AT32F407/437 LWIP FreeRTOS

Introduction

This sample code demonstrates how to run the LwIP protocol stack on FreeRTOS and build an UDP echo server.

Applicable products:

Part number	AT32F407xx
	AT32F437xx

List of peripherals:

Main peripherals	EMAC
	GPIO
	USART

1 Application method

1.1   Hardware requirements

1)   LED2/LED3

2)   USART1(PA9/PA10)

3)   AT-START-F407/ AT-START-F437 evaluation board

4)   Ethernet cable

1.2   Software requirements

1)   APP_Release

- Network debugging assistant

2)   SourceCode

- at32f407_freertos/ at32f437_freertos source code

- FreeRTOS source code

- LWIP source code

- AT32 driver library

3)   Doc

- SC0082_AT32F407_437_LWIP_FreeRTOS_V2.0.2

*Note: All projects are built around keil 5. If users want to use them in other compiling environments,
please refer to AT32F407_Firmware_Library_V2.x.x/project/at_start_f407/templates (IAR6/7, keil
4/5) for a simple change.*

1.3   Example of application

1)   Open the at32f407_freertos/ at32f437_freertos source code, compile and then download to the
evaluation board;

2)   Configure the IP address segment of the PC to be the same as that of the evaluation board, as
shown in Figure 1;

3)   Open the network debugging assistant, and enter the local and remote IP addresses;

4)   Enter the string to be sent; then the evaluation board receives the string and transmits the
same content to the host, as shown in Figure 2;

In daily application, this routine realizes hot swap and calls *ethernetif_set_link* function to perform
corresponding LWIP processing on the network connection status.

