GM236(GT333)
Data Communication Protocol Specification

BIONIME

Revision 1.0 2019-07-17

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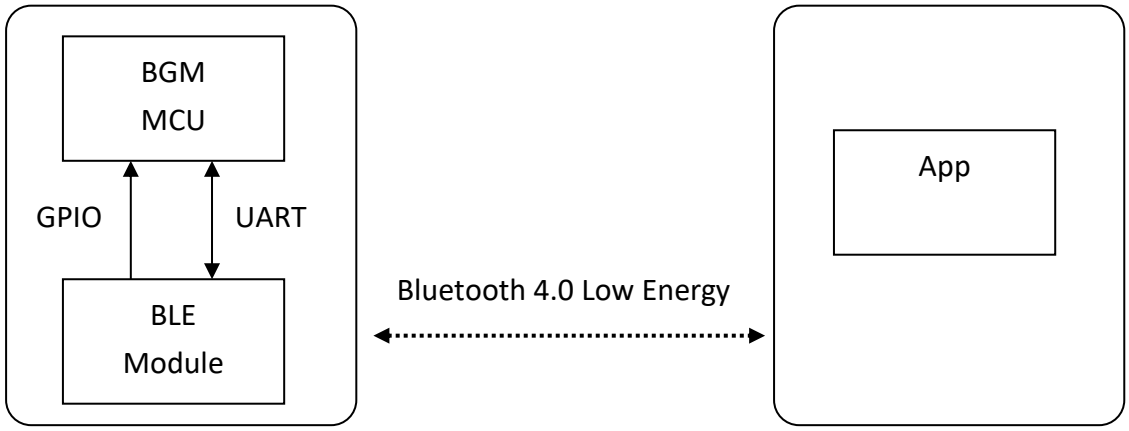
Introduction

The purpose of document is to offer a data communication protocol for transfer measurement data from meter to computer, third party's device or Smartphone App.
Smartphone App is Host, BIONIME BGM is Slave, and linked via Bluetooth 4.0 Low Energy techonology .
Host can use Bionime cusotmized BLE GATT service to communicate with BGM or switch communication mode(PCL mode or Normal mode). If BGM was swithed to PCL mode, the BGM will be locked and display PCL on screen.

Host(smartphone app) sent commands to BGM, and BGM reply "Return Data" to Host corespondly. BGM may send notifications (ex. Record Notifiation) to host when Bluetooth connection created and BGM still in Normal Mode.

Architecture Diagram



All of the data commands which transmitted between App and meter will be packed by BLE GATT Service format.

The BLE advertising device name of BGM was serial number of BGM

Bionime Customized BLE GATT Service

The Bionime customized Primary Service (0XFEE0) provide the follow 3 Characteristics:

Characteristic	Type	Description	Specification
0XFEE1	Read/Write	Set PCL Mode	1 byte PCL ON: 0X00 PCL OFF: 0X01 (default)
0XFEE2	Notify	BGM_BLE → Smartphone_	~512 bytes (Raw data)
0XFEE3	Write	BGM_BLE ← Smartphone_	~20 bytes (Raw data)
0XFEE5	Reserve		
0XFEE6	Reserve		

NOTE:

1. To write the byte of 0x00 to FEE1 to inform the BGM to open the PCL channel
2. After setting FEE2 Notify, it will automatically return "meter ID"
3. Due to payload bytes limitation of GATT service, please add total number of packets and current packet index at first 2 bytes of each payload of 0xFEE2.

