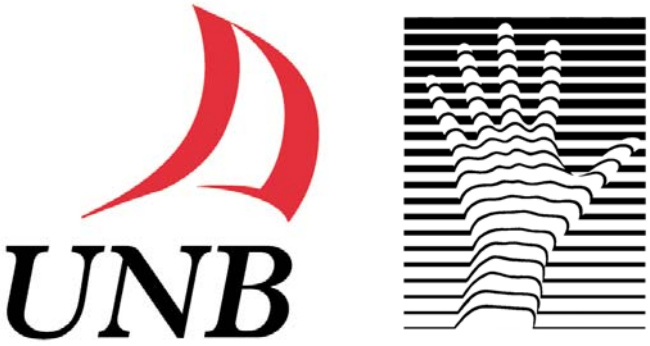

AIF2 UNB Hand Project

Prosthetic Device Communication Protocol
Host ←→ Bus Arbitrator
Communication

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1. DOCUMENT OVERVIEW

1.1. Purpose

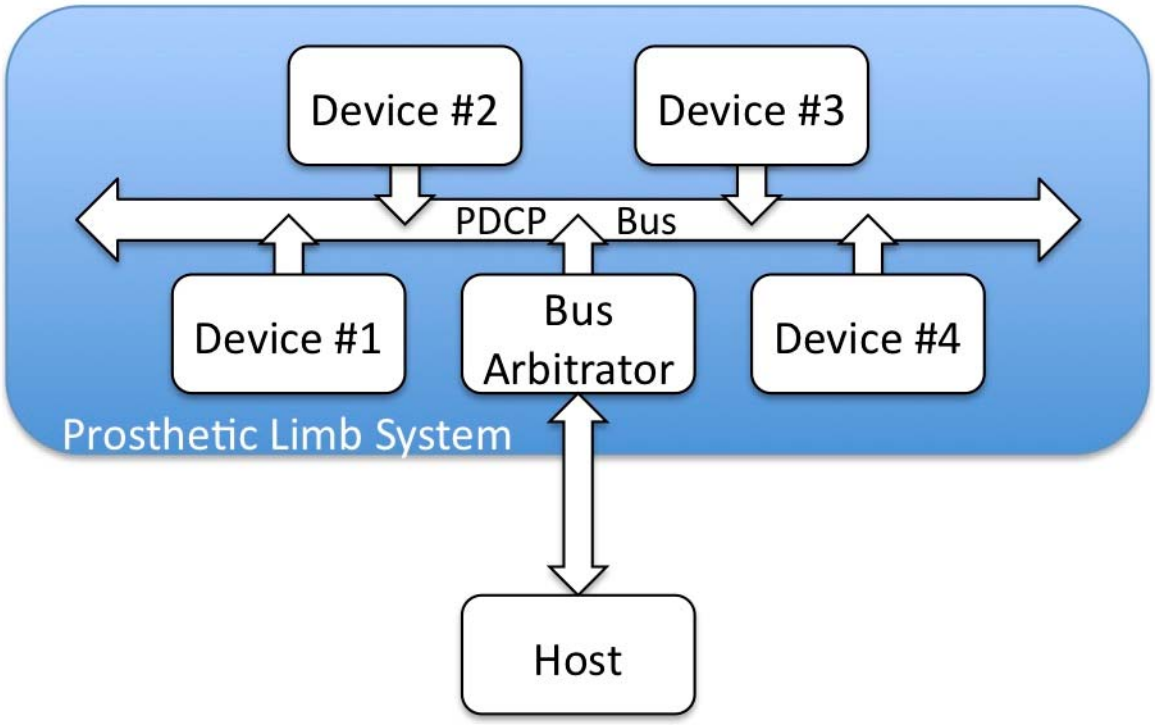
This document specifies the type and content of all messages between an external computing device's software application and the Bus Arbitrator device used in the PDCP bus system.

1.2. Scope

This document describes the format of all serial communication traffic between the Bus Arbitrator and the Host application running on an external computing device.

2. SYSTEM OVERVIEW

The Host software serves as a graphical interface and/or configuration tool for patient training/testing and configuration of the prosthetic limb system. The communication interface between the Host and the entire PDCP bus system is done through the Bus Arbitrator device. The Bus Arbitrator acts as a bridge to all other devices on the PDCP bus system, forwarding any messages received from the Host that are intended for other devices, and vice versa. Messages sent by the external application are acknowledged by the issuing of an appropriate acknowledgement of receipt message.



3. MESSAGE PROTOCOL

The message protocol used herein is a request-acknowledge format. Each message received will be acknowledged as a valid message or by specifying some erroneous state.

