WirelessUSB™ N:1 Development Kit (CY3635) Release Notes v1.0

1 Purpose

The WirelessUSB™ N:1 Development Kit (CY3635) is provided to customers interested in evaluating and developing wireless multi-point to point systems using the Cypress Semiconductor WirelessUSB Radio System on a Chip ICs (CYWUSB6934 / CYWUSB6935).

2 Kit Contents

This kit includes the following items:

1	Node Board programmed with Hub firmware	Multipurpose Node Board that is programmed to be used as a Hub.
4	Node Boards programmed with Sensor firmware	Multipurpose Node Boards that are programmed to be used as a Sensor.
12	Duracell Ultra AAA Alkaline batteries	Batteries used to power the four Sensor Node Boards.
5	Dual-Antenna Radio Modules	PCB Module containing the WirelessUSB LR Radio IC (CYWUSB6935) utilizing two trace antennas for maximum range performance.
2	Serial Adapter Boards	These boards are used to convert the UART signals coming from the Node board into RS232 signal levels for communicating with a PC COM port. The boards can optionally be used to supply external power to the Node Board.
2	10-pin Serial Ribbon Cables	Cable used to connect the Serial Adapter Board to the Node Board.
2	Serial Cables	Cable used to connect the Serial Adapter Board to a PC COM port.
1	Proto Board	Prototyping board that can be connected to the expansion header of a Sensor Node board for prototyping new sensors or actuators.
1	24-pin Ribbon Cable	Cable used to connect the expansion header of the Sensor Node Board to the Proto Board.
1	Magnet	Security sensor magnet used to demonstrate the security system functionality of the kit.
1	5V DC Power Supply	Power supply used to supply power to the Hub Node Board via the Serial Adapter Board.
1	USB 5V Power Cable	Optional power supply cable used to source power from a PC or laptop USB port in order to supply power to the Hub Node Board via the Serial Adapter Board.
1	USB Serial Adapter Cable	Optional adapter cable used to connect the Serial Adapter Board to the USB port on a host PC when a COM port is not available.
1	WirelessUSB N:1 DVK CD-ROM	CD-ROM provides kit documentation, hardware information, development tools, and example software and firmware.
1	Documentation Packet	Contains select printed documentation from the WirelessUSB N:1 DVK CD-ROM

3 System Requirements

3.1 Additional Hardware Requirements

The following items are recommended for use with the WirelessUSB N:1 DVK

- PC or Laptop with an available COM port or an available USB port
- Operating Systems: Windows 98, Windows ME, Windows 2000, Windows XP.

3.2 PSoC C-Compiler License

In order to build the Hub and Sensor firmware image using PSoC Designer 4.1, you must first obtain a C-Compiler license. Please visit the Cypress online store at www.cypress.com to purchase a license.

4 Firmware Feature Set

The chart below shows this kit's default firmware features. Some of these parameters can be modified by editing the firmware source code (i.e. Throughput can be changed to 62.5kbps):

Feature	WirelessUSB N:1 DVK
Radio Support	WirelessUSB LS Radio System on a Chip
Throughput	16 kbps (64cpb DSSS mode)
Directionality	Bi-directional data and ACK
Connectivity	up to 512:1
Binding	Seeded Bind and Automatic Bind
Error Detection	Yes, XOR and CRC-16 method
Error Correction	Yes, up to 8 bits per packet
Interference Avoidance Algorithm	Yes, automatically selects new channel if channel is corrupt or unavailable

5 WirelessUSB N:1 DVK Known Issues

The following describes any known issues at the time of the release of the development kit. During evaluation of this kit, if you discover additional issues, please contact Cypress using the contact information provided on this kit's cover letter.

5.1 PSoC Designer Compatibility

Until further notice, please be sure to use PSoC Designer version 4.1 with Service Pack 1 and the I2C Patch Files (described in section 5.2 below). Problems have been observed when trying to use the current release of PSoC Designer 4.2 in order to build the N:1 firmware project files.

