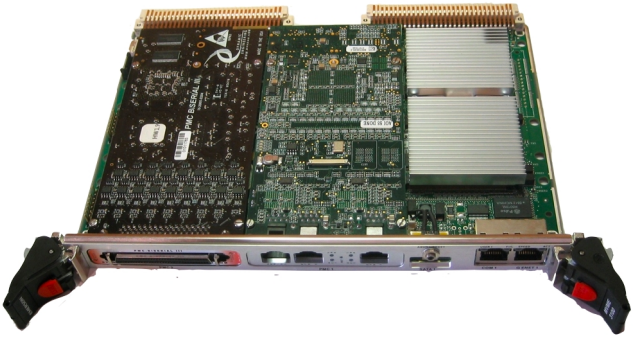

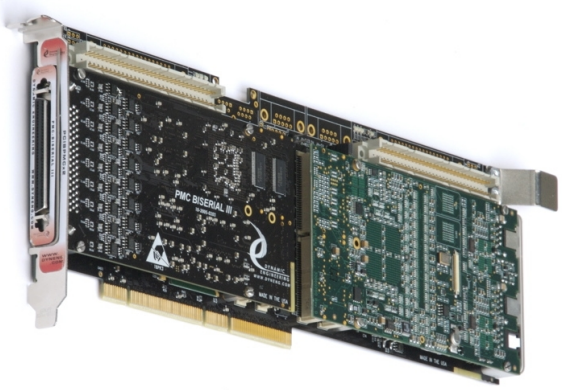

P2Psim-X and P2Psim-V simulation interface

Hardware Manual

The Goebel Company

Revision: 1.19 October 4, 2011

Purpose

This manual describes the hardware interfaces available for exercising FCE P2P interface bus.

Notice

Information in this manual has been carefully reviewed and is believed to be accurate. The Goebel Company shall not be liable for errors contained herein. The Goebel Company reserves the right to make changes or additions to the software described herein.

Contact

For technical or other inquiries contact:

email: info@GoebelEtc.com

The Goebel Company
12486 Prowell
Leavenworth WA 98826
USA
Phone: 206-601-6010

In Europe contact:

email: info@muellersystemtechnik.de

Müller Systemtechnik GmbH
Klaus R. Muller
Mendelssohnstraße 34
D-81245 München
Tel: +49 (0)89 28659081
Fax: +49 (0)89 28659082

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1 Introduction

P2P refers to the family of packet based Point-to-Point busses of Honeywell's Flight Control Electronics of the Boeing 787. The P2P simulation boards offered by the Goebel Company utilize standard components with custom programming to provide interfacing capabilities which emulate actual LRUs. This manual describes the hardware elements in the context of use for P2P interfacing. This manual is not meant to replace the individual component manuals.

P2P simulation boards are PMC based which have a wide variety of carriers available. Standard offerings include VME, and full length PCI form factors. The VME form factor is also suitable for VXI with an appropriate carrier.

1.1 P2P concepts

1.1.1 P2P packets

P2P packets consist of a preamble, followed by Manchester encoded data, CRC, and postamble. The packet data format consists of a label, followed by a length (number of 16 bit words in payload), followed by the payload consisting of 16 bit words. Data payloads are required to be an even number of 16 bit words.

1.1.2 Unidirectional and Bidirectional channels

A P2P channel can be a unidirectional connection from one LRU to another, or a bidirectional channel between LRUs. Bidirectional channels are used in low speed mode between ACEs and REUs. All other uses are for unidirectional channels. Unidirectional channels, have one transmitter, and up to 2 receivers in relatively close proximity. The close proximity allows the RS485 signal strength to sufficiently drive the receivers.

1.1.3 REU channels

REU channels are low speed bidirectional channels driven by the ACE. An REU only transmits after receiving a packet from the ACE. REU channels must obey the response timing requirements of the ACE. In addition payload words of the ACE packet are wrapped back to the response according to ACE protocol requirements. All this is done by the P2P resource autonomously without time critical guidance from the host.