3.1. Message Format

Messages are of variable length and observe the following Header-Payload structure:

1	2	3	4	5	6	7	8	9	10	n	n + 1	n + 2
Sync #1	Sync #2	Msg ID LSB	Msg ID MSB	Ref ID	CRC8	Payload Size LSB	Payload Size MSB	Payload (Byte 0)	Payload (Byte 1)	Payload (Byte n)	CRC16 LSB	CRC16 MSB

Header

Bytes 1 & 2:

The first two bytes of the message header are Sync Bytes used to determine the start of a message. The values for sync #1 and #2 are 0xFE and 0x19 respectively.

Bytes 3 & 4 :

The next two bytes of the header are the message ID which defines the type of message being sent. This message ID defines the format for the payload to follow.

Byte 5:

The fifth byte is a reference ID which can optionally be used by the external application to match a received response message to a sent request message. All acknowledgment messages will contain the reference ID issued by the original message.

Byte 6:

The sixth byte of the message header is an 8-bit CRC[1]. The CRC does not include the 2 Sync Bytes.

Bytes 7 & 8:

The final two bytes contain the payload size in number of bytes, including a 16-bit CRC value.[2] The payload size may be zero for certain message types indicating that all required information is present in the message header. In such a case, no 16-bit CRC value is provided.

Payload

The payload portion of the message is optional and contains data that is specific to the message ID sent in the header. A 16-bit CRC value is included as the final two bytes if payload data is present but is otherwise omitted.

[1] CRC8 currently not calculated/verified by Bus Arbitrator

[2] CRC16 currently not calculated/verified by Bus Arbitrator

3.2. Message IDs

The following list includes all supported message IDs, their purpose, the sender and the expected responses:

ID	Message	Payload Size	Sender	Expected Response
2200h	Unknown/Invalid Message ID	0	BA	N/A
2201h	Get PDCP System Info Command	0	HOST	2202h or 2203h
2202h	Get PDCP System Info Success Response	6	BA	N/A
2203h	Get PDCP System Info Failure Response	3	BA	N/A
2204h	Get Device Info Command	3	HOST	2205h or 2206h
2205h	Get Device Info Success Response	13	BA	N/A
2206h	Get Device Info Failure Response	3	BA	N/A
2207h	Get Input Data Channel Info	3	HOST	2208h or 2209h
2208h	Get Input Data Channel Info Success Response	13	BA	N/A
2209h	Get Input Data Channel Info Failure Response	3	BA	N/A
220Ah	Get Output Data Channel Info	3	HOST	220Bh or 220Ch
220Bh	Get Output Data Channel Info Success Response	13	BA	N/A
220Ch	Get Output Data Channel Info Failure Response	3	BA	N/A
220Dh	Get Data Channel Link Info	3	HOST	220Eh or 220Fh
220Eh	Get Data Channel Link Info Success Response	17	BA	N/A
220Fh	Get Data Channel Link Info Failure Response	3	BA	N/A
2301h	Get Device Parameter Data Command	10	HOST	2302h or 2303h
2302h	Get Device Parameter Data Success Response	Variable	BA	N/A
2303h	Get Device Parameter Data Failure Response	3	BA	N/A
2304h	Set Device Parameter Data Command	Variable	HOST	2305h or 2306h
2305h	Set Device Parameter Data Success Response	0	BA	N/A
2306h	Set Device Parameter Data Failure Response	3	BA	N/A
2307h	Configure Data Channel Link Command	16	HOST	2308h or 2309h
2308h	Configure Data Channel Link Success Response	3	BA	N/A
2309h	Configure Data Channel Link Failure Response	3	BA	N/A
230Ah	Standard Passthrough Command	17	HOST	230Bh or 230Ch
230Bh	Standard Passthrough Success Response	17	BA	N/A
230Ch	Standard Passthrough Failure Response	3	BA	N/A
230Dh	Reset PDCP Bus System Command	3	HOST	230Eh or 230Fh
230Eh	Reset PDCP Bus System Success Response	0	BA	N/A
230Fh	Reset PDCP Bus System Failure Response	10	BA	N/A

3.3. Message Contents

3.3.1. Message 2200h: Unknown/Invalid Message ID

Description: This message is sent by the Bus Arbitrator to the Host to specify that an unknown or invalid message ID was received. It is used as a generic NOT acknowledge in response to any unknown command from the Host.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**00h**	**22h**	**##h**	**CRC8**	**00h**	**00h**

Expected Message Response: N/A

3.3.2. Message 2201h: Get PDCP System Info Command

Description: This message command is sent by the Host to the Bus Arbitrator to get the current number of bound devices, input data channels, and output data channels on the PDCP bus system. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**01h**	**22h**	**##h**	**CRC8**	**00h**	**00h**

