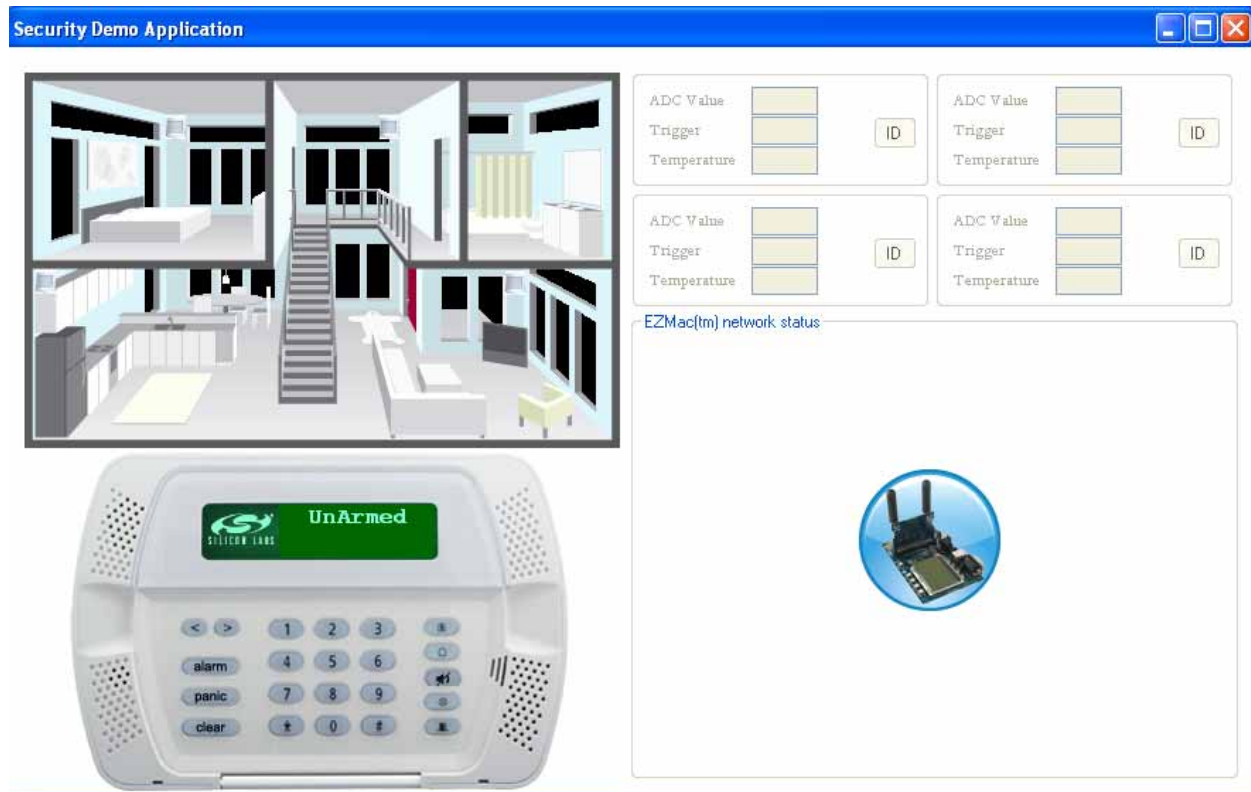
Figure 66. Application Screen Shot

To enroll the nodes onto the security network, perform the following steps:

15. On the master node, the LCD will display:

INFO
ADV. MODE
GO

Click the button below GO.

16. The LCD will update, and the menu options will change.

STATUS
ARM

Click the button below STATUS.

