

Using boards from TI's CC2430/2431/2520/2530 Kits with the Daintree Networks Sensor Network Analyzer

Application Note AN010



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Sensor Network Analyzer Release 3.0 (2009-05-05)

About the Sensor Network Analyzer

The Daintree Networks Sensor Network Analyzer (SNA) combines a powerful protocol analyzer with network visualization, measurements and diagnostics for IEEE 802.15.4™ and ZigBee® applications. It provides automatic display of network formation, topology changes, and router and coordinator state changes allowing rapid detection of incorrect network behavior and identification of device or network failures.

With Release 3.0 and newer, the SNA provides decode and analysis support for additional protocols including SimpliciTI, ZigBee RF4CE and 6LoWPAN.

The SNA works in conjunction with Daintree's 2400E Sensor Network Adapter to provide analysis for small and large networks. With multi-node capture, analysis of large networks across wide areas (such as multiple rooms within a facility) is possible.

The SNA application is also compatible with the following TI boards:

- From the CC2430 DK/ZDK: CC2430DB and the SmartRF04EB with CC2430EM.
- From the CC2431 DK/ZDK: CC2431DB and the SmartRF04EB with CC2431EM.
- From the CC2520 DK/ZDK: SmartRF05EB with CC2520EM.
- From the CC2530 DK/ZDK: CC2531 USB dongle and the SmartRF05EB with CC2530EM.

Any of these boards can be used as a packet sniffing node. No additional hardware is required.

Note that many of the above boards are also available for individual purchase from TI. Check the TI web site at www.ti.com/zigbee for details.

This application note describes how to use the SNA software with the above boards. You can find out more about the SNA software in general, refer to the following:

- **Quick Start Guide:** Included with the SNA application. From the SNA **Help** menu, select **Quick Start Guide**, or else from the Windows **Start** menu, select **Daintree Networks > Documentation > SNA Quick Start Guide**.
- **User Guide:** Included with the SNA application. From the SNA **Help** menu, select **User Guide**, or else from the Windows **Start** menu, select **Daintree Networks > Documentation > SNA User Guide**.
- **FAQs and other support resources:** These are available from the Daintree Networks web site at www.daintree.net/support

To find out more about the TI kits and boards and TI's ZigBee offerings in general, visit the Texas Instruments web site at www.ti.com/zigbee

Getting started

In summary, getting started involves the following steps, each of which is described in detail in the following sections:

1. Install the Sensor Network Analyzer software
2. Install the TI software and connect the board to your PC via USB.
3. Start the SNA software, and then add the TI board as a capture device.
4. Select the TI board as the current capture device.

Once connected and configured, you can use the TI board as a packet sniffer/capture node with the Sensor Network Analyzer.

1. Installing the SNA software

1. Go to www.daintree.net/register to register your software and download the latest release.
2. Enter your email address together with the 15-digit alpha-numeric registration code from the software CD case. After you click Next, an activation code will be emailed to the address you supply.
3. Follow the link provided to download the latest release of the SNA software, plus the *Sensor Network Analyzer Quick Start Guide*. Daintree **strongly** recommends that you download the latest version of the software to ensure you have the latest functionality and fixes.
4. Follow the instructions in the *Quick Start Guide* to install and activate the software.

2. Installing the TI software and connecting the board to your PC

1. Use a USB cable to connect the USB port of the TI board to the USB connector of your PC. (Or in the case of the CC2531, simply plug the dongle directly in to the PC's USB port.) Note that the packet sniffer software is not supported over the serial port.

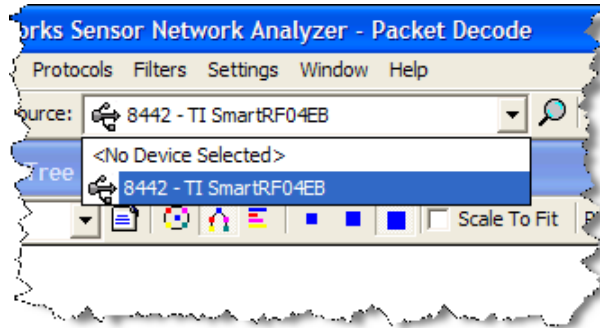



The first time you connect this board to your PC, a Found New Hardware wizard will open.


2. To install the drivers for the TI hardware,
 - o For the CC2430, CC2431, CC2520 and CC2530 boards, select to **Install the software automatically**, and then click **Next**.
 - o For the CC2531 USB dongle, select to install the driver files from the Daintree **Networks/Drivers/Chipcon/CEBAL** directory, and then click **Next**.

3. Selecting the TI board as the current capture device

1. In the SNA main window, select the required TI board or dongle from the **Source** list:
 - A CC2430DB board will be shown as **CC2430DB**
 - A CC2431DB board will be shown as **CC2431DB**
 - A CC2531 USB dongle will be shown as **CC2531 USB Dongle**
 - SmartRF04EB + CC2430EM or CC2431EM board will be shown as **TI SmartRF04EB**
 - SmartRF05EB + CC2520EM or CC2530EM board will be shown as **TI SmartRF05EB**




If the TI device is not available from the list, click  to get the SNA software to search/scan for capture devices and refresh the Source list.

2. Select the **Channel** on which you want to capture traffic.
Click  to start the capture.

Notes and limitations

While the TI board is in use by the SNA, it cannot be used concurrently by any other application. Similarly, if the board is in use by one of the TI applications, it cannot be used by the SNA.

If the TI board is not detected by the SNA the first time it is connected to the PC via USB, try disconnecting and then reconnecting it. Then click  to refresh the list of available capture devices. If it still is not detected, use the TI Packet Sniffer software or SmartRF Studio software to verify that the TI board is correctly connected and configured. (See the TI User Manual for instructions.)

If the SNA displays an error message saying that a device's firmware needs to be updated, follow the instructions that came with the TI kit to upgrade the firmware for the board or dongle. Firmware files are provided with the SNA software (in the Daintree Networks\Firmware\TI directory):

- fw_cc2430_802_15_4.hex (for the CC2430 and CC2431)
- sniffer_fw_cc2530.hex (for the CC2530)
- sniffer_fw_cc2531.hex (for the CC2531)
- srf05eb-fwid0500.hex (for the SmartRF05EB)

If multiple TI boards are connected, it may be difficult to identify which board is which, and which is the required capture node. A trial and error approach is required. Note that this is not a problem with the SmartRF05EB boards, which show the ID from the bottom of the board.

Where to next?

We recommend that you start exploring the SNA menus to get an understanding of the full capabilities of this product.

Detailed descriptions of all options are available in the *Sensor Network Analyzer User Guide*, which you can open from the SNA **Help** menu and the Windows **Start** menu. You can also find FAQs and other supporting information on the Daintree web site at www.daintree.net/support

Daintree's *Introducing the SNA* guide provides a high-level overview of the most common operations. This guide is available from the Daintree web site at www.daintree.net/support/doco.php

The Daintree web site includes other useful information, such as

- www.daintree.net/solutions for product information including data sheets and an animated tour
- www.daintree.net/purchase to purchase Daintree products online
- www.daintree.net/contact to contact the Daintree sales or support teams