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Software User's Guide
(Linux)

PCIeBiSerial-L3com1
One-Channel Half Duplex Interface

PCIeBiSerial-L3Com1

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Connection of incompatible hardware is likely to cause serious damage.

Product Description

The PCIe BiSerialDb37-L3COM1 board is a one channel half duplex interface card implementing a byte wide receive or transmit port.

For a detailed description of the hardware including register definitions, see HW User Manual, PCIeBiSerialDb37-L3COM1.

Software Description

The driver supports either receive or transmit function for the I/O card's port. The direction of I/O is specified via the open function o_flag parameter. If O_RDONLY is specified, the port is a receive port, O_WRONLY a transmit port.

The transmit capability is provided for test purposes. During normal system operations, only the receive function will be utilized. A default configuration is applied when the port is opened.

Applicable receive configuration parameters include blocking timeout, packet mode, pad mode, pad pattern, and Rx FIFO back pressure level. Blocking timeout provides a mechanism to timeout on blocking read operations. Pad mode specifies whether 3 additional 32 bit words (12 bytes) of pad pattern are appended to a received frame/packet. Pad pattern is the 8 bit pattern which will be utilized. In the case of a packet which is not a multiple of 32 bits, the pad pattern will be used to "fill" the unused bytes of the last long word. The Rx FIFO level parameter specifies the percentage full of the Rx FIFO when the back pressure signal is asserted.

Packet mode specifies receive behavior. An Rx packet is generated upon detection of Tx idle from the external device. The HW provides a packet byte count when this condition is detected. If the amount of data in a frame/packet is unknown, this is the preferred mode of operation. Alternatively, non-blocking reads may be issued, and application software can determine packet boundaries based upon pad patterns.

There is only one applicable transmit configuration parameter. This parameter specifies flow control behavior when the back pressure signal assertion is detected. Please see the HW user manual for PCIeBiSerialDb32-L3COM1 manual for further information.

Default read configuration is as follows: Block forever (if opened as blocking), packet mode enabled, pad pattern = 0xff, extended pad disabled, and Rx FIFO level is set to 50%. Default Tx configuration specifies BPHO (back pressure hold-off).

Port configuration can be changed after the initial open if desired.

The version of this driver is v1.0.0. The driver has been validated on an i7 Ubuntu server running 3.8.0-44 kernel (64 bit) SMP (little Endian platform).

Installation

1)   Copy de_BiSerL3com1.c and de_BiSerL3com1.h to your module build directory. Invoke the system %make.+ A makefile for this module has been included in the release tar-ball.
2)   Copy the resulting de_BiSerRL3com1.ko module to the target platform/directory.
3)   Copy the startup script bnm to the target.
4)   Invoke the script (./bnm), it will create the devices required by the driver and performs an insmod of the module. You may invoke this script from the systems rc.local file as well

Application Programming model

After a port is opened, it may be configured for the desired mode of operation via the DE_CONFIG_PT ioctl. Both blocking and non-blocking modes of operation are supported. This behavior is set via the standard file flags upon open.

Please see de_PcieBiSerRtn8.h for details of the parameters for this and other supported ioctls.

Sample application

Two sample applications (de_IoApp.c, de_IoctlApp.c) are provided to demonstrate configuration, ioctl invocation, and I/O in the supported modes.

1)   Compile the sample application for your platform, the output executable for these examples are dyn_io and dyn_ioctl.
a.   Nominal compilation gcc
                gcc . Wall . o dyn_io de_IoApp.c -lrt
                gcc . Wall . o dyn_ioctl de_IoctlApp.c
                The apps should compile without warnings, it is assumed
                de_PcieBiSerL3com1.h is resident in the same directory as the
                applications for these examples.

Invocation parameters

I/O application invocation is as follows:

./dyn_io mode (r(eader)|w(riter)|b(oth) port(0-N) frame_len(32 bit words)

The firs parameter specifies mode of operation. The second parameter specifies the port. The third parameter, frame length is specified in 32 bit words. The final parameter determines whether this port will be a reader or a writer. Optionally an iteration count may be specified as the last parameter after frame length.

Mode %both+is not supported for the production release of the driver. The app assumes two I/O cards are installed in the system and cabled together properly in order to execute without error. Rx data is compared to Tx data upon read completion for each iteration.

Ioctl application invocation is as follows:
./dyn_ioctl

A menu will be displayed:
Enter p(ll program)||r(eg ops)|e(xit)

The Ioctl application demonstrates pll programming, register R/W/RMW operations.

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