GATT Payload Format

Byte 1	Byte 2	Byte 3	…	Last Byte
Total number of Packets	Packet Index	Data byte	…	Data byte

For example:

If MCU send 26 bytes (from A ~ Z), and the maximum payload bytes of is 20 bytes. BLE module should separate to several packets to send all data bytes to Smartphone

#1 packet: 0x02 0x01 ‘A’ ‘B’ ‘C’ ‘D’ ‘E’ ‘F’ …….. ‘R’

#2 packet: 0x02 0x02 ‘S’ ‘T’ ‘U’ V’ ‘W’ ’X’ ‘Y’ ‘Z’

Command Format Description

Byte Index	Value	Description
0	0xB0	Header of Command
1	0xNN	Command ID
2~n	0xNN ~ 0xNN	Data bytes (Optional)

(last byte)	0xNN	Checksum

Return Data Format Description

Byte Index	Value	Description
0	0x4F	Header of Return Data
1	0xNN	Return Data ID
2~n	0xNN ~ 0xNN	Data bytes
(last byte)	0xNN	Checksum

checksum

Checksum = (Byte[0] + byte[1] + …. Byte[n]) & 0xFF

For Example:

Command : *0xB0 0x20 0x4F*

Checksum Byte = *(0xB0 + 0x20 + 0x4F) & 0xFF*

= *0x11F & 0xFF*

= *0x1F*

Therefore the commnad send is: *0xB0 0x20 0x4F 0x1F*

Protocol Description

Have To write the byte of 0x00 to FEE1 first to inform the BGM to enable the PCL channel command protocol

Query Model Name

Byte Index	0	1	2	3	4	5	6	7
Command	0xB0	0x00	CS					
Return Data	0x4F	0xFF	MN1	MN2	MN3	MN4	MN5	CS

Query meter’s model name.

Description of MN1 ~ MN5:

Meter model name, ASCII format charactes.

For Example:

Host Send:

0xB0 0x00 0xB0

Mete Response:

0x4F 0xFF 0x47 0x4D 0x37 0x38 0x32 0x83

(HEX)

HDR CID 'G' 'M'' '7' '7' '2' CS

(ASCII)

It means the Meter's Model name is GM700.

Query Firmware Version

Byte Index	0	1	2	3	4	5	6
Command	0xB0	0x01	CS				
Return Data	0x4F	0xFE	FV1	FV2	FV3	FV4	CS

Query the meter's firmare verion.

FV1~FV4 Description:

Firmware version. ASCII format characters.

For Example :

Host Send:

0xBO 0x01 0xB1

Meter Response:

0x4F 0xFE 'A' '0' '0' '2' CS

(ASCII)

0x4F 0xFE 0x41 0x30 0x30 0x32 0x26

(Hex)

It means Meter's firmware version is A002

Get/Set Date Time & Unit

Byte Index	0	1	2	3	4	5	6	7	8
Command	0xB0	0x06	UNIT	YEAR	MONTH	DAY	HOUR	MINUTE	CS
Return Data	0x4F	0xF9	UNIT	YEAR	MONTH	DAY	HOUR	MINUTE	CS

Get and Set the date/time and measurement unit of Meter

UNIT Format Description:

Bit	Description
7:5	Reserved, Default = 0.
4	On/Off Volume(Buzzer) 0 : Volume On 1 : Volume Off
3	Get or Set 0 : Get from meter 1 : Set to meter
2	24-hours display setting 0 : 24 hours display. 1 : 12 hours display.
1	Display measurement unit, 0 : mg/dL 1 : mmol/L NOTE: If Bit 0 of this byte is 1, it means Unit Setting is fixed, then bit 1 is unworkable.
0	Unit changeable setting 0 : Unit is changeable. 1 : Unit is fixed.

	NOTE: This bit is only workable during read data; write is unworkable,

YEAR Description:

Value Range: 0x00 ~ 0x63, Means 2000 ~ 2099.

MONTH Description:

Value Rannge: 0x00 ~ 0x0B, Means Jan.~Dec.

DAY Description:

Value Range: 0x00~0x1E, Means 1~31

HOUR Description:

Value Range: 0x00~0x17, Means 0~23 hour.

MINUTE Description

Value Range: 0x00 ~0x3B, Means 0~59 Minutes.