Expected Message Response: 2202h – Get PDCP System Info Success
2203h – Get PDCP System Info Failure

3.3.3. Message 2202h: Get PDCP System Info Success Response

Description: This message response is sent by the Bus Arbitrator to the Host and returns the number of bound devices, input data channels, output data channels, and data channel links.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**02h**	**22h**	**##h**	**CRC8**	**06h**	**00h**

9 Number of Devices	10 Number of Input Data Channels	11 Number of Output Data Channels	12 Number of Data Channel Links	13 CRC16 LSB	14 CRC16 MSB
##h	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.4. Message 2203h: Get PDCP System Info Failure Response

Description: This message response is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to query/return the PDCP system information. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**03h**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.5. Message 2204h: Get Device Info Command

Description: This message is sent by the Host to the Bus Arbitrator to get the specified device's information. The specified bound device number value start from 1. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**04h**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Bound Device Number	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 2205h – Get Device Info Success
2206h – Get Device Info Failure

3.3.6. Message 2205h: Get Device Info Success Response

Description: This message is sent by the Bus Arbitrator to the Host and returns the information for the specified bound device.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**05h**	**22h**	**##h**	**CRC8**	**0Dh**	**00h**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB	15 Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 Device Type LSB	17 Device Type MSB	18 Device Profile LSB	19 Device Profile MSB	20 CRC16 LSB	21 CRC16 MSB
##h	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.7. Message 2206h: Get Device Info Failure Response

Description: This message is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to query/return the information for the specified device. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**06h**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.8. Message 2207h: Get Input Data Channel Info Command

Description: This message is sent by the Host to the Bus Arbitrator to get the specified input data channel's information. The specified input data channel number value start from 1. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**07h**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Input Data Channel Number	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 2208h – Get Input Data Channel Info Success
2209h – Get Input Data Channel Info Failure

3.3.9. Message 2208h: Get Input Data Channel Info Success Response

Description: This message is sent by the Bus Arbitrator to the Host and returns the information for the specified input data channel.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**08h**	**22h**	**##h**	**CRC8**	**0Dh**	**00h**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB	15 Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 Data Channel Type LSB	17 Data Channel Type MSB	18 Data Channel Profile LSB	19 Data Channel Profile MSB	20 CRC16 LSB	21 CRC16 MSB
##h	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.10. Message 2209h: Get Input Data Channel Info Failure Response

Description: This message is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to query/return the information for the specified input data channel. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**09h**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.11. Message 220Ah: Get Output Data Channel Info Command

Description: This message is sent by the Host to the Bus Arbitrator to get the specified output data channel's information. The specified output data channel number value start from 1. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Ah**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Output Data Channel Number	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 220Bh – Get Output Data Channel Info Success
220Ch – Get Output Data Channel Info Failure

3.3.12. Message 220Bh: Get Output Data Channel Info Success Response

Description: This message is sent by the Bus Arbitrator to the Host and returns the information for the specified output data channel.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Bh**	**22h**	**##h**	**CRC8**	**0Dh**	**00h**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB	15 Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 Data Channel Type LSB	17 Data Channel Type MSB	18 Data Channel Profile LSB	19 Data Channel Profile MSB	20 CRC16 LSB	21 CRC16 MSB
##h	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.13. Message 220Ch: Get Output Data Channel Info Failure Response

Description: This message is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to query/return the information for the specified output data channel. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Ch**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.14. Message 220Dh: Get Data Channel Link Info Command

Description: This message is sent by the Host to the Bus Arbitrator to get the specified data channel link's information. The specified data channel link number value start from 1. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Dh**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Data Channel Link Number	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 220Eh – Get Data Channel Link Info Success
220Fh – Get Data Channel Link Info Failure

3.3.15. Message 220Eh: Get Data Channel Link Info Success Response

Description: This message is sent by the Bus Arbitrator to the Host and returns the information for the specified data channel link.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Eh**	**22h**	**##h**	**CRC8**	**11h**	**00h**

9 Output Data Channel's Device VID LSB	10 Output Data Channel's Device VID MSB	11 Output Data Channel's Device PID LSB	12 Output Data Channel's Device PID MSB	13 Output Data Channel's Device SN LSB	14 Output Data Channel's Device SN MSB	15 Output Data Channel's Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 Input Data Channel's Device VID LSB	17 Input Data Channel's Device VID MSB	18 Input Data Channel's Device PID LSB	19 Input Data Channel's Device PID MSB	20 Input Data Channel's Device SN LSB	21 Input Data Channel's Device SN MSB	22 Input Data Channel's Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

