



Pronghorn

PBMS Module

Author: Joe Teixeira

Date: 2-Dec-02

Revision: 0.1

Table of Contents

OVERVIEW.....	1
FUNCTIONALITY	1
NETWORK CONFIGURATION	2
MAPPING CONFIGURATION.....	3
STATUS COUNTERS	4
OTHER MESSAGES	5

Overview

This document details the configuration interface for implementing a Pronghorn Profibus Multi-Slave module driver installation. This document assumes the reader is familiar with the Liaison's Pronghorn product. Refer to the *Pronghorn Users Guide* for a more detailed information.

The main purpose of this module driver, named *pbms*, is to provide connectivity to a Profibus (or compatible) devices via the Profibus DP protocol. The module driver uses the Woodhead Connectivity 5136-PBMS interface card to access the DP network via the *ddpbm* Kernel device driver . Refer to the *5136-PBMS Hardware Guide*, version 2.03, for details on the interface card.

Functionality

The module drivers main purpose is to obtain or provide slave data, contained on the 5136-PBMS interface card. The module driver can emulate up to 125 slave devices on the DP network Configuration of each slave is accomplished through the network configuration .csv file

Registers

There is only one set of data registers on a DP slave device. Typically accessed as byte data. However the module drive an also access the same data area using word or bit offsets. In addition there are three other data areas that can be access on the 5136-PBMS interface card.

<i>Type</i>	<i>Pref</i>	<i>Size</i>	<i>Max Length</i>
Bit	Pxxxx	1 bit	1952
Byte	Bxxxx	8 bits	244
Word	Wxxxx	16 bits	122
Status	Sxxxx	16 bits	8
Diagnostic	Dxxxx	8 bits	6
Extended Diagnostic	Exxxx	8 bits	237

The xxxx represents the address offset.

Communication Interface

The Profibus DP protocol has specific electrical requirements for physical communication layer that is handled by the 5136-PBMS interface hard. Consult the hardware documentation for configuration options of the 5136-PBMS interface card.

Network Configuration

The configuration of this module and its network interface card is accomplished through the network comma separated values file (.csv) using software just as Excel or gnumeric. Additionally, slave configuration is included in the file. Some of the parameters are standard parameters used to access the interface card while others are particular to this module. Most parameters have a default value that will be used if the parameter does not exist. Additionally the parameters can be listed in any order.

<i>Name</i>	<i>Valid Range</i>	<i>Default</i>	<i>Description</i>
Card	1 - 8	1	This identifies the interface card being used. Up to 8 cards can be installed in one processor.
Baud	9k6 - 1m ⁱ	1m5	The communication speed being used.
IO_Port	0 - 0xFFFF	0x250	The port address used to access the hardware.
IO_Addr	0xC000 - 0xEFFF	0xC800	The shared memory address for the card to use

Slave Configuration

Additionally the file contains another section, for each pbms client, which contains slave configuration. Information for each slave being emulated must be listed. A maximum of 125 slaves can be configured. The #TC control character identifies the client name, for the slaves being configured. So this value will be the same as the *name* parameter of the *PBMS* configuration section.

<i>Name</i>	<i>Valid Range</i>	<i>Default</i>	<i>Description</i>
Slave	1 - 125	0 ⁱⁱ	This identifies the slave number to emulate.
Virtual	True or False	False	True indicate a virtual slave while False indicates a monitored slave.
ID	0 - 0xFFFF ⁱⁱⁱ	0	This identifies the slave type.
TX_Len	0 - 244	0	This is the number of bytes that this slave will be transmitting to the Master device.
Watchdog	10 - 655350	0	Number of milliseconds before the slave timeouts

Errors

If any of the validation, for the network configuration parameters, fails a critical error message will be placed in the logs. In addition the module driver will not start. The following is a list of critical message that might be generated.

ⁱValid values are:9k6, 19k2, 93k75, 187k5, 500k, 750k, 1m5, 3m, 6m, 12m Where 'k' represents 1000 and 'm' represents 1000000.

ⁱⁱA value of zero is invalid and configuration of the slave will fail. So this parameter must be present.