1.1.4 ACE/FCE channels

ACE channels provide an encrypted wrap function to FCMs. Multiple packets are sent back-to-back within a frame. A flexible configuring capability allows the sequencing of packets reproducing the packet sequences of LRUs. The sequencing of packets is configured by using the p2p_sub_channel_config and p2p_rrsub_channel_config interfaces. Refer to these sections for information on sub-channels.

1.1.5 DMRS channels

DMRS channels are a low speed unidirectional channel from DMRS to the ACE. The P2P resource can be used to transmit simulated DMRS traffic to the ACE, or it can be used to receive DMRS traffic verifying protocols.

1.2 Hardware architecture

1.2.1 CPU PMC

The CPU PMC (See Figure 3) on the P2P test resource utilizes the low power IBM/AMCC PowerPC 440GX embedded Processor. With integrated PCI-X, DDR SDRAM, SRAM and Ethernet interfaces, the 440GX offers a high performance solution for general computing applications. A SO-DIMM DDR SDRAM memory slot and socketed boot flash provide flexible field upgradeability.

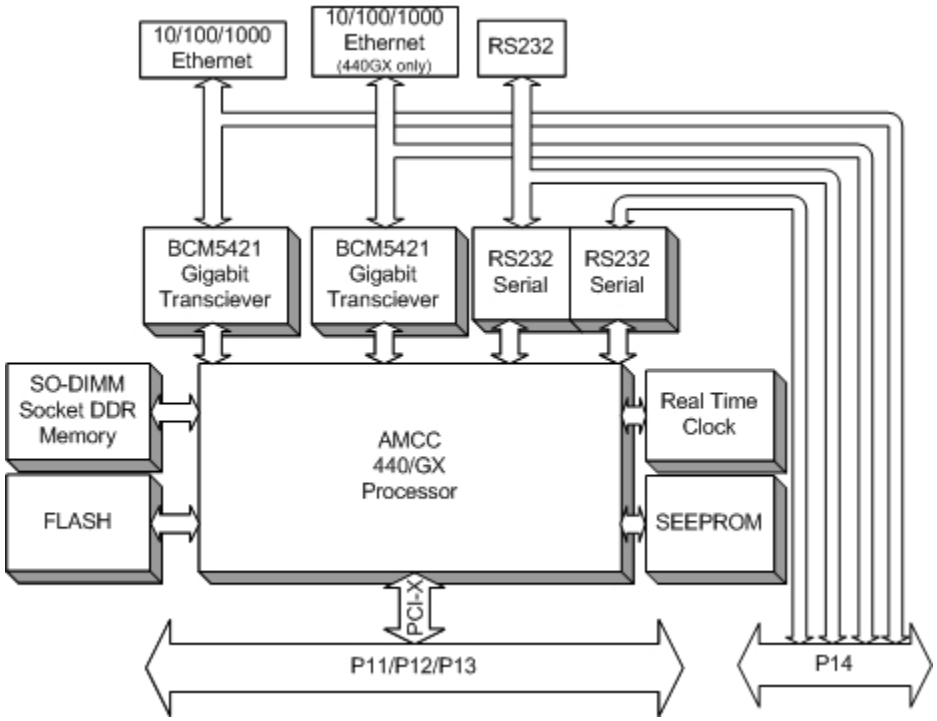

Figure 1 PrPMC

The CPU PMC provides the platform for firmware which handle timing and protocol processing of the P2P bus. Powerful data generation capabilities resident on the CPU PMC provide simulation and test capabilities.

1.2.2 IO PMC

The IO PMC is a Xilinx FPGA based PMC with RS485 drivers for 32 channels. The 32 channels are accessible via SCSI II connector on the front panel of the carrier. When isolation is necessary it is provided by a breakout panel connected to the card's SCSI II connector.

All 32 channels are configurable as either high speed (5Mbit) or low speed (400Kbit) channels.