Note: To meet PHY clock accuracy requirements of different PHY chips,

1.   The PHY is independently clocked by external crystal oscillator;

*2.   If the PHY chip clock frequency is required to be 25 MHz, the MCU can use a 25 MHz crystal oscillator,
and then output to PHY through MCO pin (one crystal oscillator can be saved through this method).*
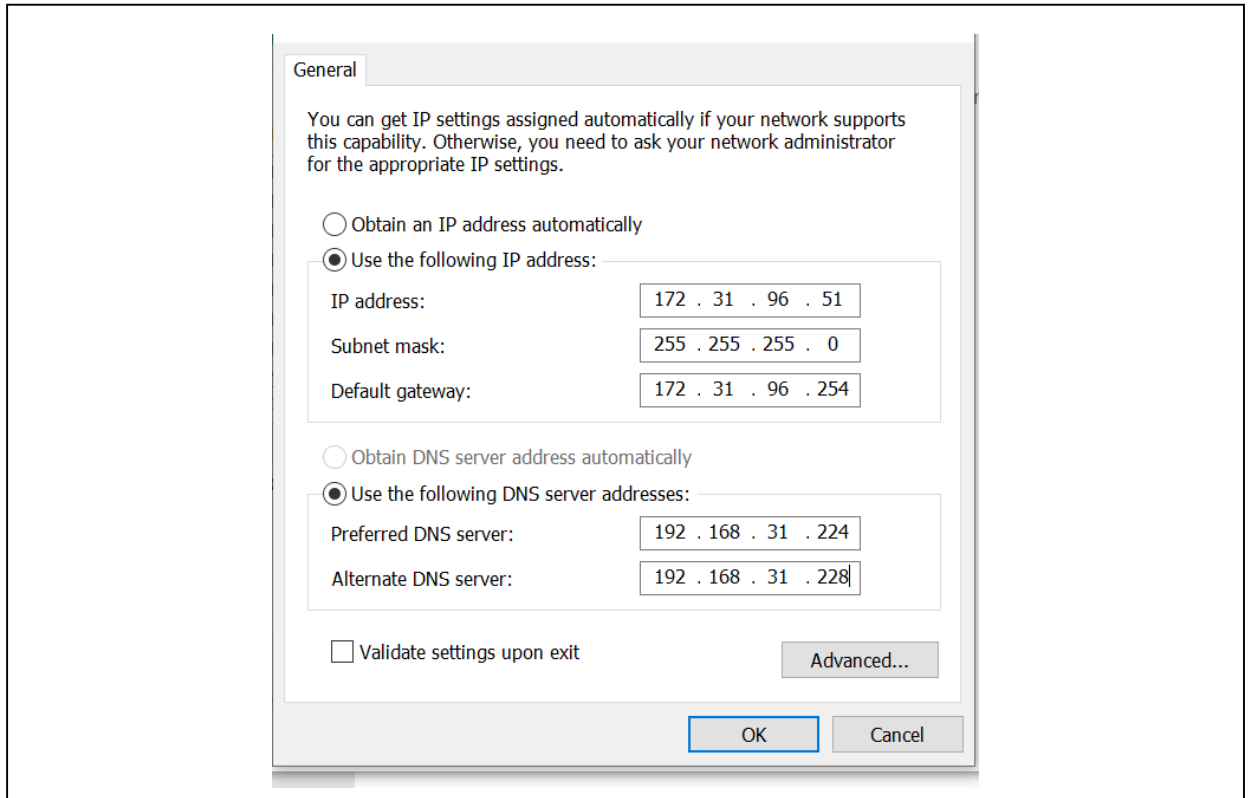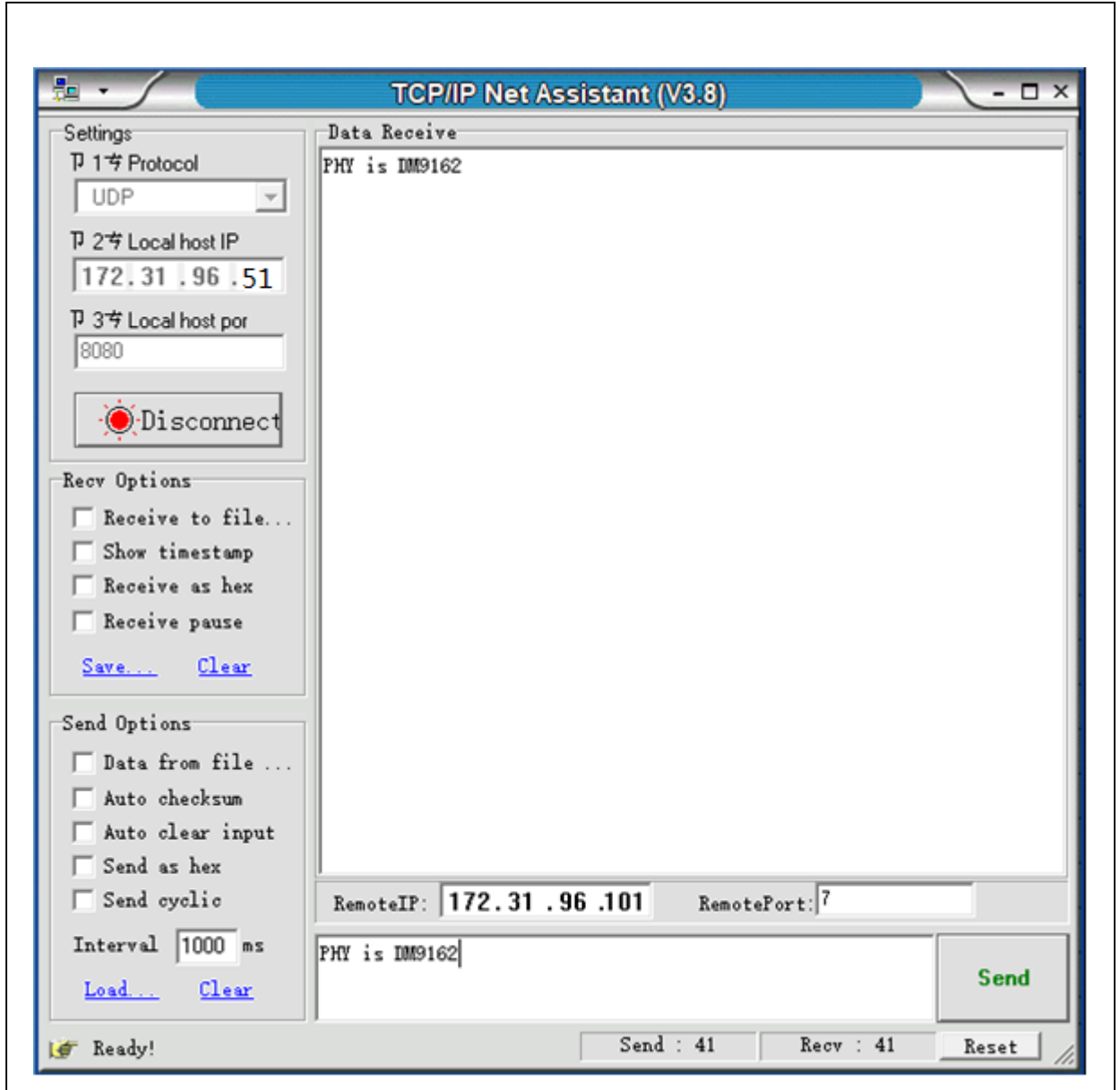
Figure 1. Set PC network segment

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

◯ Obtain an IP address automatically

◉ Use the following IP address:

IP address:	172 . 31 . 96 . 51
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	172 . 31 . 96 . 254

◯ Obtain DNS server address automatically

◉ Use the following DNS server addresses:

Preferred DNS server:	192 . 168 . 31 . 224
Alternate DNS server:	192 . 168 . 31 . 228

☐ Validate settings upon exit

Advanced...

OK   Cancel

Figure 2. Host sends a string and receives feedback from evaluation board

2 Revision history

Table 1. Document revision history

Date	Version	Revision note
2022.03.24	2.0.0	Initial release.
2022.04.15	2.0.1	1. Rectified the print warning during LWIP operation; 2. Added network connection status detection feature.
2022.10.20	2.0.2	Rectified the problem of data sending and receiving lag.

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