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IS1678S Command Set

(v0.97)

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1. General Description

BM77 provides UART communication interface with MCU. This document describes UART interface and communication protocol between **BM77** and MCU. The word "**BM77**" follows this chapter also including the behavior of BM79BLETR. "It's only for **BM77**" is annotated if BM79BLETR doesn't support.

2. UART Interface

2.1 Pin definition

Name	Pin Define	Type	Description
UART_TX_IND	P0_4	Output	**BM77** inform Host MCU that UART data will be transmitted out after few us (Setting by EEPROM, default 5ms)
UART_RX_IND	Configurable	Input	Host MCU inform **BM77** that UART data will be transmitted out after few us
UART_RTS	P0_0	Input	UART Flow Control High: UART flow stop Low: UART flow Go
UART_CTS	P1_7	Output	UART Flow Control High: UART flow stop Low: UART flow Go
UART_TXD	HCI_TXD	Output	
UART_RXD	HCI_RXD	Input	

2.2 Packet Format:

The UART packet format is shown as below diagram.

	HEAD		MID	DATA	CRC
	START	LENGTH	COM/Event.ID	COM/Event PARAM	CHKSUM
BYTE NO	0	1 ~ 2	3	4 ~ XX	Length + 3
SIZE (BYTE)	1	2	1	0 ~	1
VALUE	0xAA	1 ~	COMMAND	DATA	CHK SUM
	SINC WORD	Check sum to be calculated			
			TARGET LENGTH		

Check sum rule: Summation of every byte after START WORD(LENGTH, COM.ID, COM PARAM, CHK SUM) is 0xXX00

e.g.

	START	LENGTH(H)	LENGTH(L)	ID	PARAM	CHKSUM
BYTE NO	0	1	2	3	4	5
VALUE	0xAA	0x00	0x02	0x01	0x00	0xFD

2.3 UART Setting

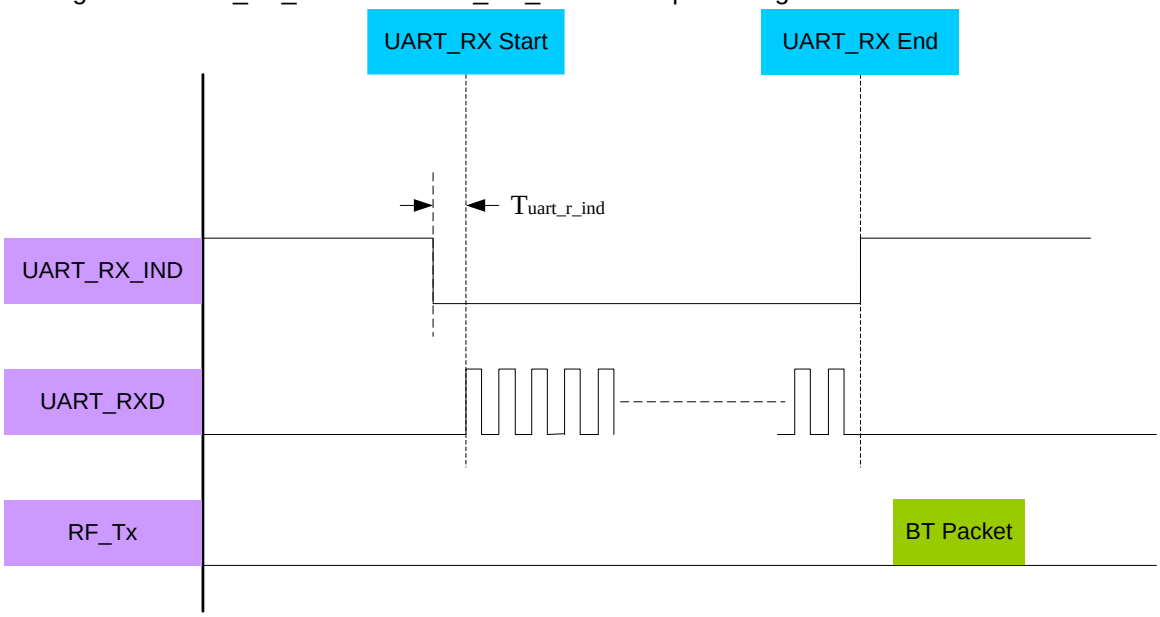
- UART supports baud rates from 1200 to 921600 bps.
- UART setting can be configured by E2PROM value change.
  - UART Baud rate setting:
  - UART setting: Parity check

2.4 Support HCI UART mode

- Fix baud rate in 115200bps.
- Enter test mode for mass production and system configuration.

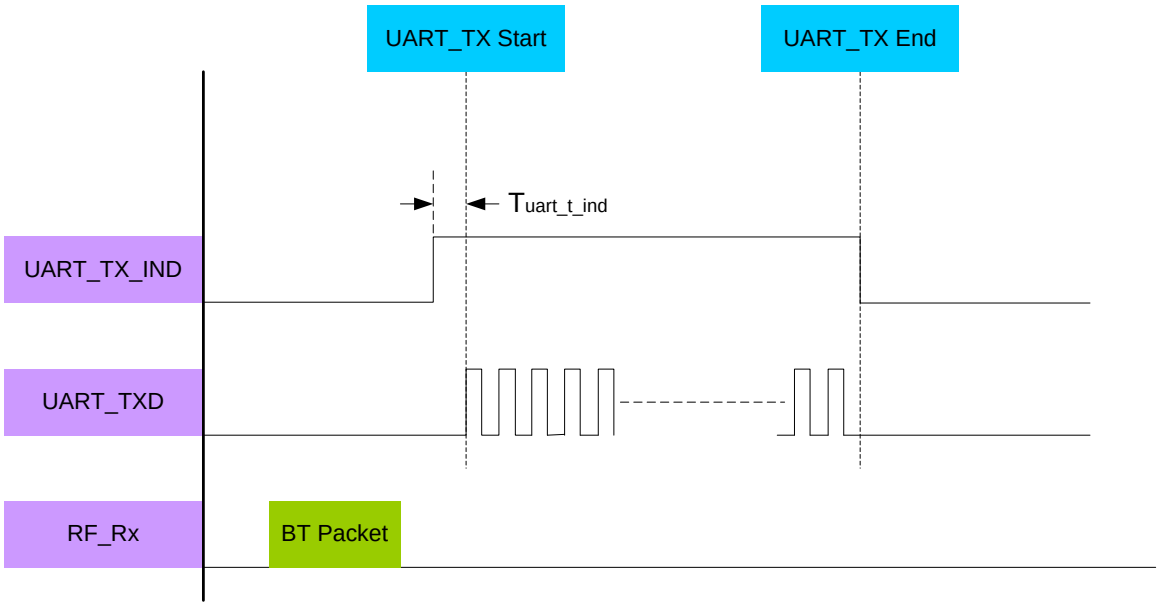
2.5 UART data exchange for low power mode

- Signal of UART_TX_IND and UART_RX_IND are required to guarantee the correction of UART data.



*** Tuart_r_ind: > 2ms**

Fig 3.5.1 Host_MCU indicate **BM77** UART data timing diagram



*** Tuart_t_ind: by E2PROM setting (Default 5ms)**

Fig 3.5.2 **BM77** indicate Host_MCU UART data timing diagram

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2.6 UART flow control

- CTS / RTS signal flow control scheme.
- UART flow control scheme can be configured by E2PROM setting.
- If UART_CTS sets flow stop while data transmission, **BM77** will stop transmit, and that won't transmit more than two bytes after flow stop.

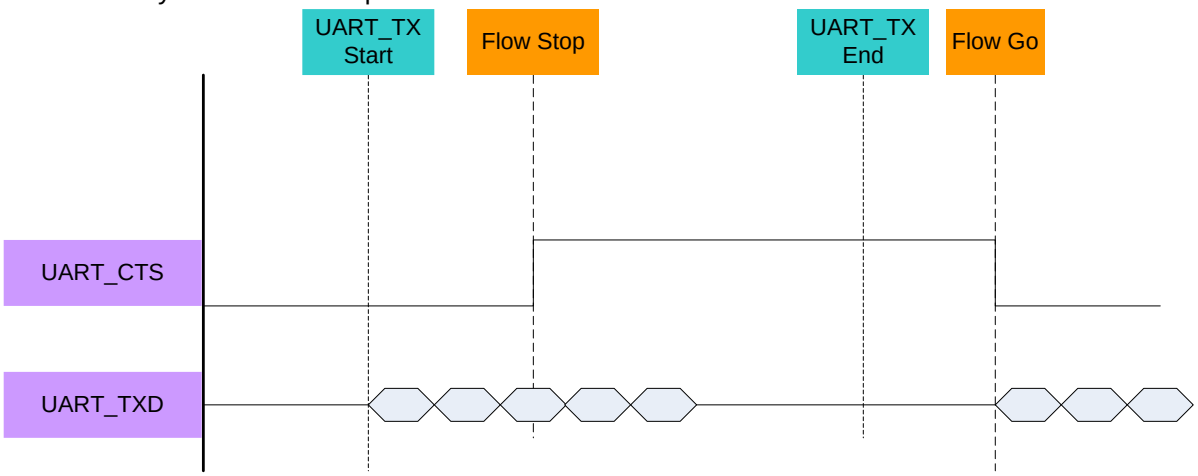

Fig 3.6.1 Host_MCU indicate **BM77** UART flow control timing diagram

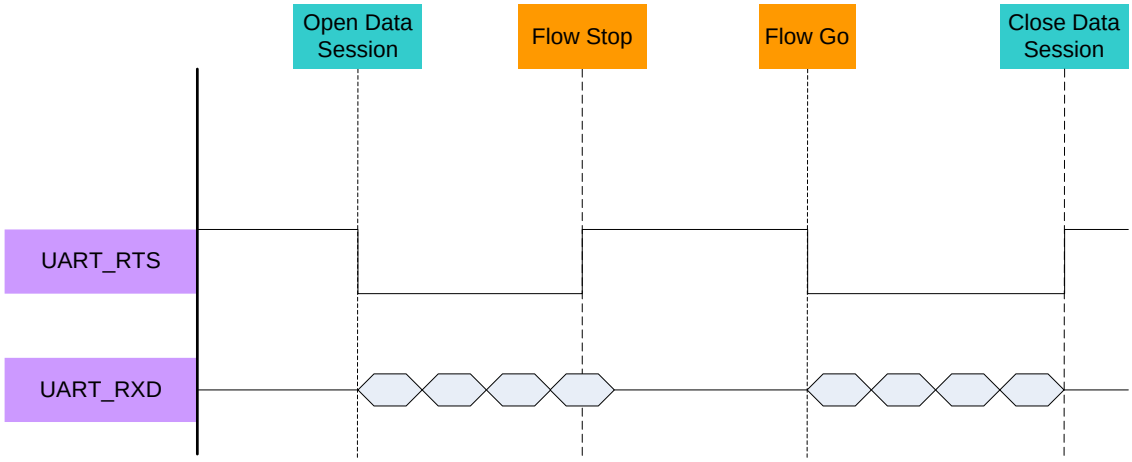

Fig 3.6.2 **BM77** indicate Host_MCU UART flow control timing diagram

2.7 UART packet error handle

BM77 will reply Command_Compete with UART_Check_Sum_Error (0xFF) status if received UART packets with Check Sum error.