For Example Get Date Time & Unit:

Host Send:

0xB0 0x06 0x00 0x00 0x00 0x00 0x00 0x00 0xB6

Meter Response:

0x4F 0xF9 0x01 0x09 0x00 0x00 0x0C 0x00 0x5E

Unit(0x01) Get Time, 24-hours, mg/dL, Unit is fixed

Year(0x09) Get year 2009

Month(0x00) Get January

Day(0x00) Get 1st day of the month

Hour(0x0C) Get 12 o'clock

Minute(0x00) Get 0 minutes

For Example Set Date Time & Unit:

Host Send:

0xB0 0x06 0x0C 0x0D 0x08 0x0C 0x06 0x1A 0x03

Meter Response:

0x4F 0xF9 0x0C 0x0D 0x08 0x0C 0x06 0x1A 0x95

Unit(0x0C) Set Time, 12-hours, mg/dL, Unit is selectable

Year(0x0D) Set year 2013

Month(0x08) Set September

Day(0x0C) Set 13'th day of the month

Hour(0x06) Set 6 o'clock

Minute(0x1A) Set 26 minutes

Get/Set Time Zone

Get/Set Time Zone Command						
	0	1	2	3	4	
Command	B0	32	R/W	TimeZone	CS	
Return Data	4F	CD	R/W	TimeZone	CS	

R/W = 0x00 , Get Time Zone

R/W = 0x01, Set Time Zone

TimeZone Description

Value Range: 0 ~ 31

Default Value = 31

Time Zone Table

Meter TZ Index	Timezone String	GMT value	UTC value
0	Etc/GMT-12	GMT+12	UTC+12
1	Etc/GMT-11	GMT+11	UTC+11
2	Etc/GMT-10	GMT+10	UTC+10
3	Etc/GMT-9	GMT+9	UTC+9
4	Etc/GMT-8	GMT+8	UTC+8
5	Etc/GMT-7	GMT+7	UTC+7
6	Etc/GMT-6	GMT+6	UTC+6
7	Etc/GMT-5	GMT+5	UTC+5
8	Etc/GMT-4	GMT+4	UTC+4
9	Etc/GMT-3	GMT+3	UTC+3
10	Etc/GMT-2	GMT+2	UTC+2
11	Etc/GMT-1	GMT+1	UTC+1
12	Etc/GMT	GMT	UTC
13	Etc/GMT+1	GMT-1	UTC-1
14	Etc/GMT+2	GMT-2	UTC-2
15	Etc/GMT+3	GMT-3	UTC-3
16	Etc/GMT+4	GMT-4	UTC-4
17	Etc/GMT+5	GMT-5	UTC-5
18	Etc/GMT+6	GMT-6	UTC-6
19	Etc/GMT+7	GMT-7	UTC-7
20	Etc/GMT+8	GMT-8	UTC-8
21	Etc/GMT+9	GMT-9	UTC-9
22	Etc/GMT+10	GMT-10	UTC-10
23	Etc/GMT+11	GMT-11	UTC-11
24	Etc/GMT+12	GMT-12	UTC-12
25	Etc/GMT-13	GMT+13	UTC+13
26	Etc/GMT-14	GMT+14	UTC+14
27	*NA*		
28	*NA*		
29	*NA*		
30	*NA*		
31	*Meter Default Value*	*Meter Default Value*	*Meter Default Value*

Read One Record

Byte Index	0	1	2	3	4	5	6	7	8	9
Command	0xB0	0x61	IND_L	IND_H	CS					
Return Data	0x4F	0x9E	IND_L	IND_H	DA_0 ~ DA_5					
Byte Index	10	11	12	13	14	15	16	17	18	19
Return Data	Reserve									
Byte Index	20	21	22	23	24	25	26	27	28	29
Return Data	CS									

Read One Record Type2 and Read Eight Record Return Data Description

DA_n	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Month(Bit 1~0)			Day (5Bits)				
1	Month(Bit 3~2)		Timezone Bit0	Hour (5Bits)				
2	Timezone Bit2	Timezone Bit1	Minute (6Bits)					
3	ShowHiFg	Year (7 Bits)						
4	Timezone Bit4	Timezone Bit3	Meal Bit2	Meal Bit1	Meal Bit0	CB/CS	Glucose(Bit 9~8)	
5	Glucose(Bit 7~0)							
10	Reserve							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	Check Sum(8Bits)							

Read one blood glucose data and it will update last trandmission index of record . The last transmission index is used for tracking and caculating unread record count.