2 PCI interface card

2.1 Host hardware requirements

2.1.1 PCI-X or 64 bit PCI compatibility

The P2P PCI cards utilize a PCI-X capable carrier. This carrier is compatible with legacy PCI equipment, but the physical configuration places requirements on host system. The host must be equiped with either 64 bit PCI connectors or 32 bit PCI connectors with no obstruction of the rear connector tab present on 64 bit cards. Although consumer grade PCs with 32/33 MHz bit PCI slot are adequate for interfacing to the P2P cards, server grade PCs with PCI-X slots are preferred.

2.1.2 Full length pci

Host hardware must support full length PCI cards. Full length PCI cards, require the case have a support bracket to mate with the support tab on the rear edge of the PCI card. Host systems without this support tab place undue stress on the carrier, and invalidate the warrantee.

2.1.3 3.3 volt supply

The default configuration utilizes the 3.3 volt supply of the host backplane.

2.1.4 Host cooling

The host computer must have active PCI cooling capability. This generally takes the form of a fan near the rear of the PCI cards blowing air over the PCI cards.

2.2 PCIX dual PMC carrier

The P2P hardware (See Figure 1) consists of two PMC modules, hosted on a full length PCI carrier. The IO PMC has 32 channels routed out the front via a 68 pin SCSI II connector. The processor PMC is on the rear slot of the dual carrier, and does not require any cable connections. The carrier is universal type compatible with legacy 5V PCI as well as 3.3v PCI or PCIX. Note, for insertion on 32 bit slots refer to the host hardware requirments.

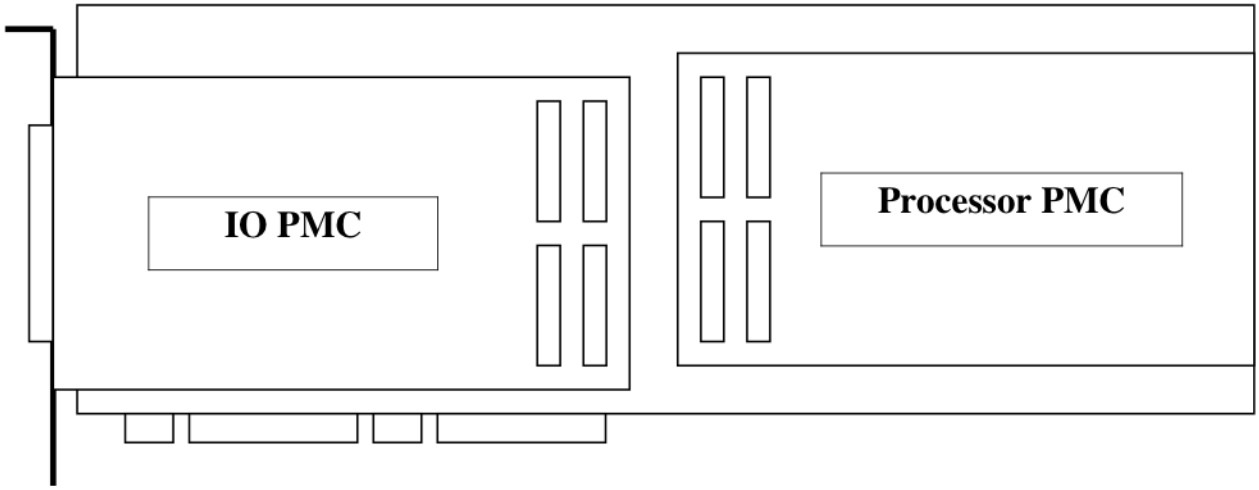

Figure 2 P2P on PCI dual PMC carrier

The PMC carrier is based on an Intel 31154 PCI-X bridge. The dual PMC-X carrier allows operation at PCI-X speeds of up to 133Mhz on a suitable host bus. In addition compatibility with legacy 5v 33Mhz/32 bit pci is supported while allowing the local PCI bus to remain at full speed.