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3. Command Op Code Definition

Command Type	Op Code	Command	Return Event	Auto Pattern	Manual Pattern
Common	0x01	Read_Local_Information	Command_Complete	F	
	0x02	Reset		N/A	
	0x03	Read_BM77_Status	BM77_Status_Report	N/A	
	0x05	Into_Power_Down_Mode	Command_Complete	N/A	
	0x07	Read_Device_Name	Command_Complete	F	
	0x08	Write_Device_Name	Command_Complete	F	I
	0x09	Erase_all_Paired_Device_Information	Command_Complete	F	I
	0x0A	Read_Pairing_Mode_Setting	Command_Complete	F	
	0x0B	Write_Pairing_Mode_Setting	Command_Complete	F	I
	0x0C	Read_All_Paired_Device_Information	Command_Complete	F	
	0x0D	Delete_Paired_Device	Command_Complete	F	I
GAP	0x10	Read_RSSI_Value	Command_Complete	N/A	CM
	0x11	Write_Adv_Data	Command_Complete	F	I
	0x12	Write_Scan_Res_Data	Command_Complete	F	I
	0x13	Set_Advertising_Parameter	Command_Complete	F	I
	0x1B	Disconnect	Disconnection_Complete	N/A	CM
	0x1C	Invisible_Setting	Command_Complete	N/A	I
	0x1D	SPP_Create_Link	SPP_Connection_Complete	N/A	I
	0x1E	SPP_Create_Link_Cancel	Command_Complete	N/A	I
	0x1F	Read_Remote_Device_Name	Command_Complete	N/A	CM
SPP/GATT Transparent	0x3a	Send_Transparent_Data	Command_Complete	N/A	CM
Pairing	0x40	Passkey_Entry_Res	Command_Complete	CP	CP
	0x41	User_Confirm_Res	Command_Complete	CP	CP
Common_2	0x50	Read_PIN_Code	Command_Complete	F	I
	0x51	Write_PIN_Code	Command_Complete	F	I
	0x52	Leave_Configure_Mode	Command_Complete	F	N/A

*I: Available in Idle Mode

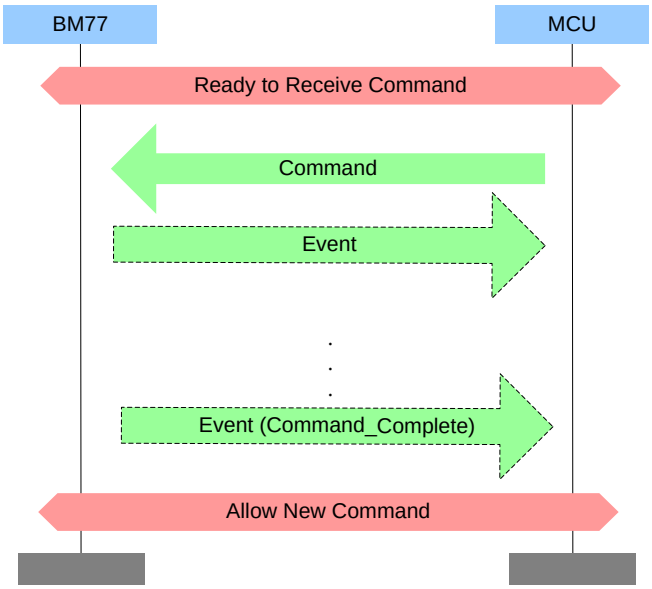
*CP: Available in Connected Mode with Pairing Procedure.

*F: Available in Configure Mode

*CM: Available in Connected Mode with Manual Pattern

3.1 Rules of MCU Command Assign

Most of command request sending by MCU will be replied by Command_Commplete event. Another new command request is allowed for MCU by receiving Command_Complete event.



There are some exceptions that no Command_Complete event is sent by the **BM77** to indicate that this command has been completed. Following are the exception commands:

- Read_BM77_Status: The BM77_Status_Report event indicates that this command has been completed.
- SPP_Create_Link: The SPP_Connection_Complete event indicates that this connection establishment has been completed. If **BM77** can't achieve the connection establishment, then the SPP_Connection_Complete event won't be sent to MCU. MCU can send SPP_Create_Link_Cancel command to stop the action.
- Reset: MCU can know that the command has been completed by getting BM77_Status_Report event.
- Disconnect: The Disconnect_Complete event indicates that this command has been completed.

Besides some command request are allowed for MCU without waiting Command_Complete event after last command request was sending. Those commands are listed as below:

- SPP_Create_Link_Cancel
- Disconnect
- Reset

3.2 Common_1 Commands

MCU sends the Common Command to **BM77** for specific purpose. **BM77** will reply the Command_Complete event to notify the command process result.

3.2.1 Read_Local_Information (0x01)

Command	Op Code	Command Parameters	Return Parameters
Read_Local_Information	0x01	None	Status, Version, BD_ADDR

Description:

This command is used to read local information of **BM77**.

Return Parameters:

Status: *Size: 1 Byte*

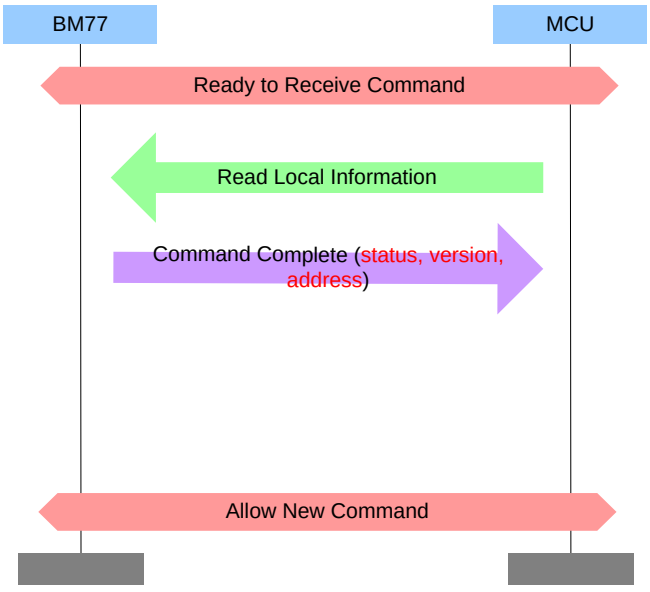
Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

Version: *Size: 5 Bytes*

Value	Parameter Description
0xXXXXXXXXXX	Version information of **BM77**

BD_ADDR: *Size: 6 Bytes*

Value	Parameter Description
0xXXXXXXXXXXX	**BM77** Bluetooth address



[Return to Command Table]

3.2.2 Reset (0x02)

Command	Op Code	Command Parameters	Return Parameters
Reset	0x02	None	

Description:

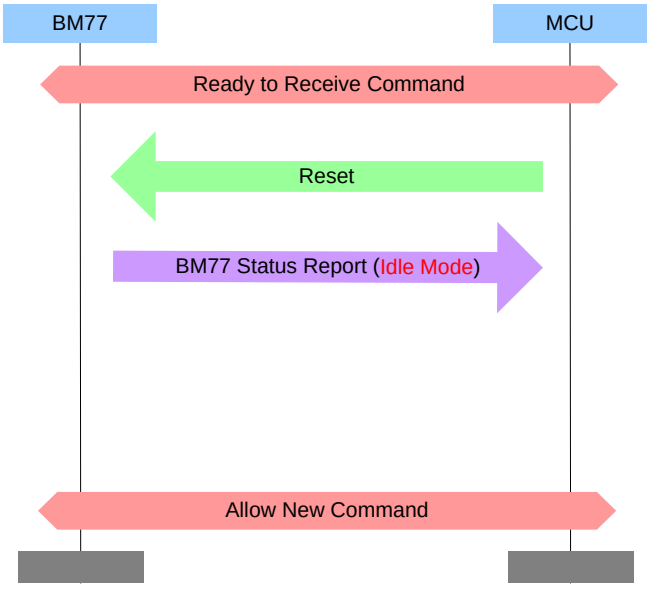
This command is used to reset **BM77**.

Command Parameters:

None

Return Parameters:

None



[Return to Command Table]

3.2.3 Read_BM77_Status (0x03)

Command	Op Code	Command Parameters	Return Parameters
Read_BM77_Status	0x03	None	

Description:

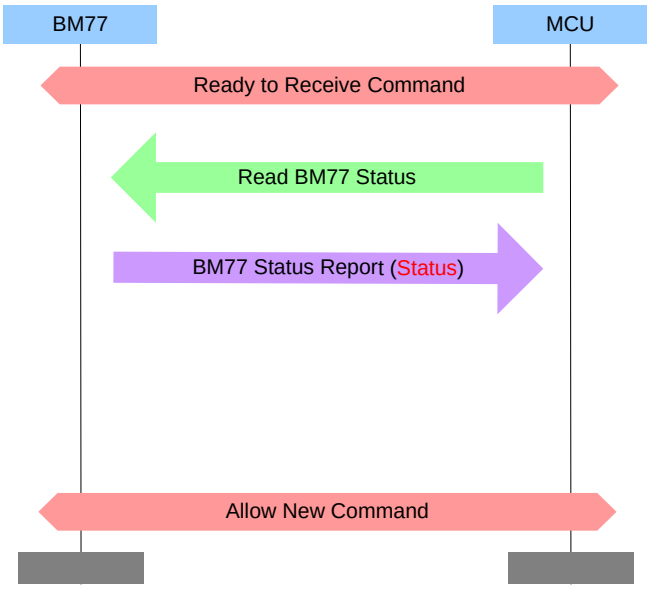
This command is used to read status of **BM77**. And the status of **BM77** will be informed by "BM77_Status_Report" event.