> **CAUTION :**
> Before read blood glucose data, host must be send "*read total amount of blood glucose data*" command to BGM once, and then it can send "*read specific glucose data*" command to read specific data record from BGM.
> Otherwise the BGM will response incrooect or unexepcted data.

This command has 2 types:

Record index = (IND_H << 8) + INX_L

TYPE 1： If Record Index = 0, it means *read amount of blood glucose datas*.

TYPE 2： If Record Index > 0, it means *read specific blood glucose data*.

TYPE 1：

Return Data Description:

IND_ L & IND_H Description:

The low bits and high bits of record index that wants to read.

In this type, these two bytes were fixed to 0x00.

Index L : 0x00

Index H : 0x00

DA_0 Description:

Bit	Description
7:0	Total amount of blood glucose records (low bits). Ex.: Total Amount = (DA_1 << 8) + DA_0

DA_1 Description:

Bit	Description

7:0	Total amount of blood glucose records (high bits). Ex.: Total Amount = (DA_1 << 8) + DA_0

DA_2 Description:

Bit	Description
7:0	Maximum amount of blood glucose records that can be stored in meter (low bits). Ex.: Max. Amount = (DA_3 << 8)+ DA_2

DA_3 Description:

Bit	Description
7:0	Maximum amount of blood glucose records that can be stored in meter (high bits). Ex.: Max. Amount = (DA_3 << 8)+ DA_2

DA_4 Description:

Bit	Description
7:0	Last transmission Index of record (low bits). Ex.: Index = (DA_5 << 8) + DA_4

DA_5 Description:

Bit	Description
7:0	Last transmission Index of record (high bits). Ex.: Index = (DA_5 << 8) + DA_4

TYPE 2：

Return Data Description:

IND_ L & IND_H Description:

Record index = (IND_H << 8) + INX_L

DA_0 Description:

Bit	Description

7:6	Month (low bit). Value Range: 0~11, Means Jan. ~ Dec. Ex.: Month = (DA_1 & 0xC0) >> 4 + (DA_0 & 0xC0) >> 6 + 1
5	Null
4:0	Day. Value Range: 0~31, Means day1~day31. Ex.: Day = DA_0 & 0x1F + 1

DA_1 Description:

Bit	Description
7:6	Month (low bit). Value Range: 0~11, Means Jan.~ Dec. Ex.: Month = (DA_1 & 0xC0) >> 4 + (DA_0 & 0xC0) >> 6 + 1
5	Timezone Bit 0
4:0	Hour (24-hours). Value Range: 0-23, means 00:00 to 23:00. Ex.: Hour = DA_1 & 0x1F

DA_2 Description:

Bit	Description
7:6	Timezone Bit 2/1
5:0	Minute. Range: 0~59, Means 0~59 minutes.

	Ex.: Minute = DA_2 & 0x3F

DA_3 Description:

Bit	Description
7	Hi Flag 1: Record was marked as “Hi”(Over 600 mg/dL) 0: Normal record
6:0	The last 2 digits of year. Range: 0~99; Means 2000~ 2099 (DEX) Ex: Year = DA_3 & 0x7F + 2000

DA_4 Description:

Bit	Description			
7:6	Timezone Bit 4/3			
5:3	Please combine Bit 3 ~ 5 for deciding which marker was used. More detail description please see below:			
	Bit 5	**Bit 4**	**Bit 3**	**Description**
	0	0	0	Before meal
	0	0	1	After meal
	0	1	0	No meal
	0	1	1	Moon meal
	1	0	0	BedTime meal
	1	0	1	Sport meal
	1	1	0	WakeUp meal

	.
2	The flag for mark control solution measurement. 1: Use Control solution test. 0: Normal blood glucose test
1:0	Blood glucose value (High bits, Bit 9:8). Ex: Glucose Value = (DA_4 & 0x03) << 8 + DA_5

DA_5 Description:

Bit	Description
7:0	Blood glucose value (Low bits, Bit 7:0). Ex: Glucose Value = (DA_4 & 0x03) << 8 + DA_5

For example :

TYPE 1 *The Command of read total amount of blood glucose data*:

Host Send:

0xB0 0x61 0x00 0x00 0xB7

Meter Response:

0x4F 0x9E 0x00 0x00 0x18 0x00 0xE8 0x03 0x05 0x00 0xC6

Total Amount of data = (0x00 << 8) + 0x18
= 0x18 (HEX)
= 24 (DEX)

The meter currently has 24 records..

