AN3406
Application note

Using an STM32W108-based board and Wireshark for IEEE 802.15.4 packet analysis

1 Introduction

This document describes a PC software application that interfaces STM32W108-based boards with Wireshark for capturing and displaying IEEE 802.15.4 traffic at 2.4 GHz.

This application requires the use of a compatible IEEE 802.15.4 board to interface with Wireshark as an over-the-air protocol analyzer or packet sniffer.

Wireshark is a complete open-source network protocol analyzer, widely used for troubleshooting, analysis, development and education. It enables you to inspect hundreds of protocols, including IEEE 802.15.4 and most related upper-layer protocols, such as Zigbee and 6LoWPAN.

Contents

2 Prerequisites

- PC with at least one USB 1.1 port
- Windows XP™ or more recent.
- Any of the compatible boards equipped with STM32W108 microcontroller:
    - MB851
    - MB950
    - MB951
    - MB954

    These are provided in the following kits:
    - STM32W108xx starter kit (part number: STM32W-SK)
    - STM32W108xx extension kit (part number: STM32W-EXT)
   - STM32W108xx low-cost RF control kit (part number: STM32W-RFCKIT)

    Make sure also you have appropriate FTDI drivers installed if your board is equipped with FTDI device. The FTDI drivers can be downloaded from http://www.ftdichip.com/Drivers/D2XX.htm.
- Wireshark 1.4.3 or later. The latest release can be downloaded from www.wireshark.org.
- Installer file: STM32W108-WiresharkServer-1.0.0-Setup.exe, which can be downloaded from http://www.st.com.

3 Application block diagram

The following diagram shows the relationship between the hardware and software components required to capture and analyze packets.

Figure 1. Relationship between the hardware and software components
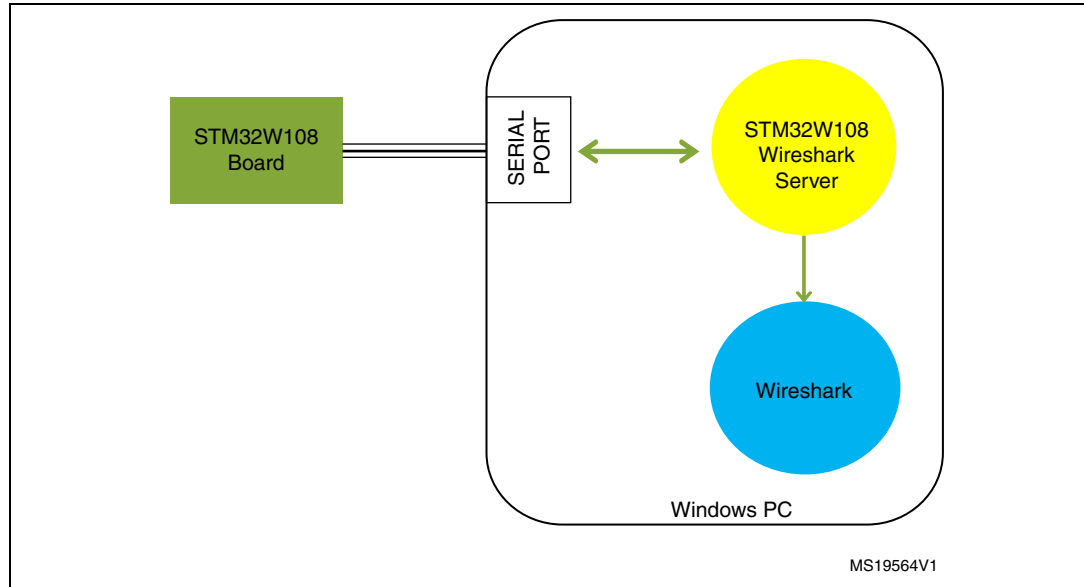
A board equipped with the STM32W108 microcontroller is connected with the user's PC via a USB cable. The board enumerates itself as a virtual serial COM port. The STM32W108 Wireshark virtual server is a sort of glue between this sniffing board and Wireshark. Its primary task is to send commands to the sniffing hardware and read captured packets from it. It also delivers these packets to Wireshark through a named pipe.

The STM32W108 Wireshark server can also flash STM32W108-based boards with the appropriate firmware for capturing packets.

4 Installing software

4.1 Installing Wireshark

Download and install Wireshark if it is not already installed on your system. You can also install it later, but you will not be able to view captured packets until it is installed.

The setup can be downloaded from www.wireshark.org. Use at least version 1.4.3. We recommend using the most recent release, with the most recent bug fixes and protocol updates.

4.2 Installing the STM32W108 Wireshark server

Launch STM32W108-WiresharkServer-1.0.0-Setup.exe to install the virtual server used to interface between the STM32W108-based board and the Wireshark packet analysis utility.

5 Installing sniffing boards

This application requires the use of an IEEE 802.15.4 transceiver, such as the STM32W108-based boards, to capture packets sent over-the-air.

5.1 Plugging in the board

Plug the board into one of the USB ports of your PC. When LED D1 blinks every second, this indicates that correct firmware has been programmed in the board. If not, make sure that the board is powered on and is programmed with the correct firmware (see *Section 5.2* for how to upload the binary onto the board).

Install the appropriate drivers for the board you are using in order to communicate with the PC (see *Section 2: Prerequisites*).

5.2 Programming the board as a sniffer

1. If the board is not preprogrammed, flash the correct firmware into the device.

   To do this, use the built-in device programmer: launch the STM32W108 Wireshark server utility and select **Tools** > **Flasher**.