Command Parameters:

None

Return Parameters:

None



[Return to Command Table]

3.2.4 Into_Power_Down_Mode (0x05)

Command	Op Code	Command Parameters	Return Parameters
Into_Power_Down_Mode	0x05		

Description:

This command is used to drive **BM77** into power down mode directly. **BM77** will into power down mode after Command_Complete is replied.

This command is valid while **BM77** is in Idle Mode only.

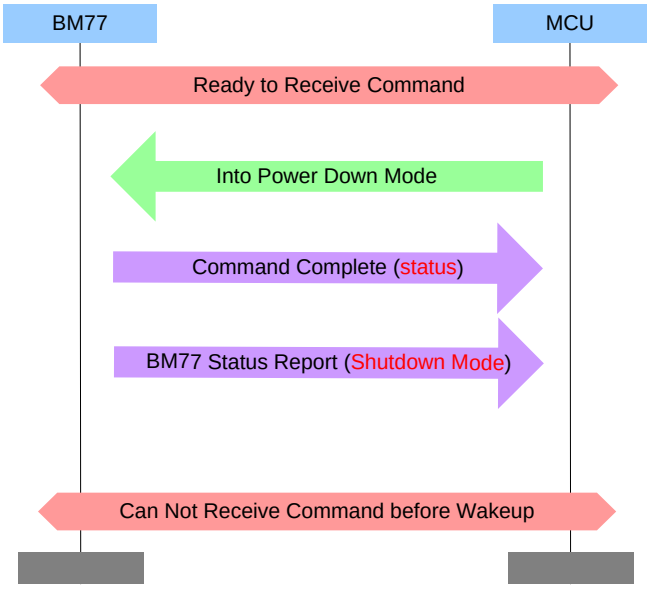
Command Parameters:

None

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.2.5 Read_Device_Name (0x07)

Command	Op Code	Command Parameters	Return Parameters
Read_Device_Name	0x07		Status, Device_Name

Description:

This command is used to read device name of **BM77**.

Command Parameters:

None

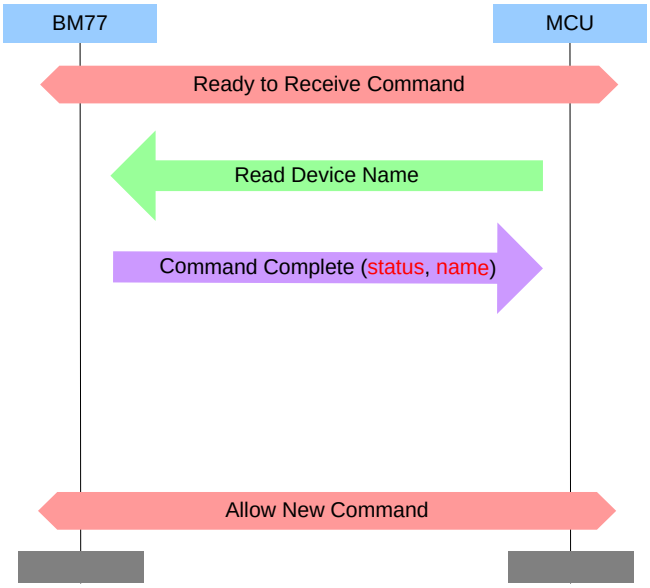
Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

Device_Name: *Size: XX Bytes*

Value	Parameter Description
0xXX	Device name of **BM77**



[Return to Command Table]

3.2.6 Write_Device_Name (0x08)

Command	Op Code	Command Parameters	Return Parameters
Write_Device_Name	0x08	Store_Option,Device_Name	Status

Description:

This command is used to write device name of **BM77**.

Command Parameters:

Store_Option: *Size: 1 Byte*

Value	Parameter Description
0x00	The change won't store to E2prom
0x01	The change will store to E2prom

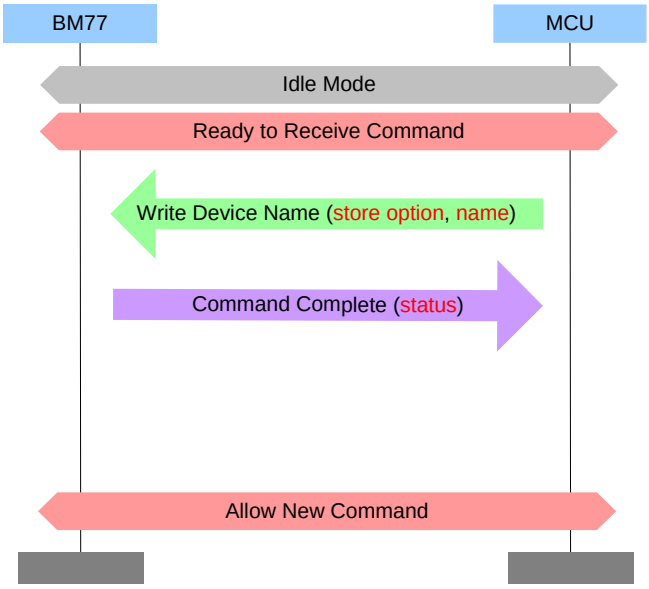
Device_Name: *Size: XX Bytes*

Value	Parameter Description
0xXX	Device name of **BM77**

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.2.7 Erase_All_Paired_Device_Information (0x09)

Command	Op Code	Command Parameters	Return Parameters
Erase_All_Paired_Device_Information	0x09		Status

Description:

This command is used to erase all of the paired device information saved in **BM77** e2prom and it is valid while **BM77** is in Idle Mode only

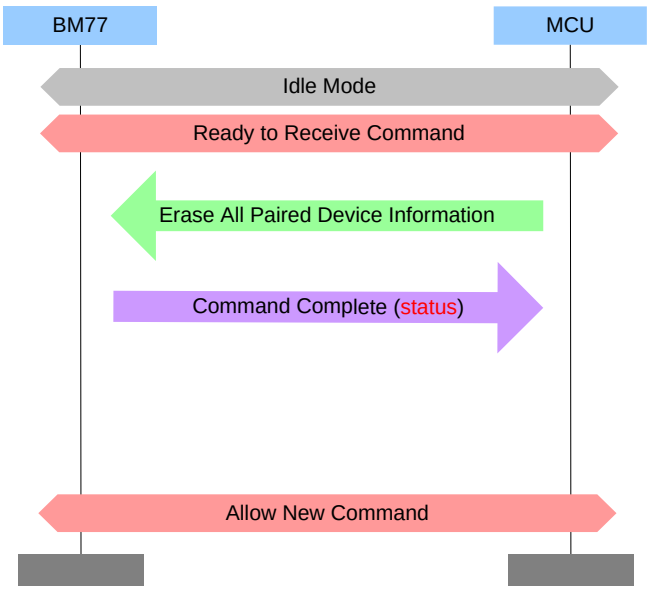
Command Parameters:

None

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.2.8 Read_Pairing_Mode_Setting (0x0A)

Command	Op Code	Command Parameters	Return Parameters
Read_Pairing_Mode_Setting	0x0A		Status, Pairing_Mode

Description:

This command is used to read pairing mode setting of **BM77**.

Command Parameters:

None

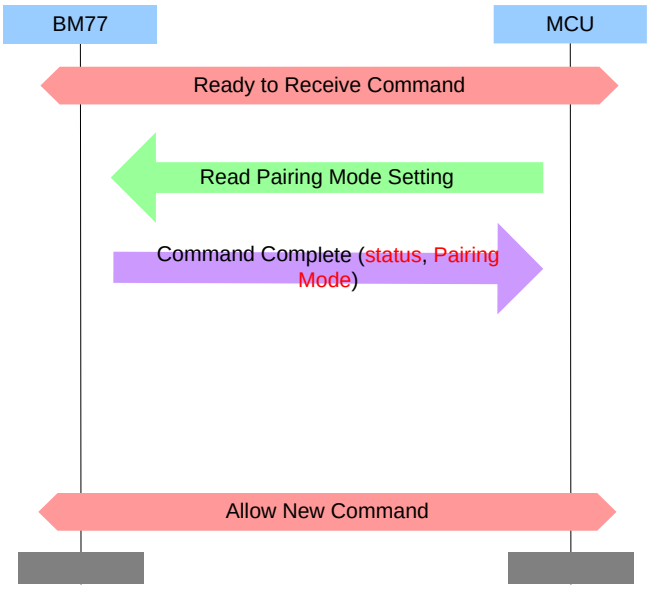
Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

Pairing_Mode: *Size: 1 Byte*

Value	Parameter Description
0x00	PIN Code Entry
0x01	Just Work
0x02	Passkey_Entry
0x03	User Confirm



[Return to Command Table]

3.2.9 Write_Pairing_Mode_Setting (0x0B)

Command	Op Code	Command Parameters	Return Parameters
Write_Pairing_Mode_Setting	0x0B	Store_Option, Pairing_Mode	Status, Pairing_Mode

Description:

This command is used to write pairing mode setting of **BM77** and it is valid while **BM77** is in Idle Mode only.

