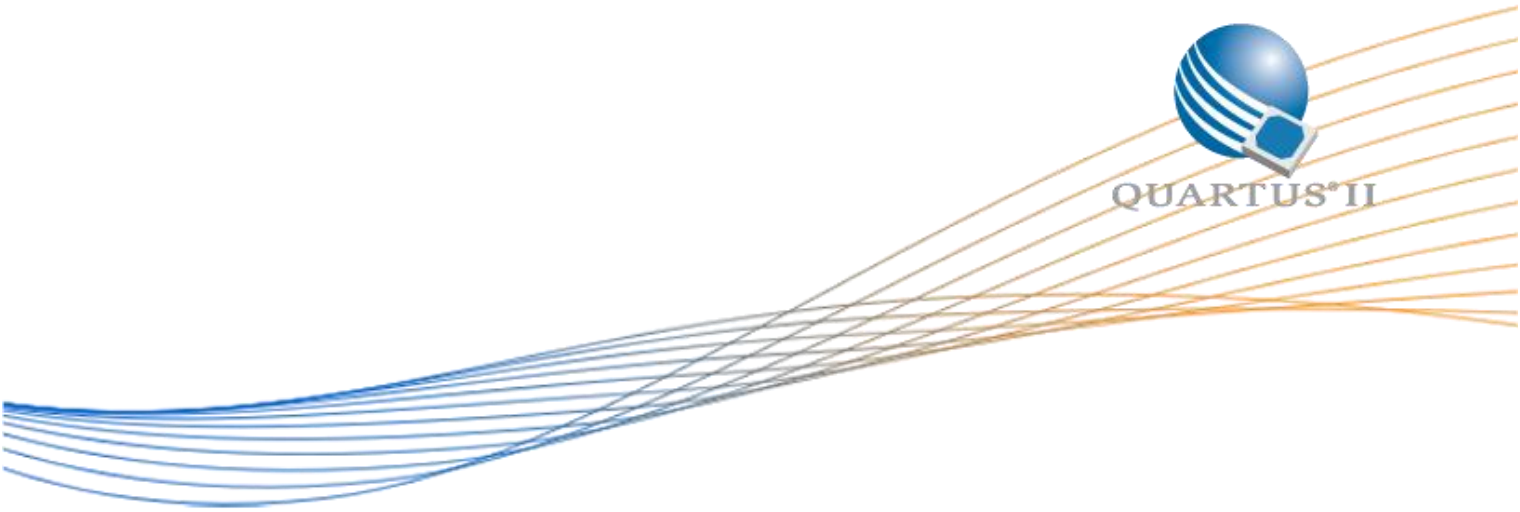

Nios II Simple Socket Server on A10 SoC Development Kit

Date: April 2018

Revision: 1.0

Contents

Overview

This design example shows a socket server using the NicheStack TCP/IP stack-Nios® II Edition on MicroC/OS-II on a Arria 10 SoC development board. The server implements simple commands to control board LEDs through a separate MicroC/OS-II task.

Tool Requirements

- Altera Arria 10 SoC Development Kit
- Quartus II software version 17.1
- Nios II Embedded Design Suite (EDS) 17.1
- Mini USB cable for programming the device

Hardware Design Specifications

Major component for hardware design:

- Nios II/f
- Onchip memory
- System timer
- System ID
- JTAG UART
- PIO
- Modular Scatter Gather DMA
- Triple-Speed Ethernet
- Transceiver PLL

Instruction for running the software

Before running the software, connect the USB blaster cable from PC to the on board mini-USB connector(J22) which is shown in Figure 1.