Figure 2.   STM32W108 Wireshark server utility

2. Choose the COM port that identifies the device you want to flash with the sniffer firmware and press the Flash button.
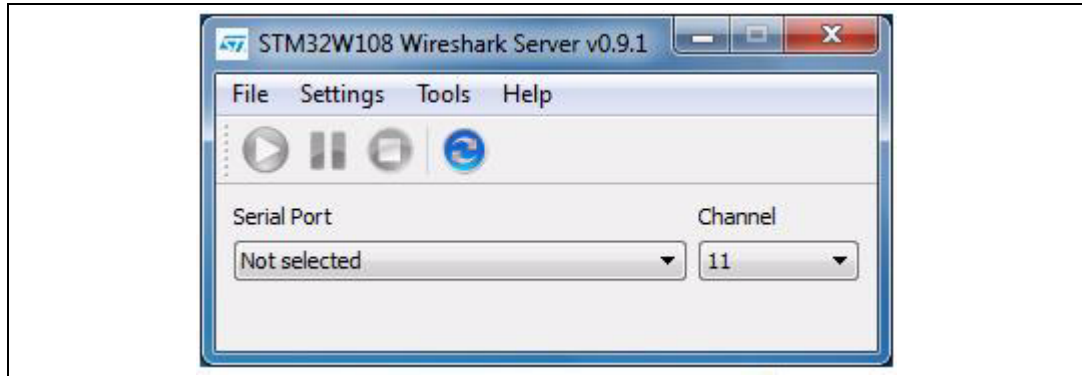
Figure 3.

A blinking LED indicates that the device is flashed successfully.

6 Virtual sniffer server

A sniffing server is needed to capture data with the boards and show them in Wireshark.

Figure 4 shows the main window of the program.

Figure 4. Wireshark main window


Toolbar icons let you control the capturing process.

	START	Start a new live capture, reading from the selected device and listening on the selected channel. Wireshark is opened. If the process is paused, it will be resumed.
	PAUSE	Suspend the current capture process. Press START to resume.
	STOP	Stop the running live capture. Press START to start a new live capture and a new instance of Wireshark.
	REFRESH	Detect compatible devices attached to your PC.

● Serial port box shows you all compatible devices found in your system. If you plug a board when the software is already started, click Refresh icon in the toolbar to update its content.

● Channel box lets you change the IEEE 802.15.4 channel from which you want to capture packets.

6.1 Packet capturing

1. Launch the sniffer server by double-clicking the shortcut on your desktop, or from the Start menu. The main window of the program displays (see *Figure 4*)[a].

2. Choose one of the devices from the serial port combo box, and your desired IEEE 802.15.4 channel from the Channel box.

3. Click START. Wireshark opens and packets are shown inside its live capture window (see *Figure 5*).

4. You can change the channel before starting the capture, or while it is already running. You can also:

   – suspend the capture by clicking PAUSE

   – resume the capture by clicking START

   – terminate the capture by clicking STOP

Note: *If capturing is stopped from Wireshark, you cannot restart a new capture from Wireshark itself. You have to stop and launch a new capture process from the server.*

Figure 5. Packet capturing

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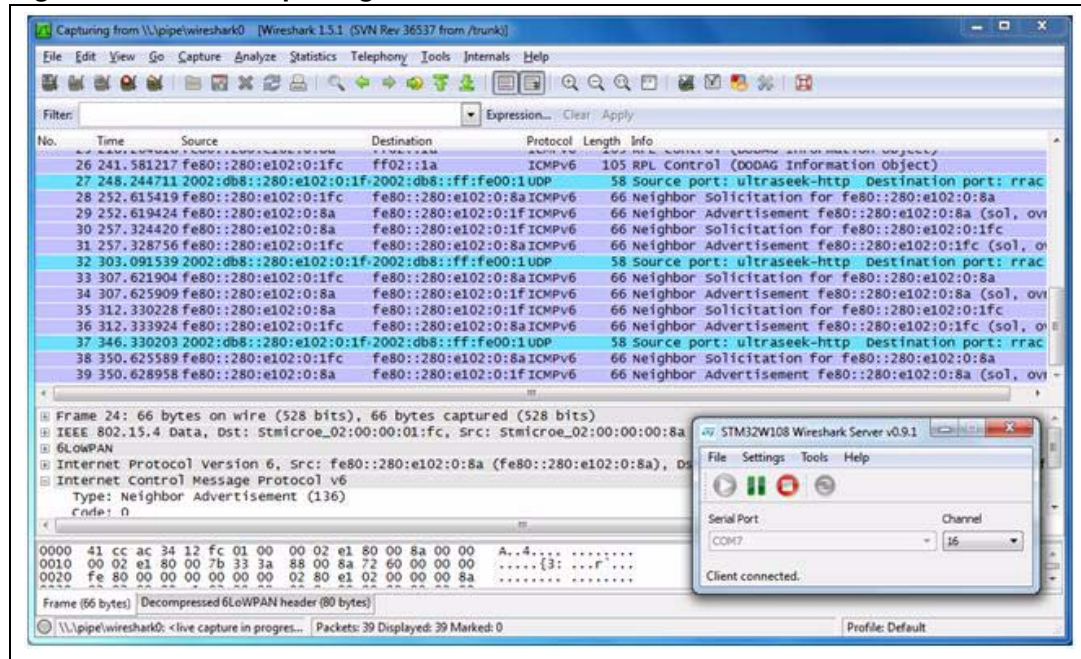
a. The program tries to detect if Wireshark is installed during startup. If Wireshark cannot be detected the correct path can be specified under **Settings** > **Preferences**

7 Revision history

Table 1.   Document revision history

Date	Revision	Changes
26-May-2011	1	Initial release.

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