Command Parameters:

Store_Option: *Size: 1 Byte*

Value	Parameter Description
0x00	The change won't store to E2prom
0x01	The change will store to E2prom

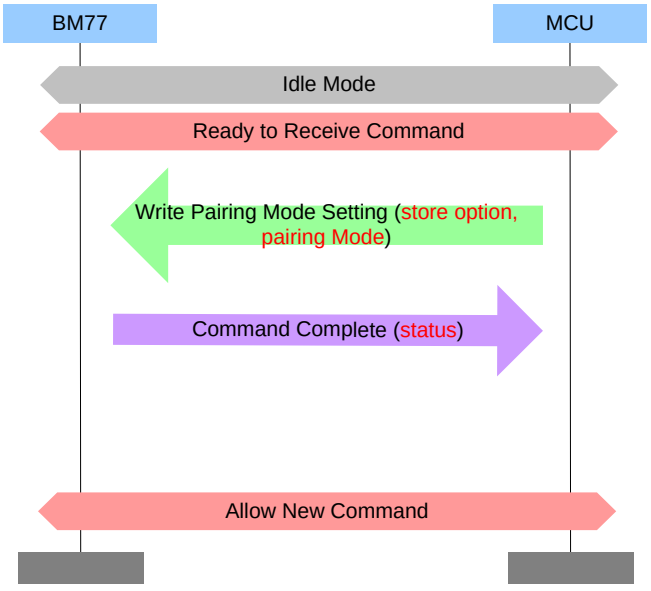
Pairing_Mode: *Size: 1 Byte*

Value	Parameter Description
0x00	PIN Code Entry
0x01	Just Work
0x02	Passkey_Entry
0x03	User Confirm

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.2.10 Read_All_Paired_Device_Information (0x0C)

Command	Op Code	Command Parameters	Return Parameters
Read_All_Paired_Device_Information	0x0C		Status, Num_Of_Paired_Device, Device_List

Description:

This command is used to read all paired devices information of **BM77** and it is valid while **BM77** is in Idle Mode only.

Command Parameters:

None

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

Num_Of_Paired_Device: *Size: 1 Byte*

Value	Parameter Description
0xXX	Number of paired devices

Device_List: Max to 4 sets

Device_Index: *Size: 1 Byte*

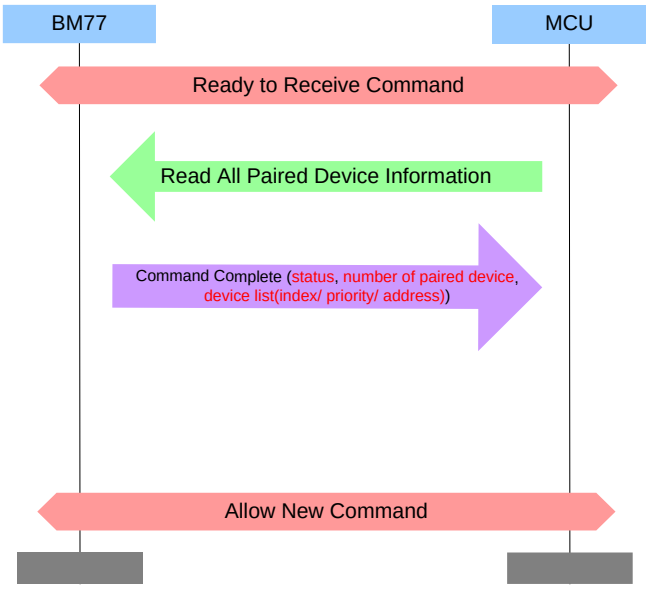
Value	Parameter Description
0xXX	Paired device index

Prioroty: *Size: 1 Byte*

Value	Parameter Description
0xXX	Link priority(0x01: Latest linked device)

Device_Address: *Size: 6 Bytes*

Value	Parameter Description
0xXXXXXXXXXXXX	Paired device Bluetooth address



[Return to Command Table]

3.2.11 Delete_Paired_Device (0x0D)

Command	Op Code	Command Parameters	Return Parameters
Delete_Paired_Device	0x0D	Device_Index	Status

Description:

This command is used to delete paired device from **BM77** and it is valid while **BM77** is in Idle Mode only.

Command Parameters:

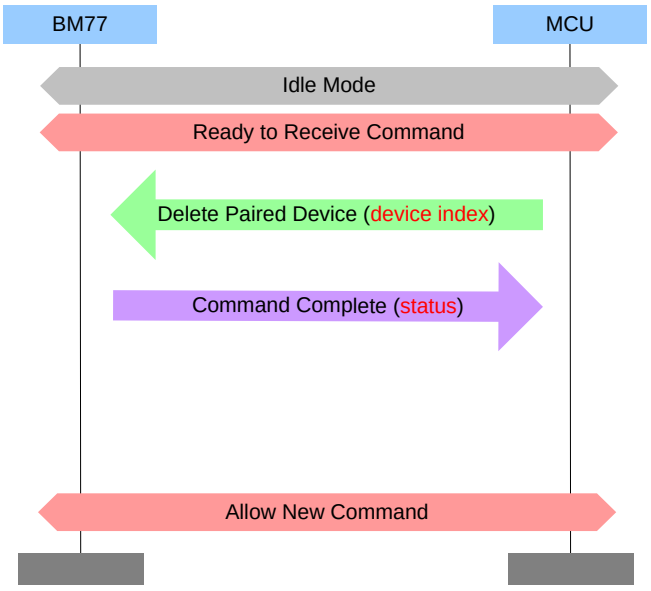
Device_Index: *Size: 1 Byte*

Value	Parameter Description
0xXX	The range of device index is from 0 to 3.

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.3 GAP Commands

MCU sends the GAP Command to **BM77** for specific purpose. **BM77** will reply the Command_Complete event to notify the result of command process.

3.3.1 Read_RSSI_Value (0x10)

Command	Op Code	Command Parameters	Return Parameters
Read_RSSI_Value	0x10	Connection_Handle	Status, RSSI_Value

Description:

This command is used to read RSSI value for peer connection.

This command is valid while **BM77** is in Connected Mode only.

Command Parameters:

Connection_Handle: *Size: 2 Bytes*

Value	Parameter Description
0xXXXX	Connection Handle

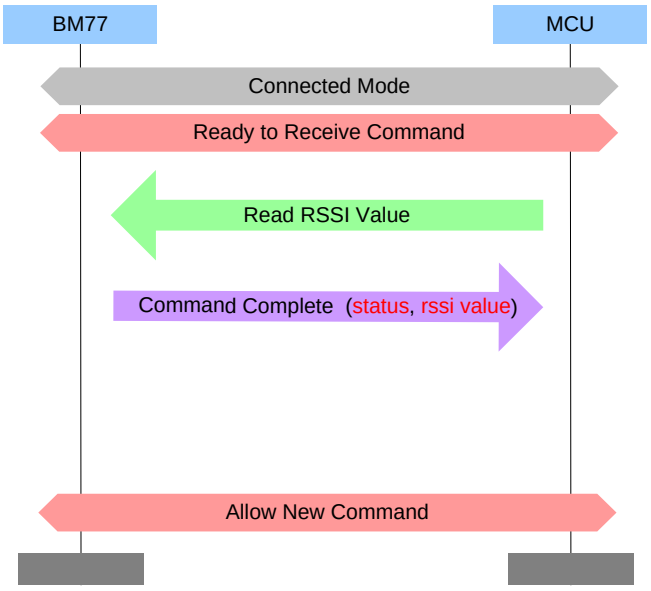
Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

RSSI_Value: *Size: 1 Byte*

Value	Parameter Description
0xXX	RSSI Value



[Return to Command Table]

3.3.2 Write_Adv_Data (0x11)

Command	Op Code	Command Parameters	Return Parameters
Write_Adv_Data	0x11	Store_Option, Advertising_Data	Status

Description:

This command is used to update the advertise data.

This command is valid while **BM77** is in Idle Mode only.

* Maximum length of advertising data in BM77 is 24 bytes

Command Parameters:

Store_Option: *Size: 1 Byte*

Value	Parameter Description
0x00	Advertising Data won't be stored to E2prom
0x01	Advertising Data will be stored to E2prom
0x80	Beacon Data won't be stored to E2prom
0x81	Beacon Data will be stored to E2prom

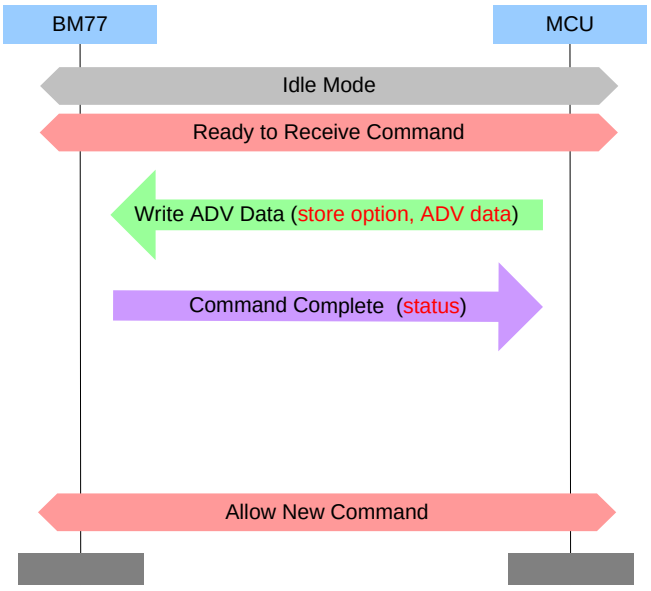
Advertising_Data *Size: 1 to 31 Octets*

Value	Parameter Description
0xXX	Advertising Data/Beacon Data

Return Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.3.3 Write_Scan_Res_Data (0x12)

Command	Op Code	Command Parameters	Return Parameters
Write_Scan_Res_Data	0x12	Store_Option, Scan_Res_Data	Status

Description:

This command is used to update the Scan_Res data.

This command is valid while **BM77** is in Idle Mode only.

Command Parameters:

Store_Option: *Size: 1 Byte*

Value	Parameter Description
0x00	The change won't store to E2prom
0x01	The change will store to E2prom

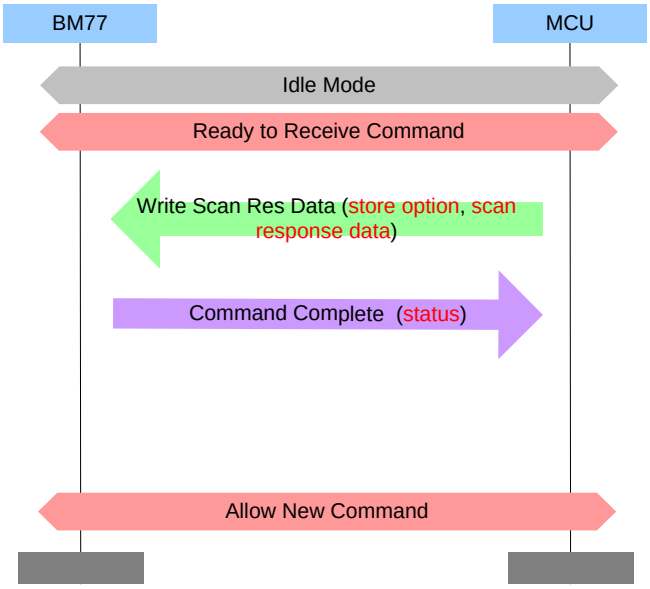
Scan_Res_Data *Size: 1 to 31 Octets*

Value	Parameter Description
0xXX	Scan Response Data

Return Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



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3.3.4 Set_Advertising_Parameter (0x13)

Command	Op Code	Command Parameters	Return Parameters
Advertising_Mode_Setting	0x13	Advertising_Interval Advertising_Type, Direct_Address_Type, Direct_Address,	Status

Description:

This command is used to set advertising parameters and it is valid while BLEDK is in Idle Mode only.