The maximum capacity of record = (0x03 << 8)+ 0xE8
= 0x3E8 (HEX)
= 1000 (DEX)

It means the maximum record capacity of meter is 1000.

Last reading Index of record =(0x00<<8) + 0x05
=0x05(HEX)

=5(DEX)

It Means Last reading index of record is 5. So App should start to read records

from 4th record for sync data correctly.

TYPE 2 *The command of read first blood glucose data:*

Host Send :

0xB0 0x61 0x01 0x00 0xB8

Meter Response:

0x4F 0x9E 0x01 0x00 0x19 0x42 0x0F 0x0B

0x80 0xC5 0x82

Transmission Position =(0x00<<8) + 0x01

=0x01(HEX)

=1(DEC)

It Means Meter Set Last Transmission Position to 1 And Then Return Meter Response.

Index = 0x00 + 0x01

= 0x01

= 1 (DEC) → 1st Data

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01

= 0x05

= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01

= 0x1A

= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F

= 0x02

= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F

= 0x0F

= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x80 & 0xC0) >> 3
= 0x10
= 16 (DEC) → Means Time Zone GMT – 4

Marker = (0x80 & 0x38) >> 3
= 0x00
= 0 (DEC) → Means Before meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Read Eight Record

Byte Index	0	1	2	3	4	5	6	7	8	9
Command	0xB0	0x62	IND_L	IND_H	CS					
Return Data	0x4F	0x9D	IND_L	IND_H	DA1_0~5					
Byte Index	10	11	12	13	14	15	16	17	18	19
Return Data	Reserve									
Byte Index	20	21	22	23	24	25	26	27	28	29
Return Data	DA2_0~5						Reserve			
Byte Index	30	31	32	33	34	35	36	37	38	39
Return Data	Reserve						DA3_0~5			
Byte Index	40	41	42	43	44	45	46	47	48	49
Return Data			Reserve							
Byte Index	50	51	52	53	54	55	56	57	58	59

Return Data	Reserve		DA4_0~5						Reserve	
Byte Index	60	61	62	63	64	65	66	67	68	69
Return Data	Reserve								DA5_0~5	
Byte Index	70	71	72	73	74	75	76	77	78	79
Return Data					Reserve					
Byte Index	80	81	82	83	84	85	86	87	88	89
Return Data	Reserve				DA6_0~5					
Byte Index	90	91	92	93	94	95	96	97	98	99
Return Data	Reserve									
Byte Index	100	101	102	103	104	105	106	107	108	109
Return Data	DA7_0~5						Reserve			
Byte Index	110	111	112	113	114	115	116	117	118	119
Return Data	Reserve						DA8_0~5			
Byte Index	120	121	122	123	124	125	126	127	128	129
Return Data			Reserve							
Byte Index	130	131	132	133	134	135	136	137	138	139
Return Data	Reserve		CS							

Read eight blood glucose data and it will update last trandmission index of record . The last transmission index is used for tracking and caculating unread record count.

CAUTION :

1.Before read blood glucose data, host must be send "*read total amount of blood glucose data*" command to BGM once, and thenit can send "*read specific glucose data*" command to read specific data record from BGM.

2.Determine the BGM total glucose data greater than or equal eight, and read index minimum is eight, if read index less than eight or BGM total glucose data less than eight the BGM will no response.

Return Data Description:

IND_ L & IND_H Description:

Record index = (IND_H << 8) + INX_L

DAn_0 Description:

Bit	Description
7:6	Month (low bit). Value Range: 0~11, Means Jan. ~ Dec. Ex.: Month = (DA_1 & 0xC0) >> 4 + (DA_0 & 0xC0) >> 6 + 1
5	Null
4:0	Day. Value Range: 0~31, Means day1~day31. Ex.: Day = DA_0 & 0x1F + 1

DAn_1 Description:

Bit	Description
7:6	Month (low bit). Value Range: 0~11, Means Jan.~ Dec.

