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LPC54608 TCP Socket example with emWin

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Document information

Info	Content
Keywords	LPC54608, TCP Socket, ADC, LED, Ethernet, emWin
Abstract	This technical note gives an overview of a bare metal example shows TCP server and clients connecting on a custom port and exchanging ADC data and LED controls over the Ethernet network and displaying the information on the LCD display using emWin graphics.

Revision history

Rev	Date	Description
1.0	20170907	Initial version.

Contact information

For more information, please visit: http://www.nxp.com

1. Introduction

The LPC5460x is a family of ARM Cortex-M4 based microcontrollers for embedded applications. LPCXpresso Development Board for LPC5460x MCUs is used in this technical note. Details of the board can be found in:

http://www.nxp.com/products/microcontrollers-and-processors/arm-processors/lpc-cortex-m-mcus/lpc54000-series-cortex-m4-mcus/lpcxpresso-development-board-for-lpc5460x-mcus:OM13092

Fig 1.   LPC54608 LPCXpresso Development Board

2. Description

The example demonstrates using raw API's of the lwIP stack to implement a custom TCP Server and Client communicating on a user defined port and protocol as a bare metal firmware i.e. no RTOS. The server receives ADC Channel 0 data (internal temperature sensor) from all the connected clients, the server can control the LED's on all the connected clients. The client receives the ADC data from the server and control the LED on the server, each client controls a different LED. The number of nodes connected, the ADC data and LED controls and LED status of the connected node are displayed on the LCD display of the LPC54608 LPCXpresso development board using emWin graphics as shown in Fig 2 and Fig 3 below.

The TCP server and client implement a custom heart beat/Keep Alive messaging, enables the dynamic detection of node disconnection and connectivity. Example supports dynamic plug and play of the nodes which is reflected on the LCD display. In

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the example the server and client are meant to be in the same network since this is a user defined protocol and the client needs to know the IP address of the server.
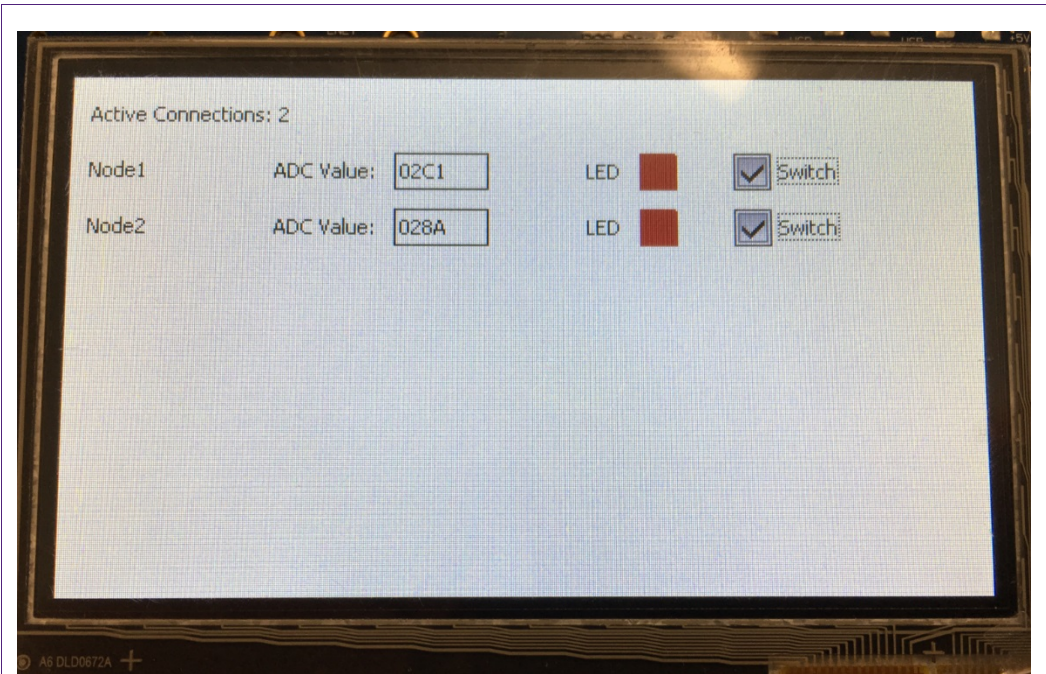