Command Parameters:

Advertising_Interval: *Size: 2 Octet*

Value	Parameter Description
0xXXXX	Advertising interval for non-directed advertising. Range: 0x0020 to 0x4000 Default: N = 0x0800 (1.28 second) Time = N * 0.625 msec Time Range: 20 ms to 10.24 sec

Advertising_Type: *Size: 1 Octet*

Value	Parameter Description
0x00	Connectable undirected advertising. It is used to make BM77 into standby mode.
0x01	Connectable directed advertising. It is used to make BM77 into link back mode.
0x02	Scannable undirected advertising. It is used to make BLEDK into broadcast mode. And it will reply advertising packet only for the observer passive scanning or active scanning to receive advertising events.
0x03	Non connectable undirected advertising. It is used to make BM77 into broadcast mode.
0x04	Proprietary Beacon Setting

Direct_Address_Type: *Size: 1 Octet*

Value	Parameter Description
0x00	Public Device Address
0x01	Random Device Address

Direct_Address: *Size: 6 Octets*

Value	Parameter Description
0xXXXXXXXXXXXX	Public Device Address or Random Device Address of the device to be connected

Return Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

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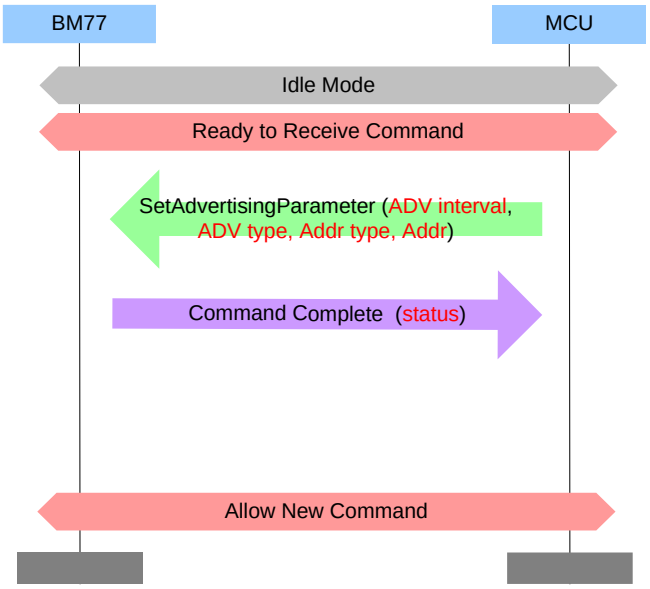


[Return to Command Table]

3.3.5 Disconnect (0x1B)

Command	Op Code	Command Parameters	Return Parameters
Disconnect	0x1B	Reserved	

Description:

This command is used to terminate a connection. And it is valid while **BM77** is in Connected Mode only.

Command Parameters:

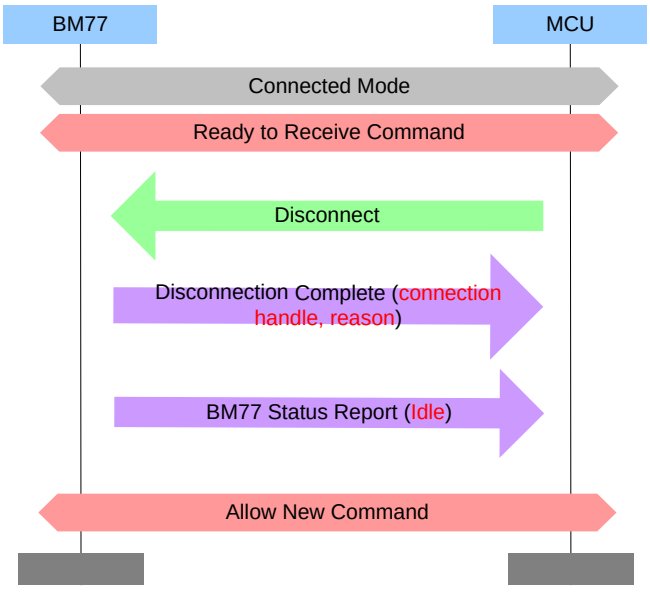
Reserved: *Size: 1 Byte*

Value	Parameter Description
0x00	Always set this byte to 0

Return Parameters:

None.

Note: No Command_Complete event is sent by the **BM77** to indicate that this command has been completed. Instead, the Disconnection_Complete event indicates that this command has been completed.



[Return to Command Table]

3.3.6 Invisible_Setting (0x1C)

Command	Op Code	Command Parameters	Return Parameters
Invisible_Setting	0x1C	Mode	Status

Description:

This command is used to configure SPP invisible and it is valid while **BM77** is in Idle Mode only.

Command Parameters:

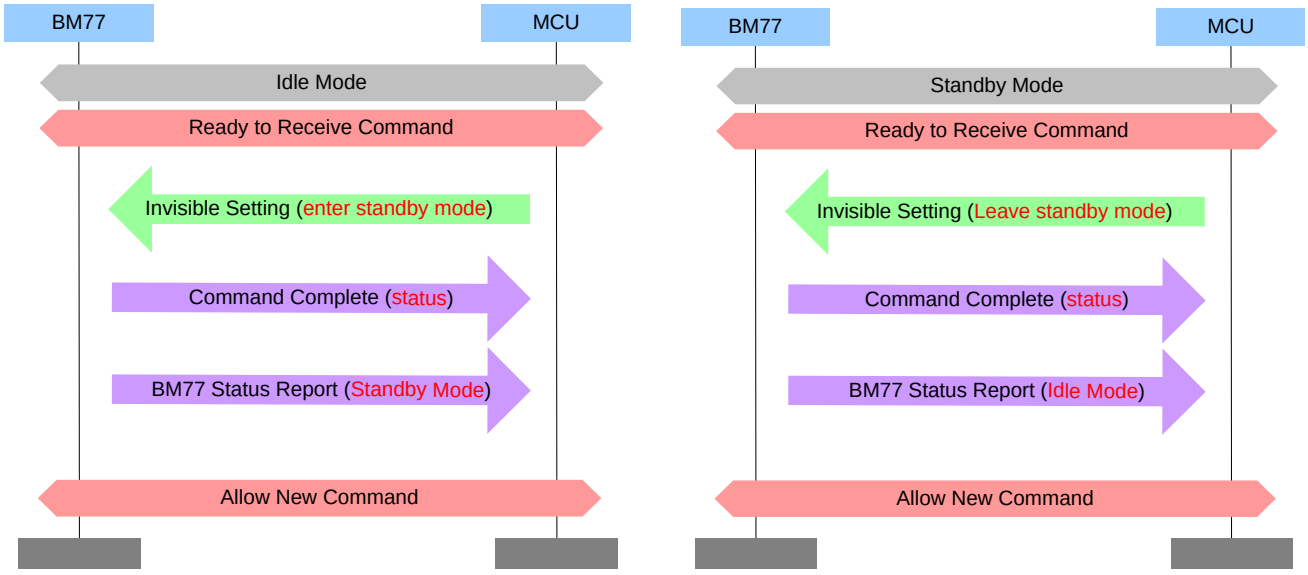
Mode: *Size: 1 Byte*

Value	Parameter Description
0x00	Leave Standby Mode
0x01	Enter Standby Mode
0x02	Enter Standby Mode and only connectable for trust device
0x81	Enter Standby Mode with Beacon Enabled
0x82	Enter Standby Mode with Beacon Enabled and only connectable for trust device

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.3.7 SPP_Create_Link (0x1D)

Command	Op Code	Command Parameters	Return Parameters
SPP_Create_Link	0x1D	Device_Index	Status

Description:

This command is used to establish with host and it is valid while **BM77** is in Idle Mode only.

* It's only for **BM77.**

Command Parameters:

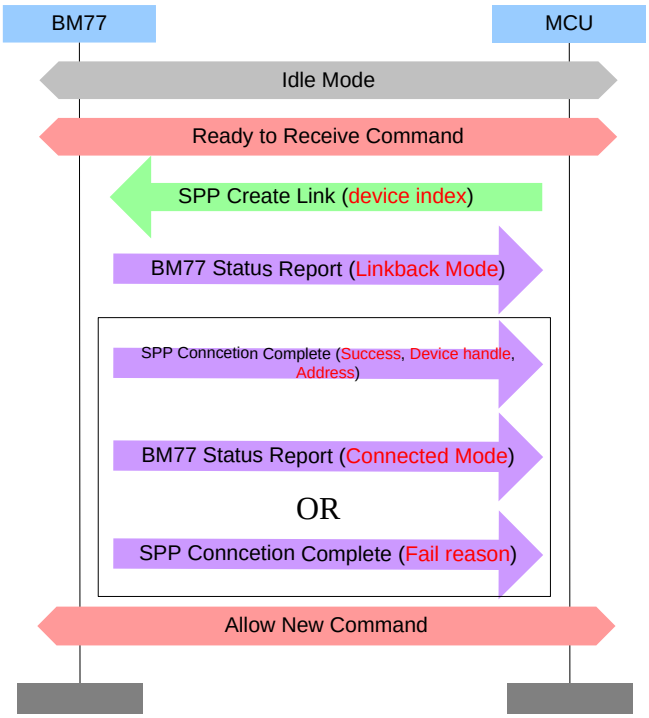
Device_Index: *Size: 1 Byte*

Value	Parameter Description
0xXX	The range of device index is from 0 to 3 (Device_Index only valid if paired information exists in BM77). Set this value to 0xff, BM77 will create link with latest paired device.

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.3.8 SPP_Create_Link_Cancel (0x1E)

Command	Op Code	Command Parameters	Return Parameters
SPP_Create_Link_Cancel	0x1E		Status

Description:

This command is used to cancel the link establishment with host and it is valid while **BM77** is in Link Back Mode only.