23 Link Status	24 CRC16 LSB	25 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.16. Message 220Fh: Get Data Channel Link Info Failure Response

Description: This message is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to query/return the information for the specified data channel link. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Fh**	**22h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.17. Message 2301h: Get Device Parameter Data Command

Description: This message is sent by the Host to the Bus Arbitrator in order to get parameter data from the appropriate device on the PDCP bus system. The intended device is specified using its Vendor ID (VID), Product ID (PID), and Serial Number (SN). Additional information can be found within the device's PDCP reference documentation.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**01h**	**23h**	**##h**	**CRC8**	**0Ah**	**00h**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB
##h	**##h**	**##h**	**##h**	**##h**	**##h**

15 Channel Index	16 Parameter Id	17 CRC16 LSB	18 CRC16 MSB
##h	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 2302h – Get Device Parameter Data Success
2303h – Get Device Parameter Data Failure

3.3.18. Message 2302h: Get Device Parameter Data Success Response

Description: This message is sent by the Bus Arbitrator to the Host in response to successfully acquiring parameter data from the desired device. The data value and size are dependent on the queried device parameter.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**02h**	**23h**	**##h**	**CRC8**	**M-8_LSB**	**M-8_MSB**

9 Data Byte #1	10 Data Byte #2	… …	M-3 Data Byte #N-1	M-2 Data Byte #N	M-1 CRC16 LSB	M CRC16 MSB
##h	**##h**	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.19. Message 2303h: Get Device Parameter Data Failure Response

Description: This message is sent by the Bus Arbitrator to the Host when an error occurred while trying to get parameter data from a given device. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**03h**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.20. Message 2304h: Set Device Parameter Data Command

Description: This message is sent by the Host to the Bus Arbitrator in order to set parameter data for the appropriate device on the PDCP bus system. The intended device is specified using its Vendor ID (VID), Product ID (PID), and Serial Number (SN). The data value and size are dependent on the parameter being set. Additional information can be found within the device's PDCP reference documentation.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**04h**	**23h**	**##h**	**CRC8**	**M-8_LSB**	**M-8_MSB**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB	15 Channel Index	16 Parameter Id
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

17 Data Byte #1	18 Data Byte #2	… …	M-3 Data Byte #N-1	M-2 Data Byte #N	M-1 CRC16 LSB	M CRC16 MSB
##h	**##h**	**##h**	**##h**	**##h**	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 2305h – Set Device Parameter Data Success
2306h – Set Device Parameter Data Failure

3.3.21. Message 2305h: Set Device Parameter Data Success Response

Description: This message is sent by the Bus Arbitrator to the Host in response to successfully setting parameter data for the given device.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**05h**	**23h**	**##h**	**CRC8**	**00h**	**00h**

Expected Message Response: N/A

3.3.22. Message 2306h: Set Device Parameter Data Failure Response

Description: This message is sent by the Bus Arbitrator to the Host when an error occurred while trying to set parameter data for the given device. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**06h**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.23. Message 2307h: Configure Data Channel Link Command

Description: This message is sent by the Host to the Bus Arbitrator in order to set the necessary parameters on the desired devices to enable data streaming from an Output Data Channel to an Input Data Channel. Both the intended Output and Input Data Channels are specified using their Vendor ID (VID), Product ID (PID), Serial Number (SN), and Channel Index. Additional information can be found within the device's PDCP reference documentation.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**07h**	**23h**	**##h**	**CRC8**	**10h**	**00h**

9 Output Data Channel's Device VID LSB	10 Output Data Channel's Device VID MSB	11 Output Data Channel's Device PID LSB	12 Output Data Channel's Device PID MSB	13 Output Data Channel's Device SN LSB	14 Output Data Channel's Device SN MSB	15 Output Data Channel's Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 Input Data Channel's Device VID LSB	17 Input Data Channel's Device VID MSB	18 Input Data Channel's Device PID LSB	19 Input Data Channel's Device PID MSB	20 Input Data Channel's Device SN LSB	21 Input Data Channel's Device SN MSB	22 Input Data Channel's Channel Index
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

23 CRC16 LSB	24 CRC16 MSB
CRC16_LSB	**CRC16_MSB**

Expected Message Response: 2308h – Configure Data Channel Link Success
2309h – Configure Data Channel Link Failure

3.3.24. Message 2308h: Configure Data Channel Link Success Response

Description: This message is sent by the Bus Arbitrator to the Host in response to a successful Data Channel Link configuration.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**08h**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Link Status	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.25. Message 2309h: Configure Data Channel Link Failure Response