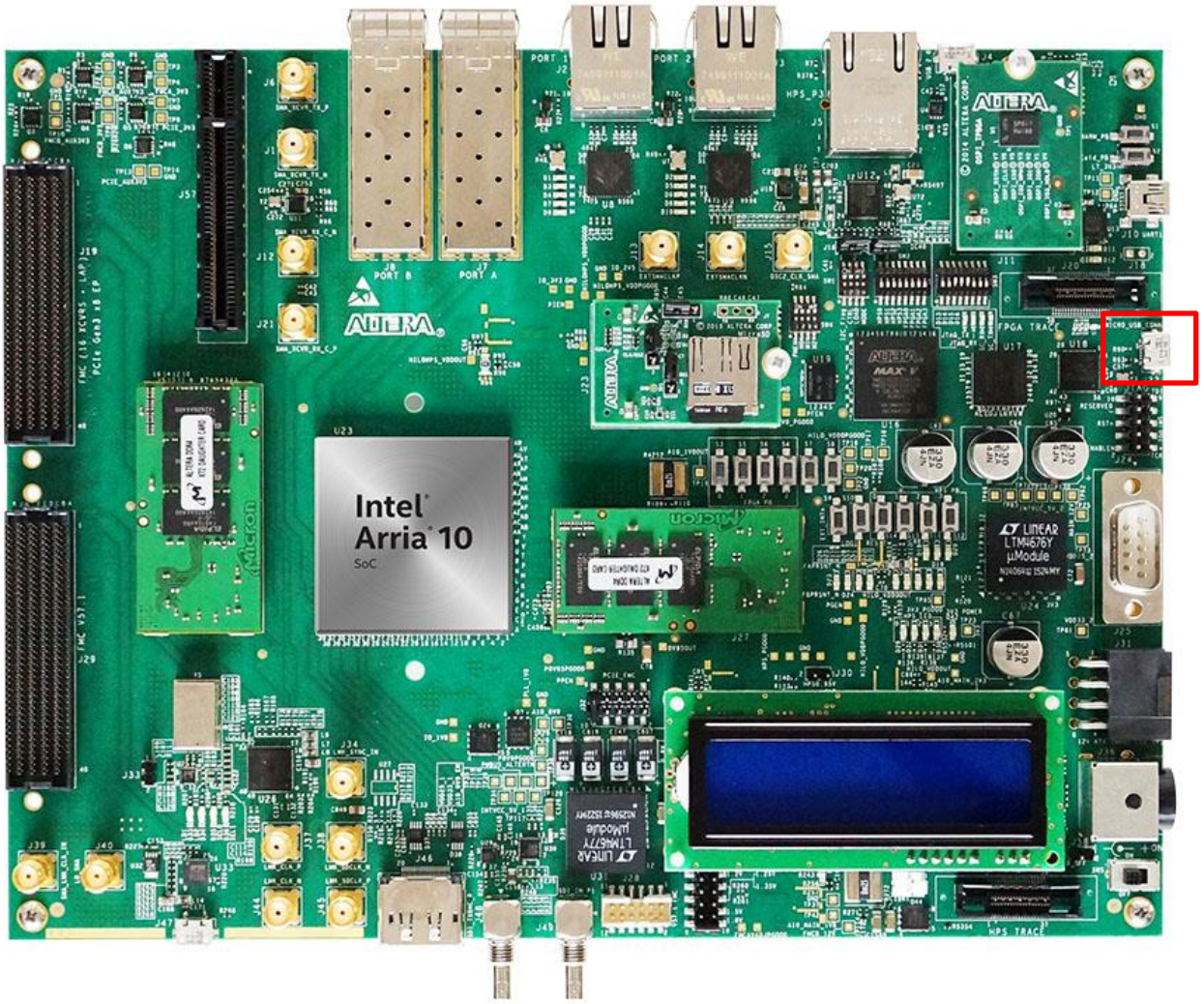

Figure 1: USB Blaster II connection location

1. Open the Quartus Programmer to program the generated .sof file to the FPGA . Master image folder provided in the project directory contain the .sof and .elf file which is ready to be downloaded to the board