*It's only for **BM77**

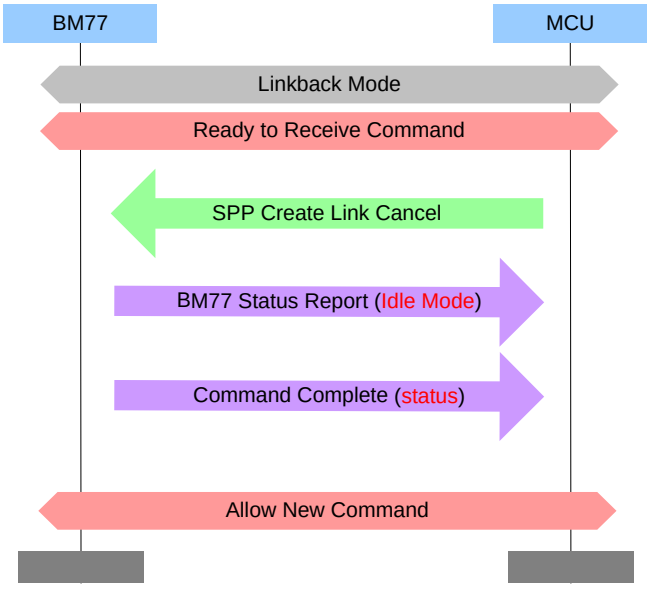
Command Parameters:

None

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.3.9 Read_Remote_Device_Name (0x1F)

Command	Op Code	Command Parameters	Return Parameters
Read_Remote_Device_Name	0x1F		Status, Device_Name

Description:

This command is used to read remote device name.

Command Parameters:

None

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

Device_Name: *Size: XX Byte*

Value	Parameter Description
0xXX	Remote Device Name

[Return to Command Table]

3.4 SPP/GATT Transparent Commands

3.4.1 Send_Transparent_Data (0x3a)

Command	*Op Code*	*Command Parameters*	*Return Parameters*
Send_Transparent_Data	0x3a	Reserved, Transparent_Data	Status

Description:

This command is used to send transparent data by ISSC_TRANS_TX service or SPP profile.

Command Parameters:

Reserved: *Size: 1 Byte*

Value	Parameter Description

0x00	Always set this byte to be 0

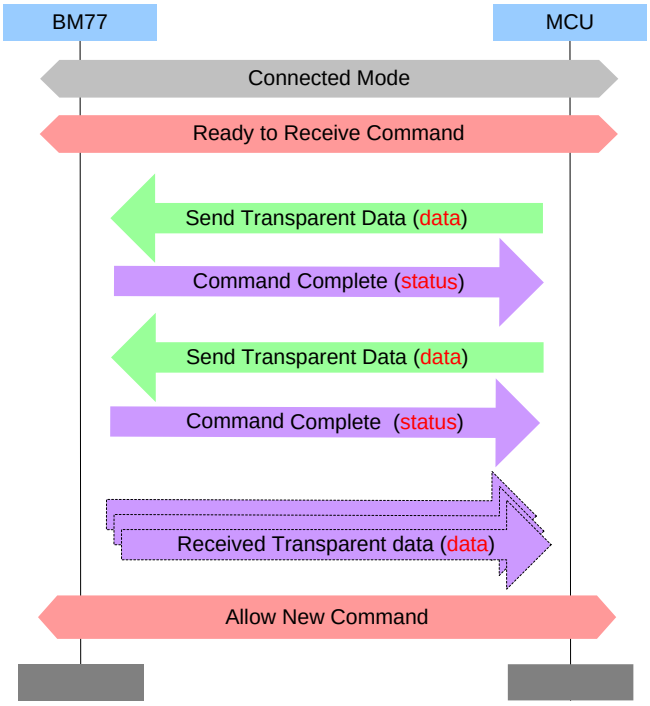
Transparent_Data: *Size: N Bytes*

Value	Parameter Description
0xXX	Transparent_Data. Maximum length of transparent data is 640 bytes

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.5 Pairing Commands

3.5.1 Passkey_Entry_Res (0x40)

Command	Op Code	Command Parameters	Return Parameters
Passkey_Entry_Res	0x40	Notification_Type, Entered_Passkey	Status

Description:

This command is used to response SSP passkey entry request from **BM77**.

Command Parameters:

Notification_Type: *Size: 1 Byte*

Value	Parameter Description
0x01	Passkey digit entered
0x02	Passkey digit erased
0x03	Passkey cleared
0x04	Passkey entry completed

Entered_Passkey: *Size: 1 Byte*

Value	Parameter Description
0xXX	Entered Digital Passkey character. It is valid only while the Notification_type is 0x01. 0x30~0x39: "0" ~"9"

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

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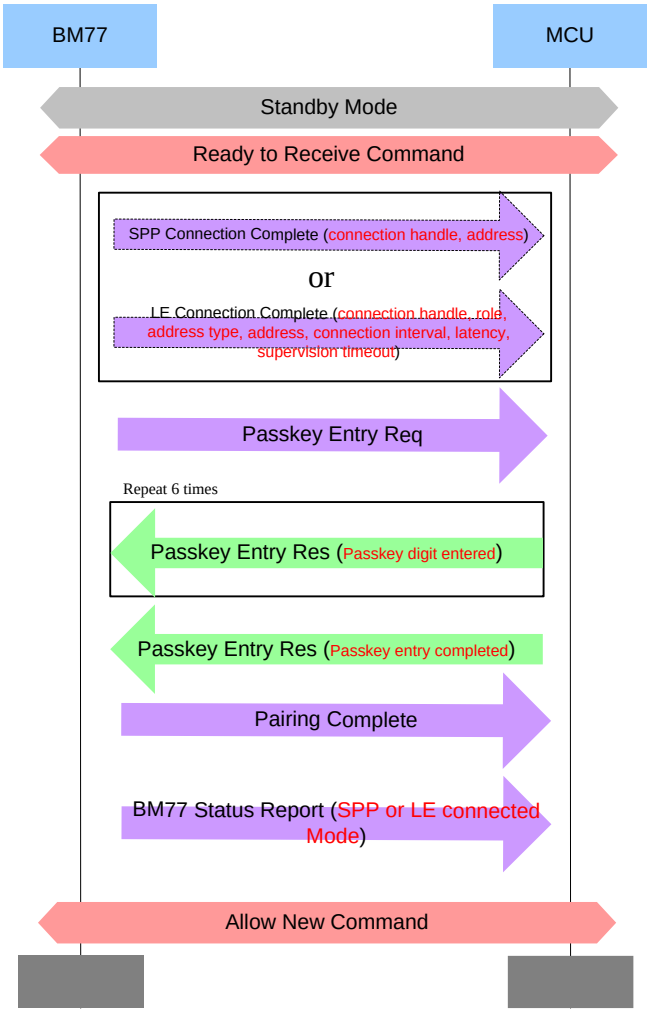


[Return to Command Table]

3.5.2 User_Confirm_Res (0x41)

Command	Op Code	Command Parameters	Return Parameters
User_Confirm_Res	0x41	option	Status

Description:

This command is used to response SSP passkey entry request from **BM77**.

Command Parameters:

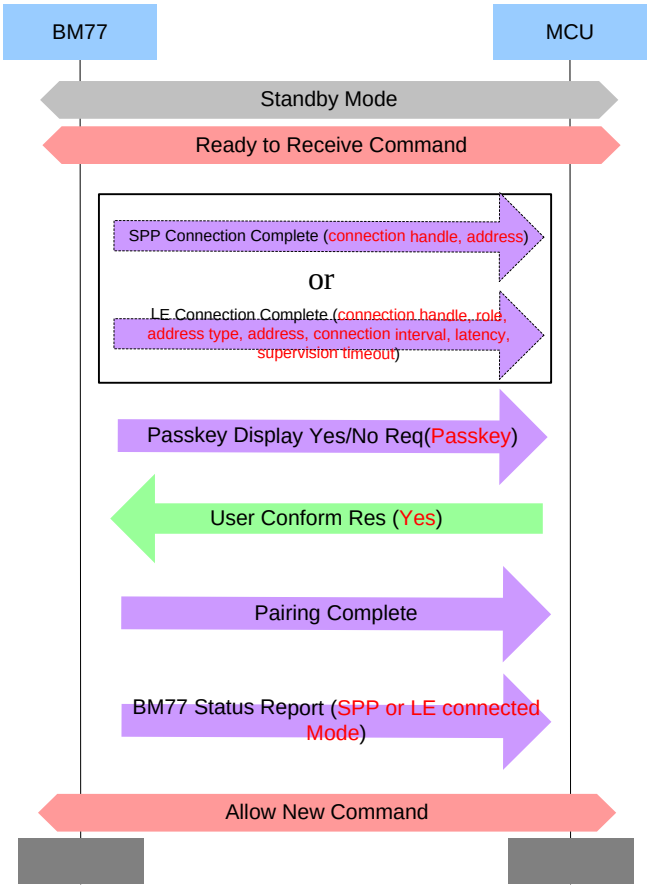
Notification_Type: *Size: 1 Byte*

Value	Parameter Description
0x00	Entered information is Yes
0x01	Entered information is No

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.6 Common_2 Commands

MCU sends the Common Command to **BM77** for specific purpose. **BM77** will reply the Command Complete event to notify the command process result.

3.6.1 Read_PIN_Code (0x50)

Command	Op Code	Command Parameters	Return Parameters
Read_PIN_Code	0x50		Status, PIN_Code

Description:

This command is used to read PIN code of **BM77**.

Command Parameters:

None

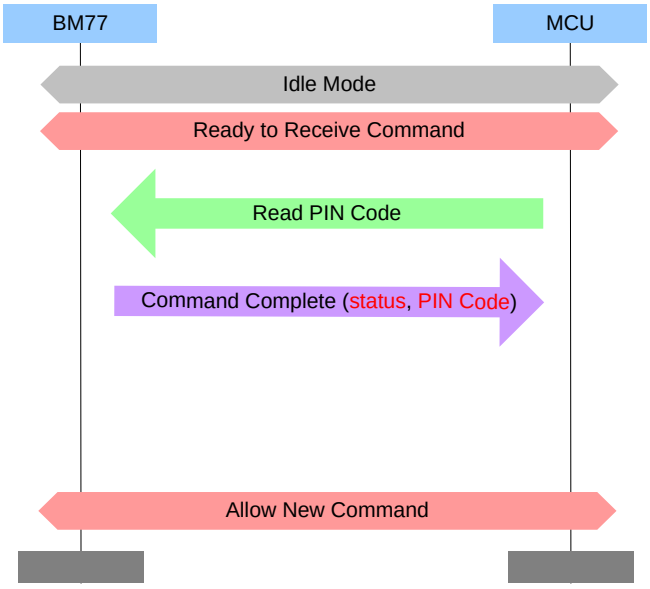
Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.