	Ex.: Month = (DA_1 & 0xC0) >> 4 + (DA_0 & 0xC0) >> 6 + 1
5	Timezone Bit 0
4:0	Hour (24-hours). Value Range: 0-23, means 00:00 to 23:00. Ex.: Hour = DA_1 & 0x1F

DAn_2 Description:

Bit	Description
7:6	Timezone Bit 2/1
5:0	Minute. Range: 0~59, Means 0~59 minutes. Ex.: Minute = DA_2 & 0x3F

DAn_3 Description:

Bit	Description
7	Hi Flag 1: Record was marked as “Hi”(Over 600 mg/dL) 0: Normal record
6:0	The last 2 digits of year. Range: 0~99; Means 2000~ 2099 (DEX) Ex: Year = DA_3 & 0x7F + 2000

DA_4 Description:

Bit	Description
7:6	Timezone Bit 4/3

<table>
<tr><td>5:3</td><td>Please combine Bit 3 & 5 for deciding which marker was used.
More detail description please see below:

<table><tr><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>0</td><td>Before meal</td></tr><tr><td>0</td><td>0</td><td>1</td><td>After meal</td></tr><tr><td>0</td><td>1</td><td>0</td><td>No meal</td></tr><tr><td>0</td><td>1</td><td>1</td><td>Moon meal</td></tr><tr><td>1</td><td>0</td><td>0</td><td>BedTime meal</td></tr><tr><td>1</td><td>0</td><td>1</td><td>Sport meal</td></tr><tr><td>1</td><td>1</td><td>0</td><td>WakeUp meal</td></tr></table></td></tr>
<tr><td>2</td><td>The flag for mark control solution measurement.

1: Use Control solution test.

0: Normal blood glucose test</td></tr>
<tr><td>1:0</td><td>Blood glucose value (High bits, Bit 9:8).

Ex: Glucose Value = (DA_4 & 0x03) << 8 + DA_5</td></tr>
</table>

DAn_5 Description:

Bit	Description
7:0	Blood glucose value (Low bits, Bit 7:0). Ex: Glucose Value = (DA_4 & 0x03) << 8 + DA_5

For Example:

The command of read 1 ~8 blood glucose data:

Host Send :

0xB0 0x62 0x08 0x00 0xB8

Meter Response:

0x4F	0x9D	0x08	0x00	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0x19	0x42	0x0F	0x0B
0x19	0x42	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	0xCS			

Transmission Position =(0x00<<8) + 0x08
=0x08(HEX)
=8(DEC)

It Means Meter Set Last Transmission Position to 1 And Then Return Meter Response.

Index = 0x00 + 0x08

= 0x08
= 8 (DEC) → 1st Data

Index-8:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-7:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-6:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-5:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-4:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-3:

Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01

= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-2:
Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A
= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Index-1:
Month = (0x42 & 0xC0) >> 4 + (0x19 & 0xC0) >> 6 + 0x01
= 0x05
= 5 (DEC) → Means May

Day = (0x19 & 0x1F) + 0x01
= 0x1A

= 26 (DEC) → Means 26th day.