ⁱⁱⁱFor a 5136-PBMS card this value should always be 26389 (0x6715)

<i>Msg ID</i>	<i>Mnemonic</i>	<i>Description</i>
1505	CRT_BAD_BAUD	Invalid baud specification (%s) - The Baud rate does not match one of predefined values.
53	ERR_OPEN_FAILED	Unable to open resource '%s' - Access to the specified interface card failed.
83	ERR_CARD_SETUP_FAILED	Setup of interface '%s' failed (err: %s) - Card initialization failed. Refer to the <i>syslog</i> for a more detailed message from <i>ddpbm</i> .
1502	ERR_SLAVE_CFG_FAILED	Slave (%d) configuration failed (%s) - The configuration failed due to the specified system error message. Refer to the <i>syslog</i> for a more detailed message from <i>ddpbm</i> .
1522	ERR_SET_FAILED	Unable to set card %s - Failed to set card state. Refer to the <i>syslog</i> for a more detailed message from <i>ddpbm</i> .

Mapping Configuration

The configuration of the module mappings is accomplished through the network comma separated values file (.csv) using software just as Excel or gnumeric. The parameters listed only pertain to this module. Refer the *Pronghorn Users Guide* for a list of the other common parameters used to configure a mapping. Most parameters have a default value that will be used if the parameter does not exist. Additionally the parameters can be listed in any order.

<i>Name</i>	<i>Valid Range</i>	<i>Default</i>	<i>Description</i>
Slave	1 - 125	0	The device (or Node) number that identifies the slave to be accessed.
Offset	Refer to Register description	0	Identifies the data offset to access, within the slave data area

Errors

If any of the validation, for the mapping configuration parameters, fails an error message will be placed in the logs. In addition that particular mapping item will not be added to the internal mapping list. However the module continues with any remaining mappings.

<i>Msg ID</i>	<i>Mnemonic</i>	<i>Description</i>
1501	WRN_SLAVE_ON_STATUS	(Item %d) Slave must be zero (or nil) when reading card status counters - When reading status counters no slave number is required.
1503	ERR_BAD_OFF_TYPE	(Item %d) Offset type is invalid must be either 'W'ord, 'B'yte or 'P'oint - The specified data type does not point to a valid Register type.
1504	ERR_ADDRESS_RANGE	(Item %d) Offset is out of range (off=%s, len=%d) - The offset and length point beyond the supported range

Status Counters

This module driver maintains a set of status counter for recording the operational status of the module and the network.

<i>Msg ID</i>	<i>Type</i>	<i>Description</i>
1506	CNT_READS	Number of reads - Keeps track of the number of read requests performed.
1507	CNT_WRITES	Number of writes - Keeps track of the number of write requests performed.
1508	CNT_READ_ERRORS	Number of reads failed - Keeps track of the number of times a read request failed.
1509	CNT_WRITE_ERRORS	Number of writes failed - Keeps track of the number of times a write request failed.
1510	CNT_STATUS_READS	Number of status counter reads - Keeps track of the number of requests for status counters
1511	CNT_STATUS_FAILED	Number of status counter reads failed - Keeps track of the number of status counter requests failed.
1512	CRD_PBM_STATUS	Card Status byte - Identifies the current state of the card ^{iv}
1513	CRD_COMM_STATUS	Comm Status byte - Identifies the current communication state ^v
1514	CRD_RECV_FRAMES	Total received frames - The number of incoming packets to the card
1515	CRD_RECV_CNFG_FRAMES	Total received configuration frames - The number of configuration command packets
1516	CRD_RECV_ERRORS	Frames received with errors - The number of incoming packets with errors
1517	CRD_SLAVE_TIMEOUTS	Slave watchdog timeouts - The number of times watchdog timer expired
1518	CRD_FRAME_ERRORS	Length, Start delimiter or end delimiter errors - The number of invalid packets
1519	CRD_CHKSUM_ERRORS	Checksum errors during receive - The number of times the CRC check failed
1520	CRD_PARITY_ERRORS	Parity errors during receive - The number of times the parity check failed
1521	CRD_DUPLICATE_SLAVES	Duplicate slave errors during receive - The number of transmissions with duplicate slaves

^{iv}Where 0=Status ok, 1=Bad Command, 2 - Bad Baud and 8=Bad Trigger. These codes can appear together (OR'ed).