PIN_Code: *Size: 4 or 6 Bytes*

Value	Parameter Description
0xXX	PIN Code of **BM77**



[Return to Command Table]

3.6.2 Write_PIN_Code (0x51)

Command	Op Code	Command Parameters	Return Parameters
Write_PIN_Code	0x51	Store_Option, PIN_Code	Status

Description:

This command is used to write PIN code of **BM77** and it is valid while **BM77** is in Idle Mode only.

Command Parameters:

Store_Option: *Size: 1 Byte*

Value	Parameter Description
0x00	The change won't store to E2prom
0x01	The change will store to E2prom

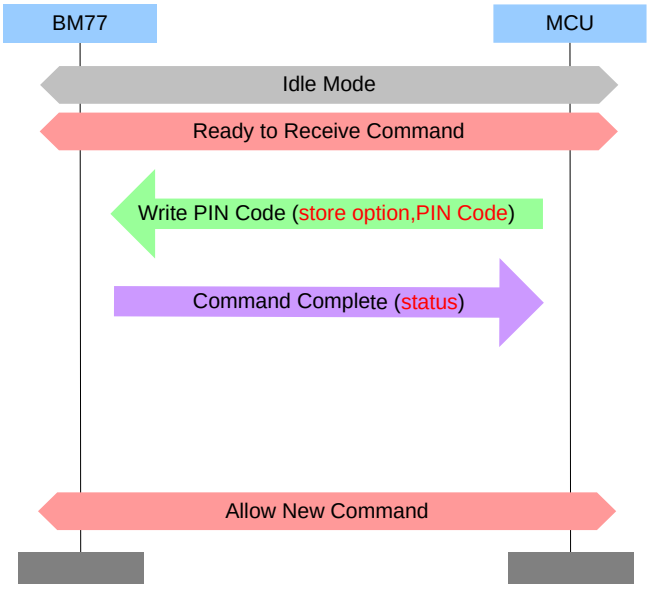
PIN_Code: *Size: 4 or 6 Bytes*

Value	Parameter Description
0xXX	PIN Code of **BM77**

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

3.6.3 Leave_Configure_Mode (0x52)

Command	Op Code	Command Parameters	Return Parameters
Leave_Configure_Mode	0x52	Option	Status

Description:

BM77 will leave configure mode if “Leave_Configure_Mode” command is received.

Command Parameters:

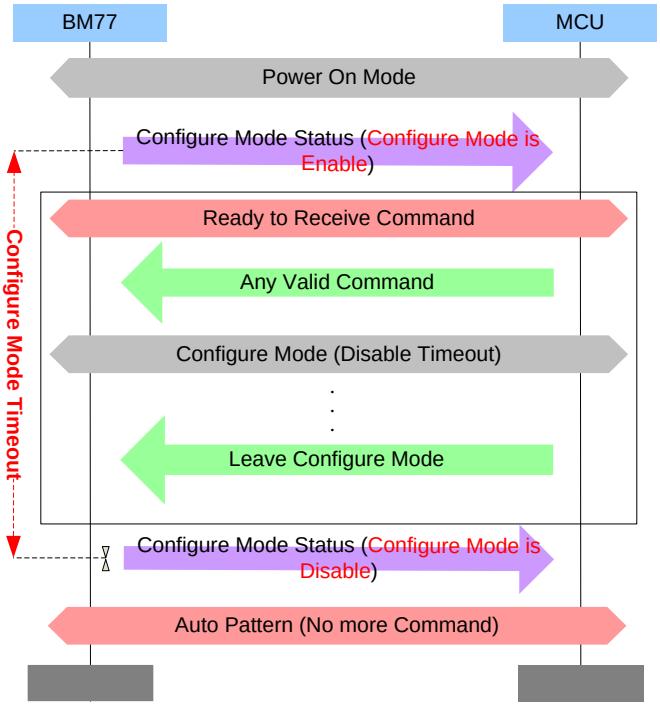
Option: *Size: 1 Byte*

Value	Parameter Description
0x00	None
0x01	Disable configure mode forever

Return Parameters:

Status: *Size: 1 Byte*

Value	Parameter Description
0x00	Command succeeded
0x01 – 0xFF	Command failed. See listing of Error Codes.



[Return to Command Table]

4. Event Op Code Definition

Event Type	Op Code	Event
Pairing	0x60	Passkey_Entry_Req
	0x61	Pairing_Complete
	0x62	Passkey_DisplayYesNo_Req
GAP	0x71	LE_Connection_Complete
	0x72	Disonnection_Complete
	0x74	SPP_Connection_Complete
Common	0x80	Command_Complete
	0x81	BM77_Status_Report
	0x8f	Configure_Mode_Status
SPP/GATT Transparent	0x9a	Received_Transparent_Data

4.1 Pairing Event

4.1.1 Passkey_Entry_Req (0x60)

Event	OpCode	Event Parameters
SSP_Passkey_Entry_Req	0x60	

Description:

This event is used to inform MCU that **BM77** has received Passkey Request.

Event Parameters:

None

[Return to Event Table]

4.1.2 Pairing_Complete (0x61)

Event	OpCode	Event Parameters
Pairing_Complete	0x61	Result

Description:

This event is used to inform MCU that **BM77** pairing process has been finished.

Event Parameters:

Result: *Size: 1 Octets*

Value	Parameter Description
0x00	Pairing Complete
0x01	Pairing Fail
0x02	Pairing Timeout

[Return to Event Table]

4.1.3 Passkey_DisplayYexNo_Req (0x62)

Event	OpCode	Event Parameters
SSP_Passkey_Entry_Req	0x62	Displayed_Passkey

Description:

This event is used to inform MCU that **BM77** has received user confirm request.

Event Parameters:

Displayed_Passkey: *Size: 1 Octets*

Value	Parameter Description
0xXX	Numeric for MCU to display

[Return to Event Table]

4.2 GAP Event

4.2.1 LE_Connection_Complete (0x71)

Event	OpCode	Event Parameters
LE_Connection_Complete	0x71	Status, Connection_Handle, Role, Peer_Address_Type, Peer_Address, Conn_Interval, Conn_Latency, Supervision_Timeout,

Description:

This event is used to inform MCU that a LE connection has been created.

Event Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Connection successfully completed.
0x01~0xff	Connection failed to complete.

Connection_Handle: *Size: 1 Octets*

Value	Parameter Description
0xXX	Connection_Handle to be used to identify a connection between two Bluetooth devices

Role: *Size: 1 Octet*

Value	Parameter Description
0x00	Connection is master
0x01	Connection is slave

Peer_Address_Type: *Size: 1 Octet*

Value	Parameter Description
0x00	Peer is using a Public Device Address
0x01	Peer is using a Random Device Address
0x02	Peer is paired device

Peer_Address: *Size: 6 Octets*

Value	Parameter Description
0xXXXXXXXXXXXX	Public Device Address or Random Device Address of the peer device

Conn_Interval: *Size: 2 Octets*

Value	Parameter Description
0xXXXX	Connection interval used on this connection. Range: 0x0006 to 0x0C80 Time = N * 1.25 msec Time Range: 7.5 msec to 4000 msec.

Conn_Latency: *Size: 2 Octets*

Value	Parameter Description
0xXXXX	Connection latency for this connection. Range: 0x0006 to 0x0C80 Time = N * 1.25 msec Time Range: 7.5 msec to 4000 msec.

SuperVision_Timeout: *Size: 2 Octets*

Value	Parameter Description
0xXXXX	Connection supervision timeout. Range: 0x000A to 0x0C80 Time = N * 10 msec Time Range: 100 msec to 32 seconds

[Return to Event Table]

4.2.2 Disconnection_Complete (0x72)

Event	OpCode	Event Parameters
Disonnection_Complete	0x72	Connection_Handle, Reason

Description:

This event is used to inform that the connection has been terminated.

Event Parameters:

Connection_Handle: *Size: 1 Octets*

Value	Parameter Description
0xXX	Connection_Handle to be used to identify a connection between two Bluetooth devices

Reason: *Size: 1 Octet*

Value	Parameter Description
0xXX	Disconnection reason. See listing of Error Codes.

[Return to Event Table]

4.2.3 BT_Connection_Complete (0x74)

Event	OpCode	Event Parameters
BT_Connection _Complete	0x74	Status,Connection_Handle, Peer_Address

Description:

This event is used to inform MCU that a Bluetooth BR/EDR connection has been created.

* It's only for **BM77.**

Event Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Connection successfully completed.
0x01~0xff	Connection failed to complete.

Connection_Handle: *Size: 1 Octets*

Value	Parameter Description
0xXX	Connection_Handle to be used to identify a connection between two Bluetooth devices

Peer_Address: *Size: 6 Octets*

Value	Parameter Description
0xXXXXXXXX XXXXX	Device Address

Peer_Address_Type: *Size: 1 Octet*

Value	Parameter Description
0x00	Peer is using a Public Device Address
0x01	Peer is using a Random Device Address
0x02	Peer is paired device

[Return to Event Table]

4.3 Common Event

4.3.1 Command_Complete (0x80)

Event	OpCode	Event Parameters
Command_Comp lete	0x80	Command_OpCode, Return_Parameters

Description:

This event is used to response of commands.

Event Parameters:

Command_OpCode: *Size: 1 Octet*

Value	Parameter Description
0xXX	Opcode of the command which caused this event.

Return_Parameters *Size: Depends on Command*

Value	Parameter Description
0xXX	Opcode of the command which caused this event.

[Return to Event Table]

4.3.2 BM77_Status_Report (0x81)

Event	OpCode	Event Parameters
BM77_Status_Report	0x81	Status

Description:

This event is used to inform MCU status of **BM77** while status is changed and response of "Read_BM77_Status" command.