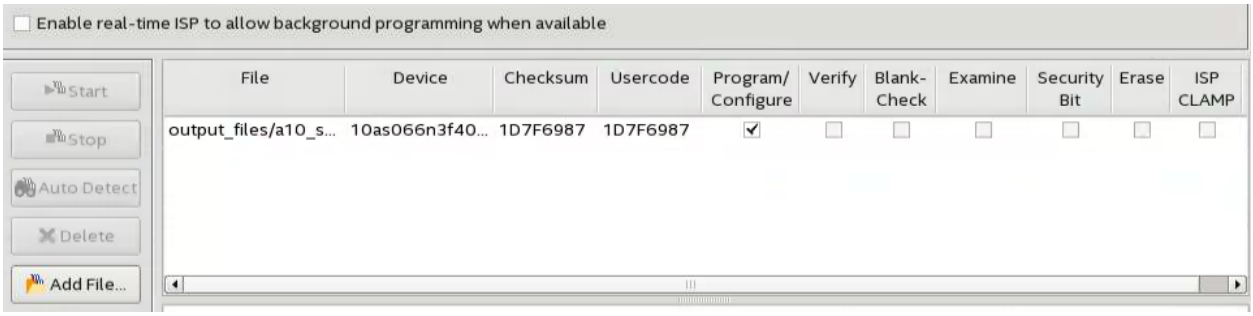

Figure 2: Quartus Prime Programmer

2. In this example, static IP is used. Hence, please make sure that you have configured your PC to have a static IP address before connected to the development kit.

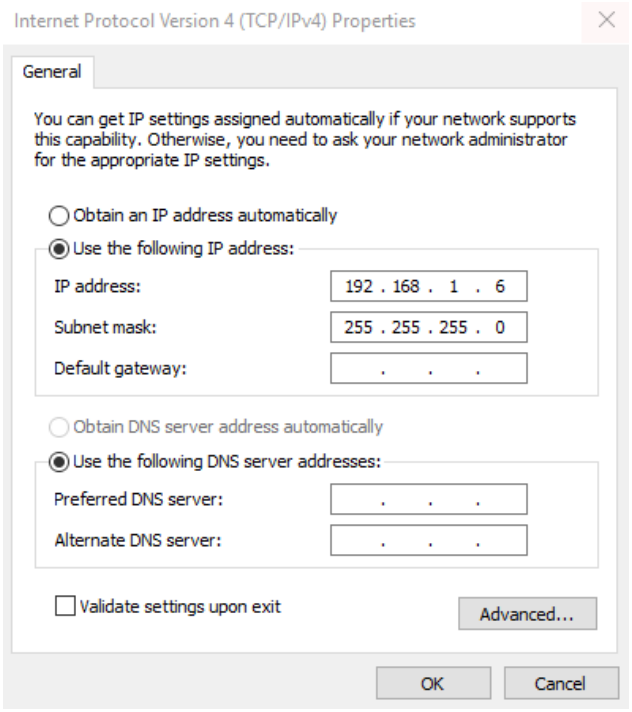

Figure 3: Setting static IP address on PC

3. Open Nios II command shell to download the .elf file and invoke the terminal by typing ***nios2-download -g a10_sss_171.elf && nios2-terminal***

```
InterNiche Portable TCP/IP, v3.1

Copyright 1996-2008 by InterNiche Technologies. All rights reserved.
prep_tse_mac 0

Can't read the MAC address from your board. We will assign you
a MAC address.

Please enter your 9-digit serial number. This is printed on a
label under your Nios dev. board. The first 3 digits of the
label are ASJ and the serial number follows this.
 -->Created "Inet main" task (Prio: 2)
Created "clock tick" task (Prio: 3)
```

Figure 4: Start up messages

4. You will be asked for the MAC address. You can simply key in any 9 digit numbers. For example: 123456789.

5. Once the simple socket server is started up successfully. You can open command prompt on your window PC and connect to the simple socket server.
   telnet 192.168.1.234 30

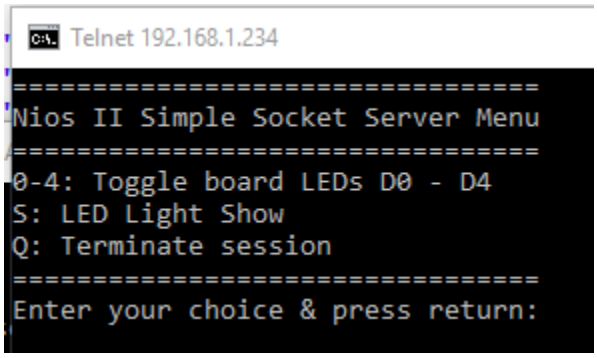

Figure 5: Messages displayed once successfully connected from command prompt

6. You can control the LED with by enter the choice from 0-4 for controlling 4 LED on the board

Hardware regeneration

You can open the Qsys system with platform designer and add/remove and modify the individual IP components within the design. After you have finished modifying the Qsys system, you can regenerate the system by clicking on “Generate HDL…”

Software regeneration

The software used in this design is based on the existing Simple Socket Server template available in Nios II Software Build Tools.

