PolarFire Design Document

Wi-Fi (Pan9320) Basic Demo

rev 1.00.000

1. Overview

The goal of this basic Wi-Fi demo is to provide a starting point to work with the Panasonic Pan9320 Wi-Fi module available on the Avalanche Development Board using a Mi-V softcore system.

Some features of the Avalanche board are included in this design: UART, user LEDs, user pushbuttons (BasicIO interface) and the Pan9320 interface. On the RISC-V side: Interrupts (External IRQs), Pan9320 drivers, GPIO and UART configuration and management and access to different memory devices.

2. Description

Platform	Avalanche Development Board
Target	PolarFire MPF300TS-1FGC484
Clock(s)	Main: 80 MHz MMIO Sub-system: 80 MHz
FPGA usage	Around 29.0k LE (9.7%)

Steps to run the demo

1. Once the Avalanche board is powered up and USB connected, configure your preferred terminal software (ie PuTTY) on your host PC for serial communication (115200 / 8 / 1 / No parity / No Flow Control) with the FPGA.
2. Wait for the heartbeat on LED2 red to go then depress Pushbutton #1 to start the demo. The host computer terminal should display the demo welcome message.
3. On a remote PC with Wi-Fi capabilities, connect to the broadcasted Access Point from the Avalanche board:
    - SSID: PAN9320_AP, Password: PAN_9320 (WPA2 key protected)
4. Start a terminal software (ie Tera Term) on the remote PC with the following setup:
    - TCP/IP mode
    - Host: 192.168.1.1
    - TCP port#: 2018
    - Service: Other (no Telnet or SSH) with no specific protocol
    - Once connected, having a “local echo” is always nice to see your inputs.
5. From the remote PC, the following commands are available (Case sensitive):
    - “LED1 green on”: Turn on the LED if not.
    - “LED1 green off”: Turn off the LED if not.
    - “LED1 red on”: Turn on the LED if not.
    - “LED1 red off”: Turn off the LED if not.

- "LED2 green on": Turn on the LED if not.
- "LED2 green off": Turn off the LED if not.
- "Heartbeat off": Stop the heartbeat on LED2 red.
- "Heartbeat on": Start the heartbeat on LED2 red.
- "LED status": Request a full LED status.
- Any other text up to 20 characters at a time will be transmitted to the Avalanche and echoed on the host PC terminal.

6. From the host PC, any text up to 20 characters at a time will be transmitted and echoed on the remote PC terminal.
7. From the Avalanche board, depression of PB#2 will send to the remote PC terminal the current LED board status.

3. Functions

Device	Description
Basic IO - UART	- Use to communicate/interact with the board. - Echo all communication received by the Wi-Fi module. - Any text typed in the Terminal window will be transfer for transmission to the Wi-Fi module after hitting RETURN.
System Timer	- Generate a 0.5 Hz heartbeat on the red LED 2.
Basic IO - Pushbutton #1	- Upon depression, activate the demo.
Basic IO - Pushbutton #2	- Upon depression, read LED and Heartbeat statuses and send them to the Wi-Fi module for transmission to the remote PC.
Pan9320	- Provide serial communications for both command and data. - Provide configured GPIO for all other control signals required by the module.

4. FPGA Blocks Configuration

Device	Configuration
BasicIO_Interface	UART for Terminal communication configured through Mi-V code (115200 / 8 / 1 / No parity / No Flow Control) User pushbutton #1: USER_PB1_IRQ connected to Mi-V External IRQ 30 User pushbutton #2: USER_PB2_IRQ connected to Mi-V External IRQ 29 Other ports pushed as Top Level ports to be mapped on I/O pads.
Pan9320_Interface	UART for Command communication configured through Mi-V code (115200 / 8 / 1 / No parity / No Flow Control) UART for NetCat communication configured through Mi-V code (115200 / 8 / 1 / No parity / No Flow Control) Other ports pushed as Top Level ports to be mapped on I/O pads.

5. Memory Description

Memory Device	Type	Size
Mi-V Boot	LSRAM	128KB (32768 x 32 bits)

6. Memory Map

Device	First Address	Last Address
MMIO – BasicIO_Interface	0x6000 0000	0x6000 0FFF
MMIO – Pan9320_Interface	0x6000 1000	0x6000 1FFF
Memory – Mi-V Boot (LSRAM)	0x8000 0000	0x800F FFFF