Hour = 0x42 & 0x1F
= 0x02
= 2 (DEC) → Means 2 o'clock

Minute = 0x0F & 0x3F
= 0x0F
= 15 (DEC) → Means 15 mins

Year = 0x0B & 0x7F
= 0x0B
= 11 (DEC) → Means Year 2011

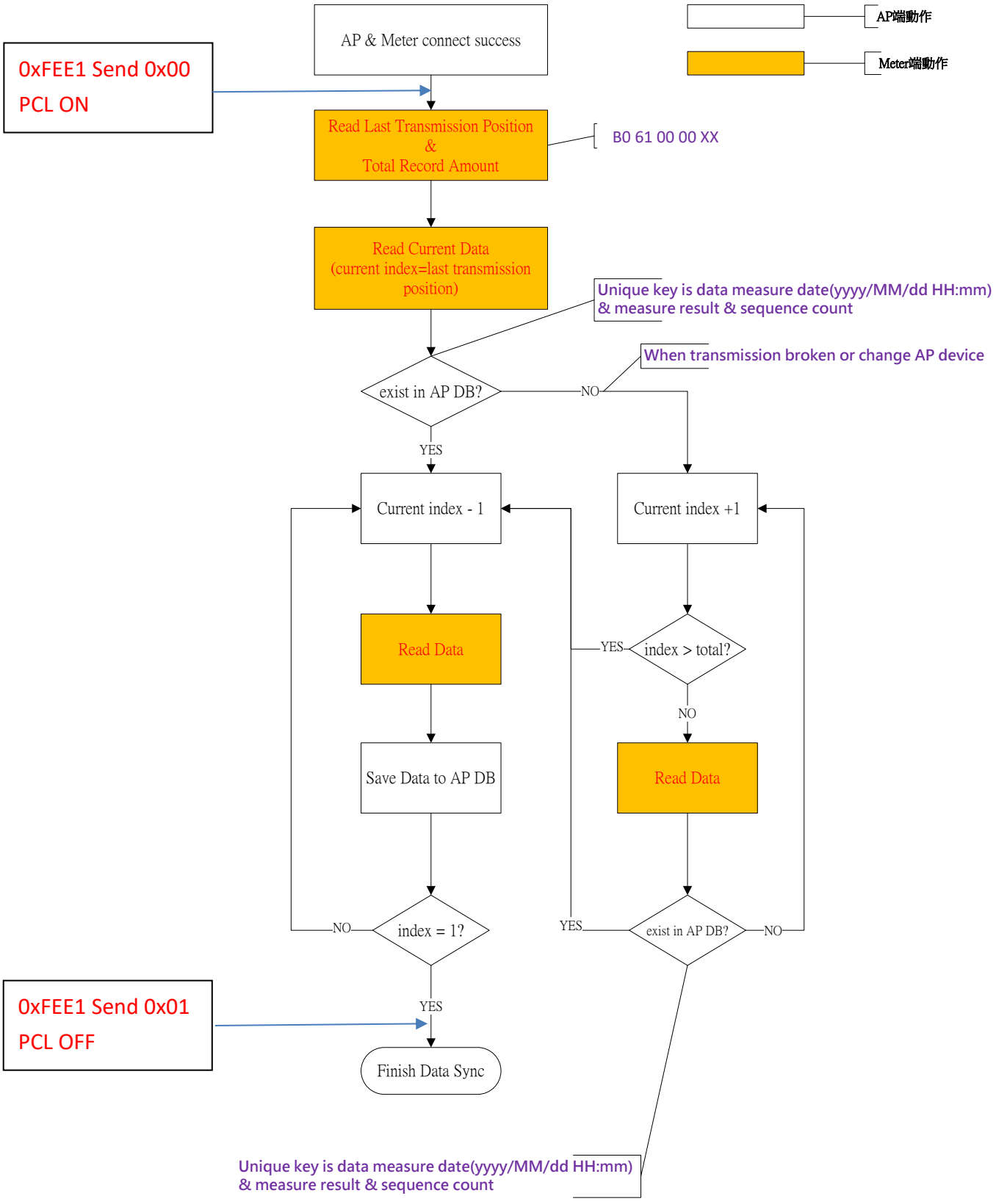
Time Zone = (0x42 & 0x20) >> 5 + (0x0F & 0xC0) >> 5
+ (0x19 & 0xC0) >> 3
= 0x00
= 0 (DEC) → Means Time Zone GMT + 12

Marker = (0x19 & 0x38) >> 3
= 0x03
= 3 (DEC) → Means Moon meal

Blood Glucose Data = (0x80 & 0x03) << 8 + 0xC5
= 0xC5
= 197 (DEC) → Means glucose data
= 197 mg/dL

Appendix

Measurement Data transmission Flow



BLE Pairing Flow