5.2 PSoC Hub Firmware Compiler Issue

There are two updated patch files that are required when using PSoC Designer 4.1.
When building the Hub firmware it is important to overwrite the PSoC library files before "generating the application". The following files must be replaced in the PSoC install files located in the Program Files directory:

- **\PSoC Designer\Data\Stdum\I2CHW\I2CHWCommon.inc**
- **\PSoC Designer\Data\Stdum\I2CHW\CY8C27\Master\MasterMstr.asm**

The updated files can be found in the **\Software\PSoC Designer 4.1\PSoC Designer Patch** Folder on the WirelessUSB N:1 DVK CD-ROM

5.3 PSoC Programming Issue

You must supply 5 volts to the Sensor Node Board when trying to program the PSoC with the stand alone CY3207 ISSP programmer. Note that the PSoC ICE-4000 does not have this limitation, and can successfully program the PSoC at 3.3V or 5V. In either case, be sure to use the "Device Reset Programming Mode", which can be selected in the PSoC Designer Project Settings dialog.

5.4 N:1 Software Application

In the Software Application's Control Dialog, pressing the Storage Rate's "Apply" button without first opening a Sensor Data Log File will cause a "Failed to open file" dialog to appear repeatedly at each recording interval. To workaround this issue, open a Sensor Data Log File by either pressing the Data Log button in to Software Application's toolbar or selecting "Capture Sensor Data …" from the File menu.

5.5 USB to Serial Adapter

Some communication issues have been observed when testing various USB to Serial adapters with the N:1 Hub. Please be aware that corrupt data may be observed if a third party USB to Serial adapter is used. The adapter that is included in the kit appears to work reliably, but is not guaranteed to function properly with all PCs and operating systems.

5.6 Power Adapter Confusion

Please be careful not to confuse the DC power supply that is included with the N:1 DVK and the power supply that is included with the PSoC development kit. They share the same size DC jack, but the PSoC ICE-4000 DC power adapter outputs 9V DC, and the N:1 DC power adapter outputs 5V DC. It is possible to damage the N:1 Node Board or Serial Adapter board if the PSoC 9V DC adapter is inadvertently plugged into the DC jack on the N:1 Serial Adapter Board since some N:1 components are connected directly to the 5V input (not through a regulator).

5.7 Windows Platform Compatibility

Comprehensive testing was performed to help ensure proper operation with Windows 2000 and Windows XP. Limited testing was performed to ensure proper operation with Windows 98 and Windows ME.

5.8 Firmware Build Options

The Hub and Sensor firmware source code contain several configurable build options. The most common options were thoroughly tested and validated. However, since there are many possible combinations of build option settings, not all configurations have been tested and validated.

5.9 Sensor Report Interval

By default, the sensors are configured to send a periodic data report to the Hub every 5 seconds. This value is configurable in the Software Application, and has been set to a relatively short duration for demonstration purposes. If a sensor is not able to communicate with the hub after a series of retransmission attempts and a channel search, then the sensor enters a lower-power state where it only attempts to re-establish communication with the Hub once every 60 seconds (this is a compile-time setting). This behavior may appear problematic to a user evaluating the demonstration, but since most real applications will utilize a much longer periodic report interval, a 60-second interval for reconnecting is a reasonable value. Note that pressing the S1 button or activating the magnetic switch will cause the Sensor to immediately attempt to communicate with the Hub.

6 CD-ROM Contents

The CD-ROM for this development kit contains the following files:

In the Root directory

- Install WirelessUSB N:1 DVK
  - This is a self-extracting installer that places a copy of all necessary files in a specified location on the user's hard drive.
  - The installer also creates a WirelessUSB program group and shortcuts to the N:1 Software Application and critical documentation.
  - The installer does not copy the following two files to the user's hard drive in order to conserve space. These items can be accessed directly from the CD-ROM:
    - PSoC Designer 4.1 installer and Service Pack 1 installer
    - Winery Application Video

- CY3635 Release Notes
  - This document which describes the overall kit contents
- readme.txt
  - Provides installer information and a directory tree of the Kit CD

In the Docs Folder:

- CY3635 User's Guide
  - Describes how to use the hardware out of the box for evaluation.
  - Describes how to build the software and firmware modules.
- CY3635 Technical Reference Manual
  - Describes detailed firmware, software, and hardware design.
- N:1 Parameter Selection Tool
  - Spreadsheet used to select and evaluate critical system parameters
- WirelessUSB Listener Tool Getting Started
  - Introductory guide to using the WirelessUSB Listener
- CY3635 Software License Agreement
- Data Sheets Folder
  - CYWUSB6935 Datasheet
    - WirelessUSB LR Radio System on a Chip Datasheet
  - CYWUSB6934 Datasheet
    - WirelessUSB LS Radio System on a Chip Datasheet
  - CY8C27443 PSoC Datasheet
    - Chip datasheet for the Programmable System on a Chip (PSoC) device.
- Application Notes Folder
  - WirelessUSB LS Theory of Operation
    - Describes the general theory of operation for WirelessUSB LS.
  - WirelessUSB LS 1-Way HID Systems
    - Describes the HID protocol used for unidirectional communication with WirelessUSB LS.
  - WirelessUSB LS 2-Way HID Systems
    - Describes the HID protocol used for bi-directional communication with WirelessUSB LS.
  - WirelessUSB LS Interference Avoidance
    - Describes logic utilized to avoid sources of interference
  - WirelessUSB LS Radio Module ETSI Testing
    - Information regarding ETSI testing and verification for WirelessUSB
  - WirelessUSB LS Radio Module FCC Testing
    - Information regarding FCC testing and verification for WirelessUSB
  - WirelessUSB LS Firmware Tips and Tricks
    - Various recommendations when designing with WirelessUSB
  - WirelessUSB Managing Power
    - Describes methods for optimizing power consumption in battery operated wireless devices.
  - WirelessUSB Maximizing Range
    - Describes techniques and considerations for maximizing the range of a wireless system.
- Video Folder
  - Winery Application Video
    - Video showing an example application utilizing the N:1 DVK for temperature control of a vineyard.
    - Note that the CD installer does not load this file onto the user's hard drive.
  - Winery Information
    - Document describing the WirelessUSB N:1 winery application shown in the video.

In the Firmware Folder:

- Binaries
  - PSoC Hex images for the firmware pre-programmed on the node boards
- Source
  - Hub
    - Firmware source code for the Hub
  - Sensor
    - Firmware source code for the Sensor

In the Hardware Folder:

- LR Radio Micro Module
  - Schematics (Orcad 9.2 / PDF), Bill of Materials (PDF), and Gerbers (ZIP) for the LR Radio Micro Modules (PDC-9192).
- Node Board
  - Schematics (Orcad 9.2 / PDF) and Bill of Materials (PDF) for the Node Boards (PDC-9178). Note that the Hub and Sensor Node boards are identical from a hardware standpoint. They are simply pre-programmed with different Firmware images.
- Proto Board
  - Schematics (Orcad 9.2 / PDF) and Bills of Materials (PDF) for the Prototyping Board (PDC-9181).
- Serial Adapter Board
  - Schematics (Orcad 9.2 / PDF) and Bills of Materials (PDF) for the Serial Adapter Board (PDC-9182).
- Example Applications
  - Schematics (Orcad 9.2 / PDF) and Bill of Materials (PDF) for the following applications:
    - Wireless Thermostat*
    - Wireless Security Sensor*
    - Simple Hub*

    *Note that these are examples only. They are not fully tested designs. They are intended to indicate what components are typically required for these types of applications.

In the Software Folder:

- Nto1 Software Application Folder
  - Software Application Executable
    - Executable program for the N:1 Sample Software Application
  - Source
    - N:1 Software Sample Application source code
- PSoC Designer™ v4.1 Folder
  - Cypress MicroSystems PSoC Designer™ v4.1 **
    - Development environment used for generating PSoC applications and compiling PSoC firmware.
    - Note that a C-compiler license must be obtained separately.
  - PSoC Designer v4.1 Service Pack 1 **
  - Patch files to fix I2C issues in PSoC Designer v4.1

  ** Note that the CD installer does not load these files onto the user's hard drive.
- In the Listener Tool Folder
  - WirelessUSB Listener Application Program
  - WirelessUSB Listener Driver