^vWhere 2=All virtual slave are ok, 4=All slaves are ok, 128=DP network is running. These codes can appear together (OR'ed).

Other Messages

In the normal operation of this module certain types of message may appear in the logs. Refer to the *Pronghorn Users Guide* for a list of the common messages that can be seen in the logs. In addition the *ddpbm* Kernel device driver can place errors to the system log (*/var/log/syslog*). The ErrNo and Mnemonic values are not Pronghorn defined codes. They are Unix system defined codes.

<i>ErrNo</i>	<i>Mnemonic</i>	<i>Description</i>
22	EINVAL	Invalid Slave Number (1-125) - The specified slave number is out of range.
22	EINVAL	Invalid TxLen %d (0-244) - The slave transmit length is too large.
22	EINVA	Invalid InitWdog %u (10-655350, in steps of 10) - The watchdog time is out of range.
22	EINVAL	Maximum number of PBM cards supported is 8 - The specified card number is not supported.
5	EIO	Failed to register device %s - The kernel had problem create a device handle
14	EFAULT	Unable to access User space data - Failed to transfer data between Kernel & User memory
22	EINVAL	I/O port (0x%x) Out of range Must be between 0x%x and 0x%x - The I/O Port value specified is not valid
16	EBUSY	I/O port (0x%x) in use - The I/O Port specified is not available
22	EINVAL	I/O memory (0x%x) Out of range Must be between 0x%x and 0x%x - The specified shared memory address value is not valid
16	EBUSY	I/O memory (0x%x) in use - The I/O address specified is not available
16	EBUSY	Unable to get I/O port (0x%x) - Failed to get handle to device
6	ENXIO	Card ID(0x%x)/Module ID(0x%x) incorrect (0x%x/0x%x) - The hardware at the specified I/O port is not a 5136-PBMS card
1	EPERM	Card is already online, must be offline to be configured - Card is in the wrong state for configuration
1	EPERM	Card Error 0x%x - Card command error code. Refer to CRD_PBM_STATUS
1	EPERM	Invalid Card Command State 0x%x - Card communication error code. Refer CRD_COMM_STATUS
14	EFAULT	Baud parameter invalid (%d). Must be between %d and %d - The specified Baud value is not valid. Refer to Baud
6	ENXIO	Can not perform command ... card not initialized - Attempted to perform a command before card is ready
16	EBUSY	Failed to put card online - Attempt to set card online failed
14	EFAULT	PBM device '%s' not open - Attempt to read/write before card was opened
14	EFAULT	PBM device '%s' not initialized - Attempt to read/write before card was initialized
14	EFAULT	Status Cntrs read length too long, req(%d) max(%d) - Specified counter + length goes out of range
14	EFAULT	Slave %d not enabled - The specified slave number was not previously configured
14	EFAULT	Slave %d status (%d) not OK - The specified slave has an error
90	EMSGSIZE	Slave %d read length too long, req(%d) max(%d)

PBMS Module

<i>ErrNo</i>	<i>Mnemonic</i>	<i>Description</i>
		- The specified offset + length is out of range
90	EMSGSIZE	Slave %d read diagnostic length too long, req(%d) max(%d) - The specified diagnostic + length is out of range
14	EFAULT	Slave %d unable to copy to user space - Failed to transfer data between Kernel & User memory
90	EMSGSIZE	Slave %d write length too long, req(%d) max(%d) - The specified offset + length is out of range
14	EFAULT	Slave %d unable to copy from user space - Failed to transfer data between Kernel & User memory
6	ENXIO	Card ID (%x) not correct (%x) - The hardware at the specified I/O port is not a 5136-PBMS card
6	ENXIO	Config bytes read not what written. c=%x, m=%x - Test pattern write failed
14	EFAULT	I/O memory (0x%x) in use by ROM - The specified shared memory address already in use
14	EFAULT	I/O memory (0x%x) in use by RAM - The specified shared memory address already in use
14	EFAULT	Unable to access I/O memory (0x%x) - The specified shared memory address is not accessible
6	ENXIO	Card module failed to run - Unable to set card to run mode. Refer to previous message to get the error reason from the card