17. The displayed screen will show the status of all nodes. At this stage, there should be no nodes associated.

18. Click the push button on the first EZLink module. The node will request an address from the master node, and the master node will populate information for that node.
    The information will include an RSSI bar graph, temperature, and battery voltage.
    The WDS GUI will also populate for this node.
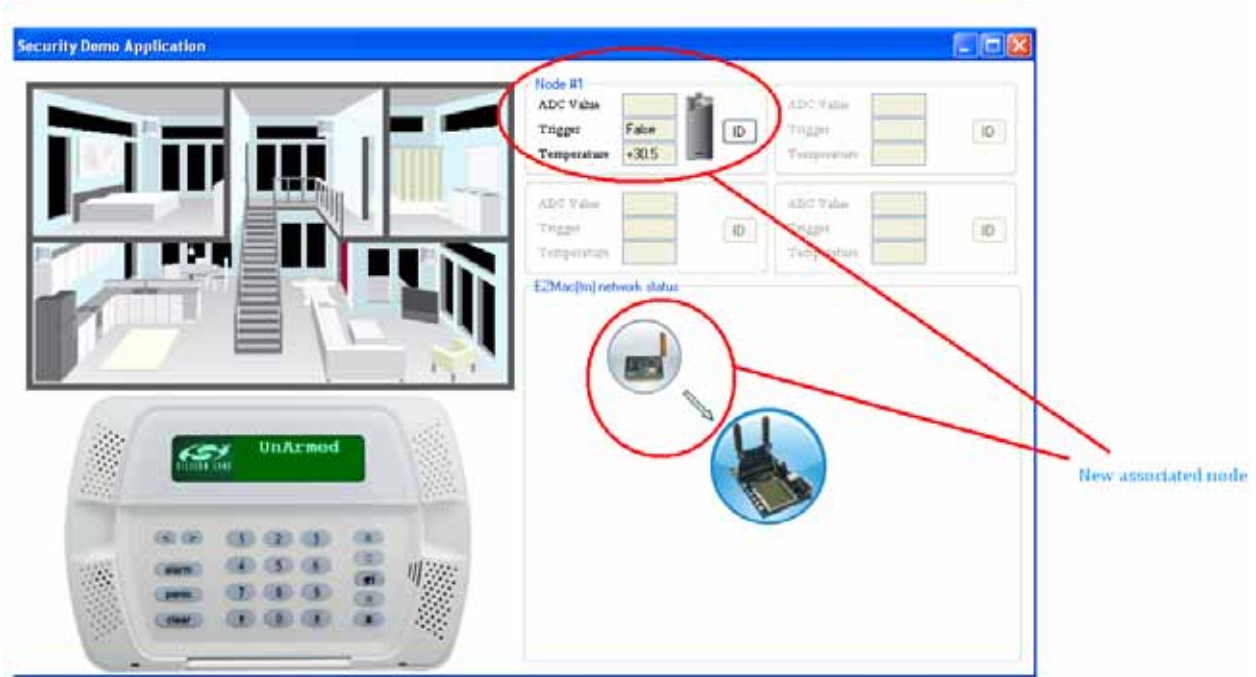
Figure 67. Associated Nodes

19. Repeat this step for up to four nodes.

Figure 68. Four Nodes

20. To arm the alarm system, two methods can be used:
    a. Click ARM on the master node
    b. Click ALARM on the GUI's alarm panel

The alarm will be armed in five seconds.

Figure 69. Alarm Armed

21. Clicking the push button on any of the sensor nodes will sound the alarm. The alarm can be silenced by either clicking the UN-ARM button on the master node or by entering the chip part number into the alarm panel in the GUI. In the case of the master node using the Si4432, the code is 4432.

Figure 70. Alarm UnArmed

22. When the alarm is triggered, a number of things will occur:
   a. The alarm will sound. A mute button exists on the alarm panel.
   b. The GUI will flash the appropriate sensor.

Figure 71. Security Demo Application

   c. The master node LCD will flash accordingly.

WDS CC-UG

APPENDIX

Icon Glossary

Table 8 lists the WDS icons and their functions.

Table 8. Icon Glossary
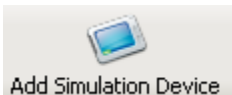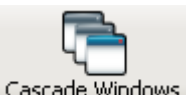
Icon	Function
Hardware Mode	Creates an instance of WDS when physical hardware is to be connected (e.g., Loadboard).
Simulation Mode	Creates an instance of WDS when "ghost" hardware is connected.
Preferences	Allows users to define their workspace environment including language and logging preferences.
Add Simulation Device	Starts Connection Manager.
Cascade Windows	When workspaces become cluttered by multiple windows, using this button will move all windows into a cascaded position.
Send Feedback	In the event that bugs are noticed or features are requested, use this button to send the WDS team an email. **Note:** This button does not operate as a technical support portal.
Supported Devices	Provides a list of currently-supported RFICs by WDS.
About	Provides information on the WDS version.
(icon)	Transmitter.
(icon)	Receiver.
(icon)	Transceiver.

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Table 8. Icon Glossary (Continued)

Icon	Function
	Shows the Register Settings Panel.
	Issues a Soft Reset to the RFIC restoring default values.
	Requests the connected hardware associated with a given panel to highlight itself (requires firmware update in earlier Loadboard 2.x).
	Load project configuration from disc.
	Save project configuration to disc.
	Instruct Loadboard to implement a voltage change.
	Instruct Loadboard to implement a voltage change.
	Measure chip current on an update. (Warning—this is a snapshot, not a continual measurement.)