Fig 2.   GUI display on server connected to two clients
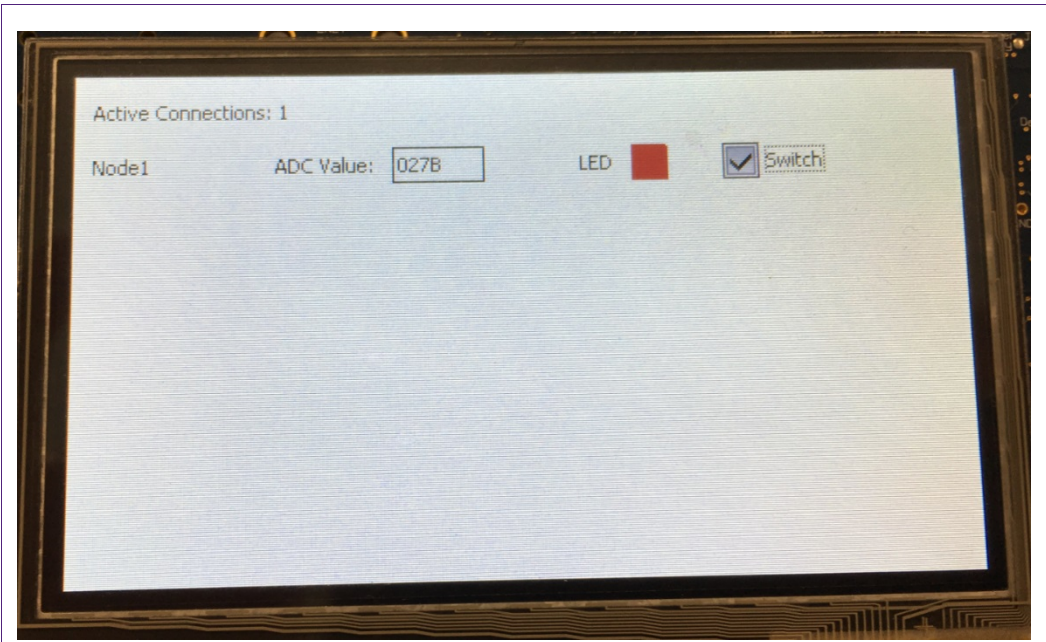

Fig 3.   GUI display on client connected to the server

The example is available in three tool chains:

- MCUXpresso IDE v10.0

- Keil MDK v5.23

- IAR Workbench v8.0

The Keil and IAR examples are found in:

lwip_tcpSocket_bm\boards\pcxpresso54608\demo_apps\lwip\lwip_tcpSocket\bm

The MCUXpresso example can be found in the zip file:

lpc54608_tcpSocket_emWin_bm_mcux.zip

3. Configuring the example

The header file app.h configures the node as either a server or one of the clients. The current implementation has the option of configuring the example as SERVER or CLIENT1 or CLIENT2. CLIENT1 and CLIENT2 option are the same except that the IP address and the MAC address are different. By choosing the right option you could compile the example as server or client and download it to the respective board.

The file app_gui.c/h contains all the necessary implementation for the GUI on the LCD display. This can be customized as per user needs.

The file tcpSocket_raw.c/h implements the custom TCP server/client protocol. The implementation in the function tcpSocket_raw_poll controls the transmission and monitoring of the heart beat/Keep Alive messages and hence detects dynamic disconnection of the connected nodes. This function also controls the transmission of the ADC data to the connected nodes. The function tcpSocket_raw_send is used to transmit TCP packets to a specific connected node.

The function process_rx_data processes the received messages and takes actions like updating the GUI and controlling the LED's. This function can be updated to change/enhance the protocol.

The function tcpSocket_checkbox_event gets called from app_gui.c whenever the checkbox state of the LED switch is changed. This function calls tcpSocket_raw_send to transmit the LED On/Off packets to appropriate node.

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6. Contents

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