Ethernet Tips for NIOSII and Eclipse

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Introduction

This document is a set of tips and guidelines in order to assist in the testing and integration of Ethernet with the Altera DE2 Board and uC/OS II. It is an addendum to the application notes from 2013 on Ethernet integration [1] and is supplementary to the independently developed 2014 Ethernet Integration [2].

Prerequisites

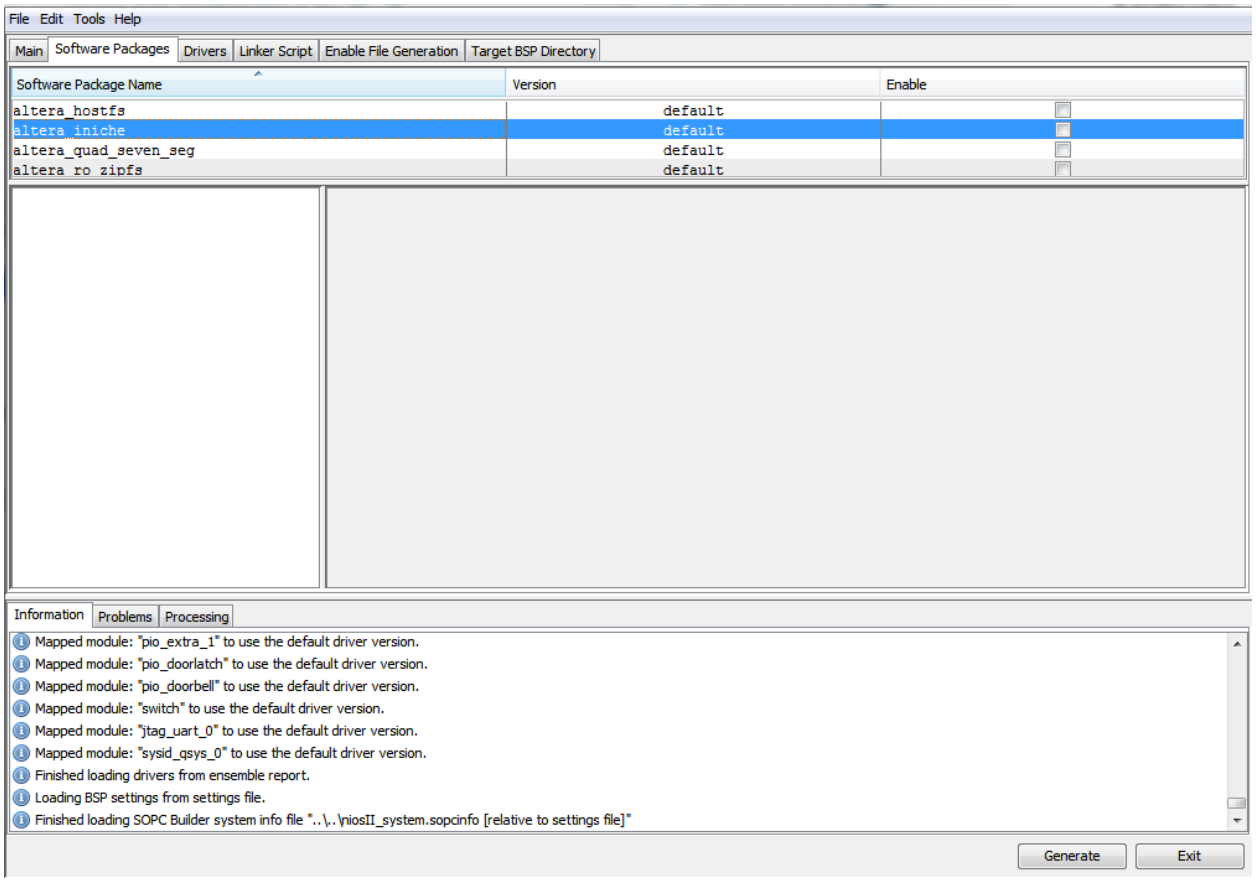
1. Working Qsys solution with the following components:
    1.1. DM9000A from AppNotes [2]
    1.2. Generic Tristate Controller
    1.3. Tristate Conduit Bridge
    1.4. Tristate Conduit Pin Sharer
    1.5. 2x16 LCD Character Display (optional)
    1.6. Green Leds (optional)
2. NIOS 2 Eclipse project using the Web Server Template and BSP

BSP Editor Tips

If header and struct references are missing for Ethernet, or the web server add software packages to the BSP Project. This will automatically add header references for the Altera_Iniche library.

The steps are:

1. Right click on the BSP project and click on properties.
2. Go to the Software Packages tab and ensure that altera_iniche is enabled.



Software Configuration Tips

Web_server.c

Verify that the web_server.c file has the following include at the top of its include list:

#include "dm9000a.h"

Also in web_server.c inside of the main() function verify the following are present.

DM9000A_INSTANCE([DM9000A_NAME], dm9000a_0);
DM9000A_INIT([DM9000A_NAME], dm9000a_0);

Where [DM9000A_NAME] is the root name for the DM9000A module of the BSP system.h naming scheme. For example, given the following system.h, [DM9000A_NAME] is DM9000A_IF_0

#define ALT_MODULE_CLASS_DM9000A_IF_0 DM9000A_IF
#define DM9000A_IF_0_BASE 0x1909210
#define DM9000A_IF_0_IRQ 13
#define DM9000A_IF_0_IRQ_INTERRUPT_CONTROLLER_ID 0
#define DM9000A_IF_0_NAME "/dev/DM9000A_IF_0"

#define DM9000A_IF_0_SPAN 8
#define DM9000A_IF_0_TYPE "DM9000A_IF"

Web_server.h

For operation without a router, static IPs must be set. The lab machines are set to DHCP by default, so consult a Lab Instructor for assistance. The board can be directly connected to a laptop however with a crossover cable **(regular CAT5 cable will not work)**. To enable static IPs, make the following changes in web_server.h.

#define IPADDR0 10
#define IPADDR1 0
#define IPADDR2 0
#define IPADDR3 111

#define GWADDR0 10
#define GWADDR1 0
#define GWADDR2 0
#define GWADDR3 1

Where the IP Address segments are separate defines. This is to enable static IPs where the board IP is 10.0.0.111, and the gateway is 10.0.0.1.

Running the application on the board

When running the software on the board, if successfully compiled and running, the PC console will display:

```
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reserved.

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)
```

This means the build is successful. The console is waiting for an input prompt for the serial number to generate a mac address. Enter any 9-digit number to bypass this. Ie. 123456789. After you enter the serial number the console will say:

```
123456789
```

```
Your Ethernet MAC address is 00:07:ed:ff:cd:15
prepped 1 interface, initializing...
dm9ka_init
mctest init called
IP address of et1 : 10.0.0.111
```

Try to visit a page using a connected PC at http://10.0.0.111

References

[1]	T. Kaddoura and J. Nahar. (2013, February 27) DM9000A Ethernet Controller Application Notes https://www.ualberta.ca/~delliott/local/ece492/appnotes/2013w/Ethernet_DM9000A/
[2]	S. Bitner, M. Chan and B. Erickson. (2014, February 24) DM9000A Ethernet Controller Application Notes https://www.ualberta.ca/~delliott/local/ece492/appnotes/2014w/G9_ETHERNET
[3]	Altera's NIOS2 Sample Web Server Project