Available Licences

By default, some licences are installed and enabled in WDS. Some options can be made available by adding/ enabling the following licences. Other licences may be issued by Silicon Labs on a case-by-case basis (e.g., to customers enrolled in beta programs).
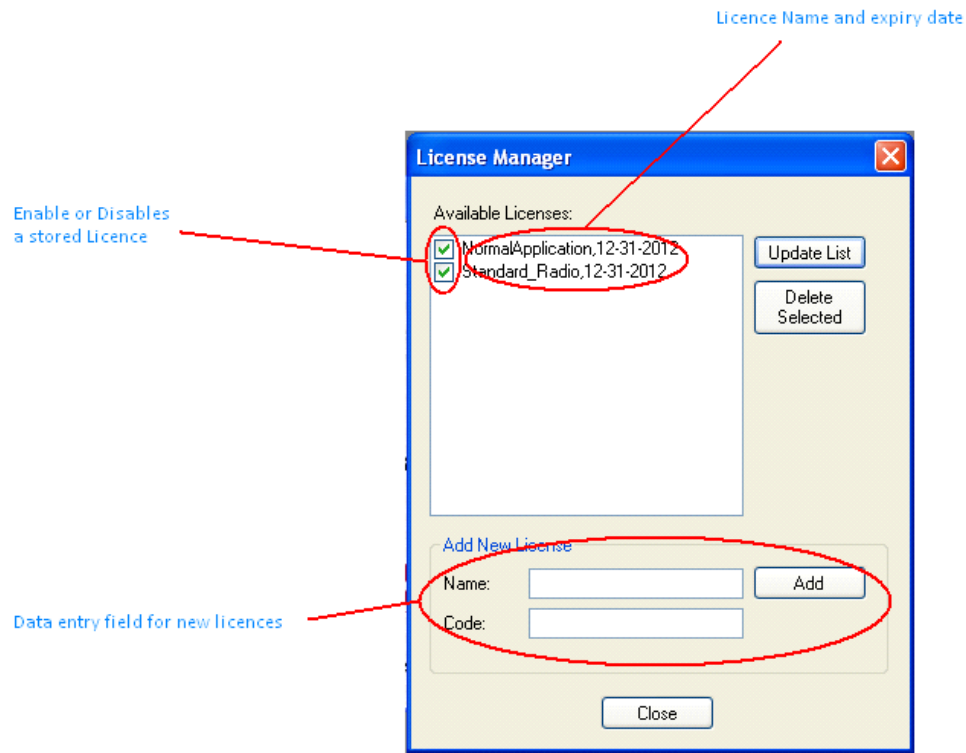
Figure 72. License Manager

Normal Application

Enable all standard release applications including (but not limited to) the following:

- Control panels
- Register setting panels
- Demo applications

Standard Radio

Enables the use of all standard release radios/revisions, such as Si4432 revision B1.

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Allow Chip Selection (Use with Care)

By default, WDS provides simulation screens based on the current chip revision (since new designs based on old silicon revisions are not recommended). This licence enables users to select different chip revisions, which may be important if customers want to perform maintenance on existing code where the register maps may be slightly different.
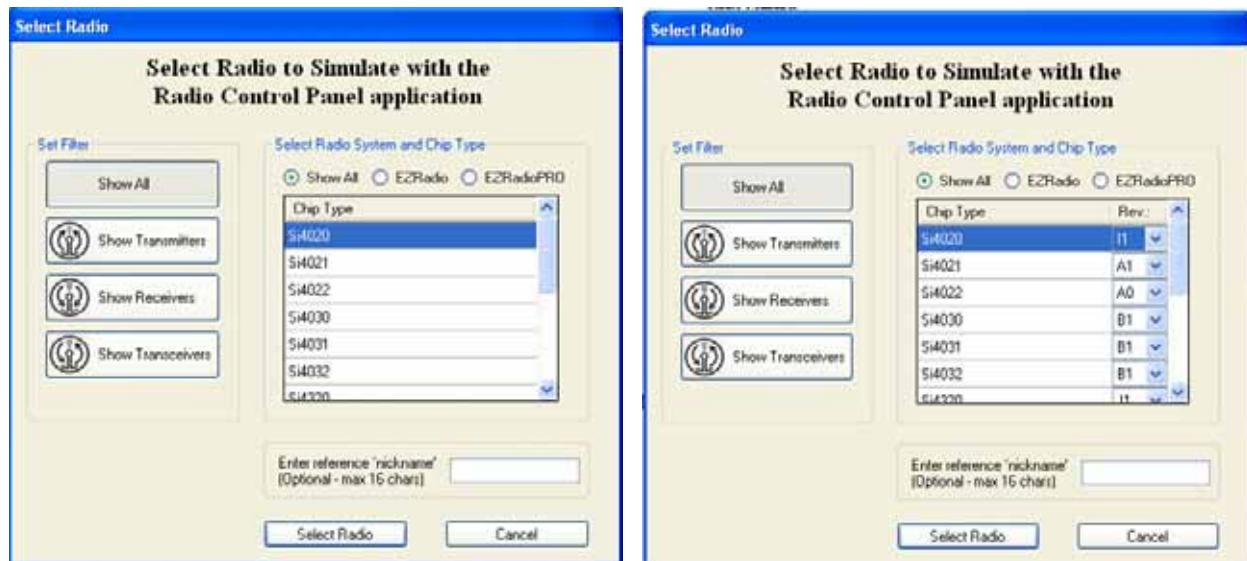
Figure 73. WDS Simulation Screens

DOCUMENT CHANGE LIST

Revision 0.1 to Revision 0.2

- Document shortened and simplified; technical experiments moved to application note.
- Added sales demo mode section.
- Added licence manager.

NOTES:

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