Description: This message is sent by the Bus Arbitrator to the Host when an error occurred while trying to configure a Data Channel Link. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**09h**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.26. Message 230Ah: Standard Passthrough Command

Description: This message is sent by the Host to the Bus Arbitrator and subsequently forwarded to the appropriate device on the PDCP bus system. The intended device is specified using its Vendor ID (VID), Product ID (PID), and Serial Number (SN). The DLC and CAN data field bytes are dependent on the type of message being forwarded. Additional information can be found within the device's PDCP reference documentation.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Ah**	**23h**	**##h**	**CRC8**	**11h**	**00h**

9 Device VID LSB	10 Device VID MSB	11 Device PID LSB	12 Device PID MSB	13 Device SN LSB	14 Device SN MSB	15 DLC
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 CAN Data Field Byte #1	17 CAN Data Field Byte #2	18 CAN Data Field Byte #3	19 CAN Data Field Byte #4	20 CAN Data Field Byte #5	21 CAN Data Field Byte #6	22 CAN Data Field Byte #7	23 CAN Data Field Byte #8
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

24 CRC16 LSB	25 CRC16 MSB
CRC16_LSB	**CRC16_MSB**

Expected Message Response: 230Bh – Standard Passthrough Success
230Ch – Standard Passthrough Failure

3.3.27. Message 230Bh: Standard Passthrough Success Response

Description: This message is sent by the Bus Arbitrator to the Host in response to a successful message reception from the given device.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Bh**	**23h**	**##h**	**CRC8**	**11h**	**00h**

9 VID LSB	10 VID MSB	11 PID LSB	12 PID MSB	13 SN LSB	14 SN MSB	15 DLC
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

16 CAN Data Field Byte #1	17 CAN Data Field Byte #2	18 CAN Data Field Byte #3	19 CAN Data Field Byte #4	20 CAN Data Field Byte #5	21 CAN Data Field Byte #6	22 CAN Data Field Byte #7	23 CAN Data Field Byte #8
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

24 CRC16 LSB	25 CRC16 MSB
CRC16_LSB	**CRC16_MSB**

Expected Message Response: N/A

3.3.28. Message 230Ch: Standard Passthrough Failure Response

Description: This message is sent by the Bus Arbitrator to the Host when an error occurred while trying to forward a message to the appropriate device (or receive a response from the device) on the PDCP bus system. An error code is returned in the payload.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Ch**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Error Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: N/A

3.3.29. Message 230Dh: Reset PDCP Bus System Command

Description: This message command is sent by the Host to the Bus Arbitrator to reset only a specific device or all the devices currently bound on the PDCP bus system. The Reset Code is used to specify the targeted device for reset. A Reset Code value of '0' is used to reset the entire PDCP bus system. The reference ID can be any value and is echoed back in the response message.

Sender: Host

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Dh**	**23h**	**##h**	**CRC8**	**03h**	**00h**

9 Reset Code	10 CRC16 LSB	11 CRC16 MSB
##h	**CRC16_LSB**	**CRC16_MSB**

Expected Message Response: 230Eh – Reset PDCP Bus System Success
230Fh – Reset PDCP Bus System Failure

3.3.30. Message 230Eh: Reset PDCP Bus System Success Response

Description: This message response is sent by the Bus Arbitrator to the Host to confirm that the resetting of the targeted device(s) on the PDCP bus system was successful.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Eh**	**23h**	**##h**	**CRC8**	**00h**	**00h**

Expected Message Response: N/A

3.3.31. Message 230Fh: Reset PDCP Bus System Failure Response

Description: This message response is sent by the Bus Arbitrator to the Host to signify that an error occurred while attempting to reset the targeted device(s) on the PDCP bus system. The payload contains the result of the resetting command where each bit represents a device (e.g. bit-0 represents bound device #1). A cleared bit represents an unsuccessful device reset.

Sender: Bus Arbitrator

Format:

1 Sync #1	2 Sync #2	3 Msg ID LSB	4 Msg ID MSB	5 Ref ID	6 CRC8	7 Payload Size LSB	8 Payload Size MSB
FEh	**19h**	**0Fh**	**23h**	**##h**	**CRC8**	**0Ah**	**00h**

9 Reset Results Byte #1	10 Reset Results Byte #2	11 Reset Results Byte #3	12 Reset Results Byte #4	13 Reset Results Byte #5	14 Reset Results Byte #6	15 Reset Results Byte #7	16 Reset Results Byte #8
##h	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**	**##h**

17 CRC16 LSB	18 CRC16 MSB
CRC16_LSB	**CRC16_MSB**

Expected Message Response: N/A