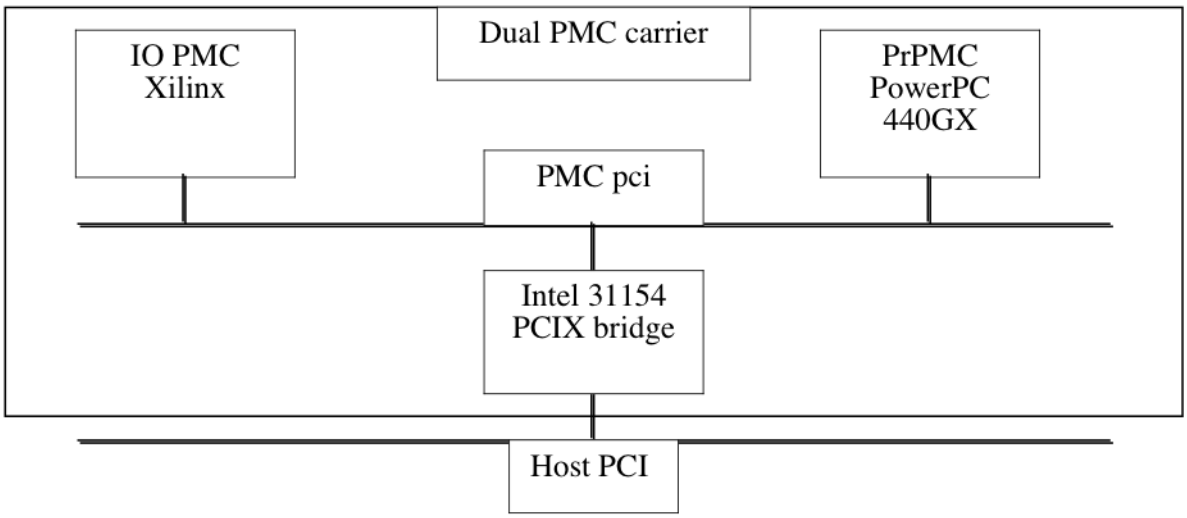

Figure 3 PCI bus diagram

1 The PMCs are connected by a local bus which is bridged to the host PCI via the Intel 31154 bridge. The processor and IO modules communicate on the local bus without any impact or interference from the host PCI bus. Time critical IO proceeds unencumbered by host PCI load. Compared to VME and cPCI the PCI carrier gives a higher performance at a lower unit cost.

3 VME interface card

3.1 Address setting

The VME address can be selected by setting the switch block of the IO pmc. The switch block has 8 switches which correspond to the upper 8 bits ov VME addressing. This method of address selection replaces the setting via processor PMC serial port used on firmware versions prior to 0.0.6.

Default switch settings 0 0 0 0 0 1 1 0
VME address 0x06000000

3.2 VME address setting of MVME3100 carrier

Newer versions of P2PSIM-V boards utilize a MVME3100 carrier. This is noted by the MVME3100 label on the release tabs. This board has VME address settings set via software on the carrier. To effect VME address changes on this board, on must interact with the carrier prom software as shown in the screen shot below. In this case the address is being set to the default VME address of 0x24020000 in a32 space. To use a different valued adjust the 24020000, 24030000, and 5c1e0000 entries by a common delta to achieve the desired address.

```
#       Initialize global environment variables.
#       This only need be done once on a new board.

MVME3100> gevInit

#       set inbound mapping to vme 24020000 -> pci 80200000

MVME3100> vmeCfg -e -i0
Editting/Creating a User VME Setting
- interpreted as follows:
Inbound Image 0 Attribute Register = 000227AF? 800201af
Inbound Image 0 Starting Address Upper Register  = 00000000?
Inbound Image 0 Starting Address Lower Register  = 00000000? 24020000
Inbound Image 0 Ending Address Upper Register = 00000000?
Inbound Image 0 Ending Address Lower Register = 1FFF0000? 24030000
Inbound Image 0 Translation Offset Upper Register = 00000000?
Inbound Image 0 Translation Offset Lower Register = 00000000? 5c1e0000

Store the User VME Setting as
the Global Environment Variable: mot-vmeIn0  (Y/N)? y
MVME3100>

#       map Tundra chip to vme 24000000

MVME3100> vmeCfg -e -r414
Editting/Creating a User VME Setting
- interpreted as follows:
CRG Attribute Register = 00000000? af
CRG Base Address Upper Register = 00000000?
CRG Base Address Lower Register = 00000000? 24000000

Store the User VME Setting as
the Global Environment Variable: mot-vmeRegAccess  (Y/N)? y
MVME3100>

#       Check that settings are properly saved.

MVME3100> vmeCfg -s -i0
MVME3100> vmeCfg -s -r414
```