Software modification

The default Simple Socket Server Template is required to be modified to fit into different development kit hardware profile. Minor modification is done on below source and header files:

File	Modification
led.c	Update led driver to map to A10 SoC Development Kit hardware
simple_socket_server.c	Update text printing on terminal
simple_socket_server.h	Enable Static IP address

After you generate the Simple Socket Server template from Nios II Eclipse, you should replace the default .c and .h files with the files provided with this design example located in <project directory>/software/src folder, and regenerate the .elf file.

The figure below shows how to change the IP address assignment in the file “simple_socket_server.h”

simple_socket_server.h

```
104  * Default IP addresses are set to all zeros so that DHCP server packets will
105  * penetrate secure routers. They are NOT intended to be valid static IPs,
106  * these values are only a valid default on networks with DHCP server.
107  *
108  * If DHCP will not be used, select valid static IP addresses here, for example:
109  *           IP: 192.168.1.234 (default 0.0.0.0)
110  *      Gateway: 192.168.1.1 (default 0.0.0.0)
111  *  Subnet Mask: 255.255.255.0
112  */
113 #define IPADDR0   192
114 #define IPADDR1   168
115 #define IPADDR2   1
116 #define IPADDR3   234
117
118 #define GWADDR0   192
119 #define GWADDR1   168
120 #define GWADDR2   1
121 #define GWADDR3   1
122
123 #define MSKADDR0  255
124 #define MSKADDR1  255
125 #define MSKADDR2  255
126 #define MSKADDR3  0
```

Figure 6: Setting Static IP address

Selection of Static IP or DHCP client

Static IP address is used in this design. Hence, take note that you will need to disable the dhcp client in BSP editor if you rebuild the software as shown below.

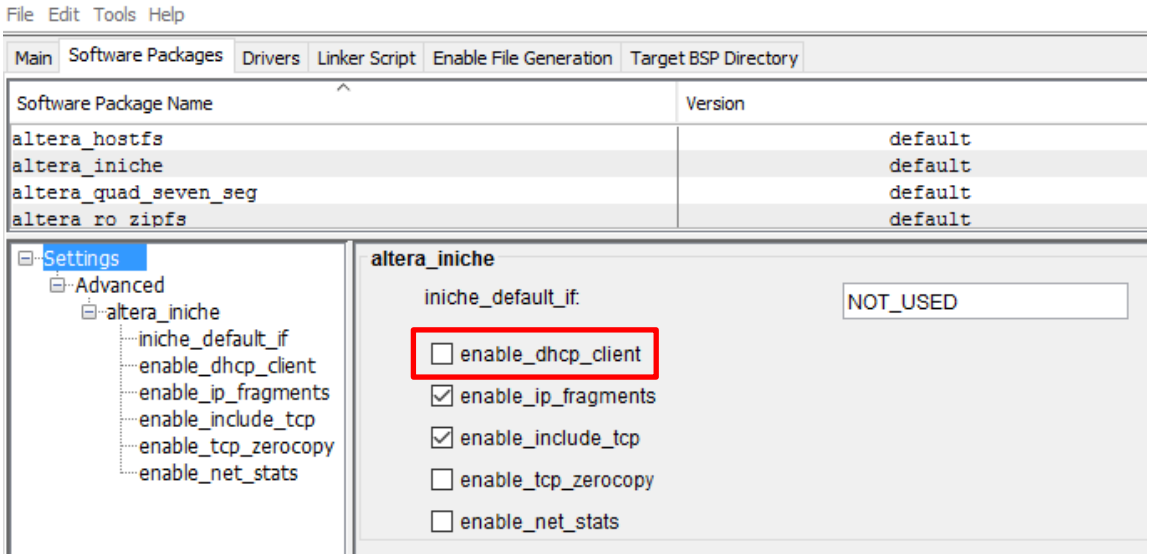

Figure 7: Disable DHCP client

Revision History

Revision	Description
1.0	Simple Socket Server design for A10