4 IO PMC connector

4.1 32 channel non-transformer coupled cards

Channels 1-32 are connected to the SCSI connector on the IO PMC as noted in the table below.

channel	pin +	pin -
1	1	35
2	2	36
3	3	37
4	4	38
5	5	39
6	6	40
7	7	41
8	8	42
9	9	43
10	10	44
11	11	45
12	12	46
13	13	47
14	14	48
15	15	49
16	16	50
17	17	51
18	18	52
19	19	53
20	20	54
21	21	55
22	22	56
23	23	57
24	24	58
25	25	59
26	26	60
27	27	61
28	28	62
29	29	63
30	30	64
31	31	65
32	32	66

4.2 20 channel transformer coupled cards

Channels 1-20 are connected to the SCSI connector on the IO PMC as noted in the table below.

channel	pin +	pin -
1	1	35
2	2	36
3	3	37
4	4	38
5	9	43
6	10	44
7	11	45
8	12	46
9	15	49
10	16	50
11	19	53
12	20	54
13	21	55
14	22	56
15	25	59
16	26	60
17	29	63
18	30	64
19	31	65
20	32	66

5 Goebel Company Hardware Warrantee

Limited Warranty On New Hardware

The Goebel Company will provide repairs, or, at The Goebel Company's sole option, replacements to new hardware equipment during the WARRANTY PERIOD (as defined below) in accordance with the following terms, conditions, and limitations.

Repairs Covered. This warranty covers repairs to correct hardware equipment defects related to material or workmanship noted during the WARRANTY PERIOD. Such repairs will be made at The Goebel Company's expense provided that you comply with the terms and conditions of this warranty.

Warranty Period. The WARRANTY PERIOD begins on the date of shipment for new hardware equipment and ends at the expiration of twelve (12) months from the date of first shipment of computer boards or systems supplied by The Goebel Company.

What Is Not Covered.

(a) Software or software media products.
(b) Consumables, such as batteries, printer ribbons, or paper.
(c) Defects caused by accident, electrical or temperature stress, abuse, misuse, or misapplication of the equipment.
(d) Equipment that has been modified without the express written permission of The Goebel Company or on which the serial number has been removed, tampered with, or defaced.
(e) Revisions due to design changes or changes in components not authorized by The Goebel Company.
(f) Products or components of systems not supplied by The Goebel Company.

Other Terms.

(a) The Goebel Company may from time to time improve, enhance, or modify the design of the hardware equipment covered by this warranty pursuant to general engineering change orders (ECOs). The Goebel Company will have the right but not the obligation, at its discretion, to apply general ECOs to the warranted equipment returned for repair without your request or notice to you.
(b) The Goebel Company reserves the right to use re-manufactured, refurbished, or used parts and modules in making warranty repairs.
(c) THE WARRANTY SET FORTH ABOVE IS EXCLUSIVE and in lieu of all others, oral or written, express or implied. Without limitation of the foregoing statement, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.
(d) Final determination of warranty eligibility shall be made by the The Goebel Company.
(e) No modifications, extensions, or additions to this warranty, are enforceable without an express written document signed by the President of The Goebel Company.
(f) The sole remedy under this warranty shall be the repair or replacement of defective hardware equipment under the above terms and conditions. The Goebel Company SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR ECONOMIC LOSS (including, but not limited to, lost profits, down time, good will, damage to or replacement of equipment and property, and any cost of recovering programming or reproducing any program or data stored in or used with The Goebel Company products) resulting from breach of this warranty or from any defect in The Goebel Company products.