Event Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0xXX	See listing of **BM77** Status.

[Return to Event Table]

4.3.3 Configure_Mode_Status (0x8f)

Event	OpCode	Event Parameters
Configure_Mode_Status	0x8f	Status

Description:

This event is used to inform MCU Configure Mode status of **BM77**.

Event Parameters:

Status: *Size: 1 Octet*

Value	Parameter Description
0x00	Configure Mode is Disabled.
0x01	Configure Mode is Enabled

[Return to Event Table]

4.4 SPP/GATT Transparent Event

4.4.1 Recieved _Transparent_Data (0x9a)

Event	OpCode	Event Parameters
Received_Transpar	0x9a	Reserved, Transparent_Data

ent_Data

Description:

This event is used to inform MCU that **BM77** has received transparent data by ISSC_TRANS_RX service or SPP profile.

Event Parameters:

Reserved: *Size: 1 Byte*

Value	Parameter Description
0x00	Always set this byte to be 0

Transparent_Data: *Size: n Octets*

Value	Parameter Description
0xXX	Transparent data

[Return to Event Table]

5. Operation Definition:

5.1 Auto Pattern:

BM77SPP will be executed base on internal state machine that can be configured by UI tool.

- BM77SPP may into “Configure Mode” by UI tool setting and MCU command assigned.
- Some commands are available at “Configure Mode” and “Connected Mode with pairing procedure” only.
- The data pipe is “Transparent Pipe”.

5.2 Manual Pattern:

BM77SPP will be executed base on MCU command totally.

- MCU must handle BM77SPP state by correct commands.
- The data pipe is “Protocol Pipe”.

5.3 Mode:

- **Shutdown Mode:** BM77 into deep power down situation.
- **Idle Mode:** No any Bluetooth behavior is executed.
- **Configure Mode:** It is used to configure relative setting before BM77 into Auto Pattern.
- **Standby Mode:** BM77 is under Bluetooth discoverable and connectable mode. It can also be paired by another device in this mode.
  - Classic Bluetooth (BR/EDR): Enable the Inquiry Scan and Page Scan in this Mode.
  - Bluetooth Low Energy: Enable the Undirected Advertising in this Mode.
- **Link Back Mode:** BM77 tries to recover the last Bluetooth connection. BM77 can still be discoverable and connectable mode as an optional configuration.
  - Classic Bluetooth (BR/EDR): Enable Page Procedure to establish Bluetooth Link.
  - Bluetooth Low Energy: Enable Directed Advertising to allow the recorded host to setup Bluetooth Link.
- **Connected Mode:** Bluetooth connection is established successfully.
  - Classic Bluetooth (BR/EDR): BM77 will use SPP or iAP protocol to exchange the application data.

- Bluetooth Low Energy: BM77 will use GATT protocol to exchange the application data.

5.4 Data Pipe:

- **Transparent Pipe:** The exchange data between MCU and APP will be transferred directly.
- **Protocol Pipe:**
  - MCU to APP: MCU use “Send_Transparent_Data” command to send data.
  - APP to MCU: BM77SPP use “Recieved _Transparent_Data” event to inform MCU.

5.5 BM77 State Definition:

- **Access State:** BM77 is trying to setup Bluetooth Connection.
- **Link State:** BM77 is ready to exchange Host MCU UART traffic.
- **Shutdown State:** BM77 is shutdown after Idle Mode.

6. State Machine Charts

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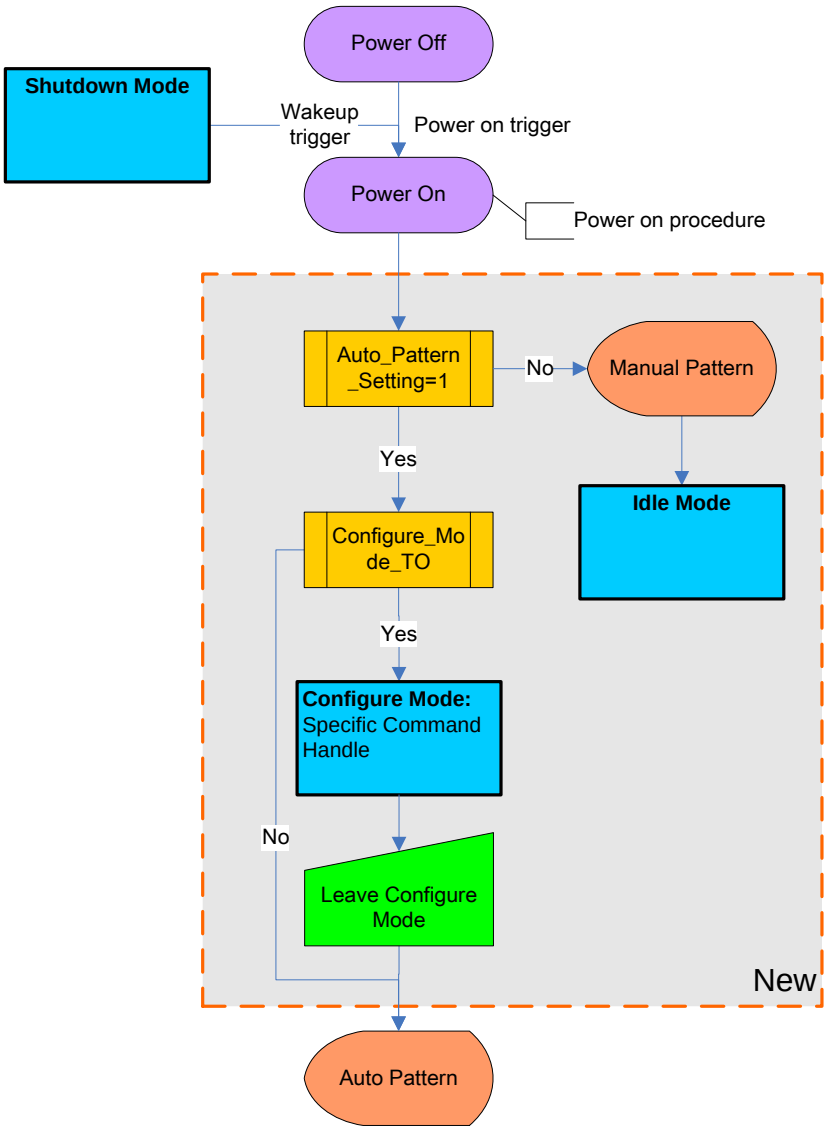
6.1 Power ON Flow



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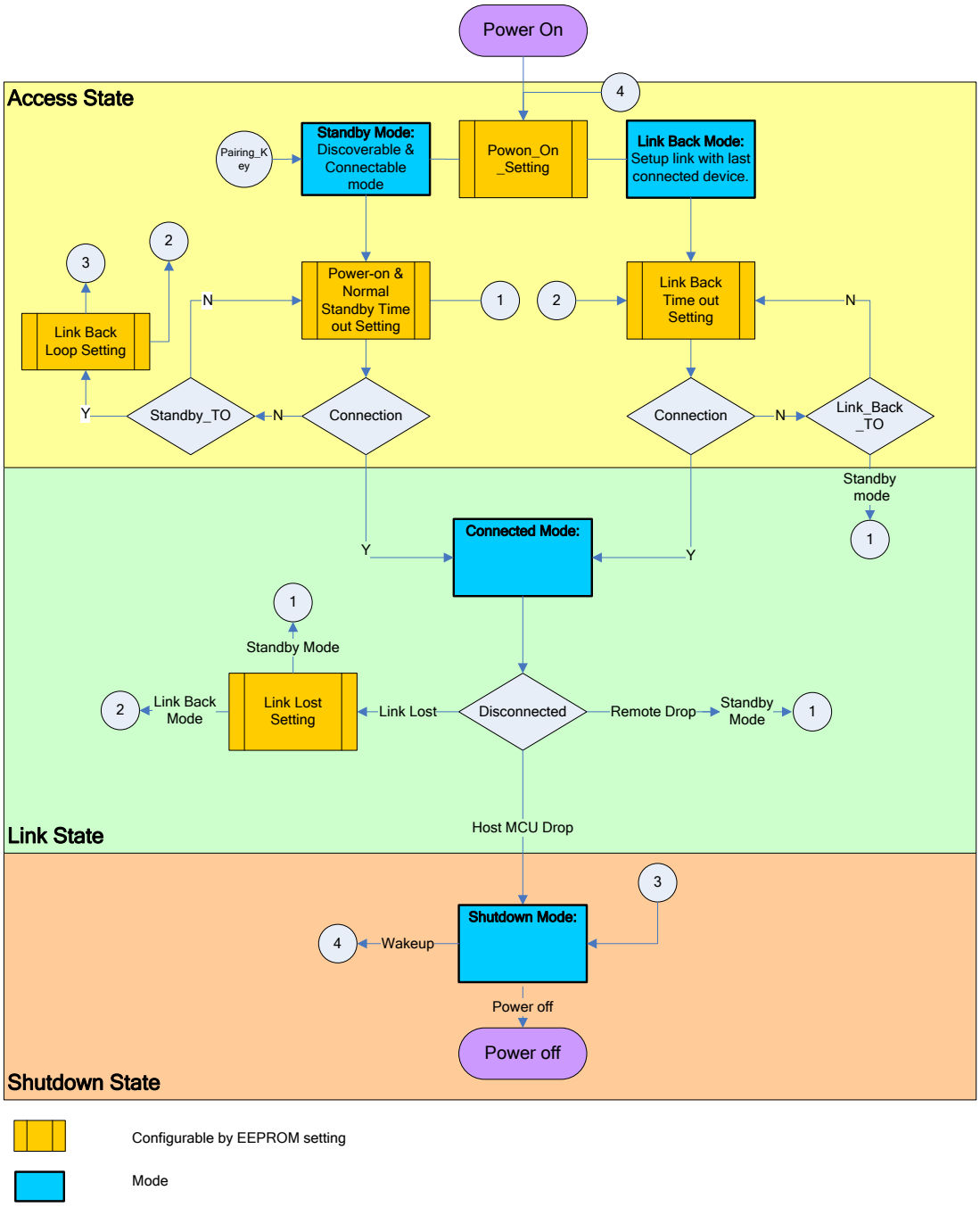
6.2 Auto Pattern



Configurable by EEPROM setting

Mode

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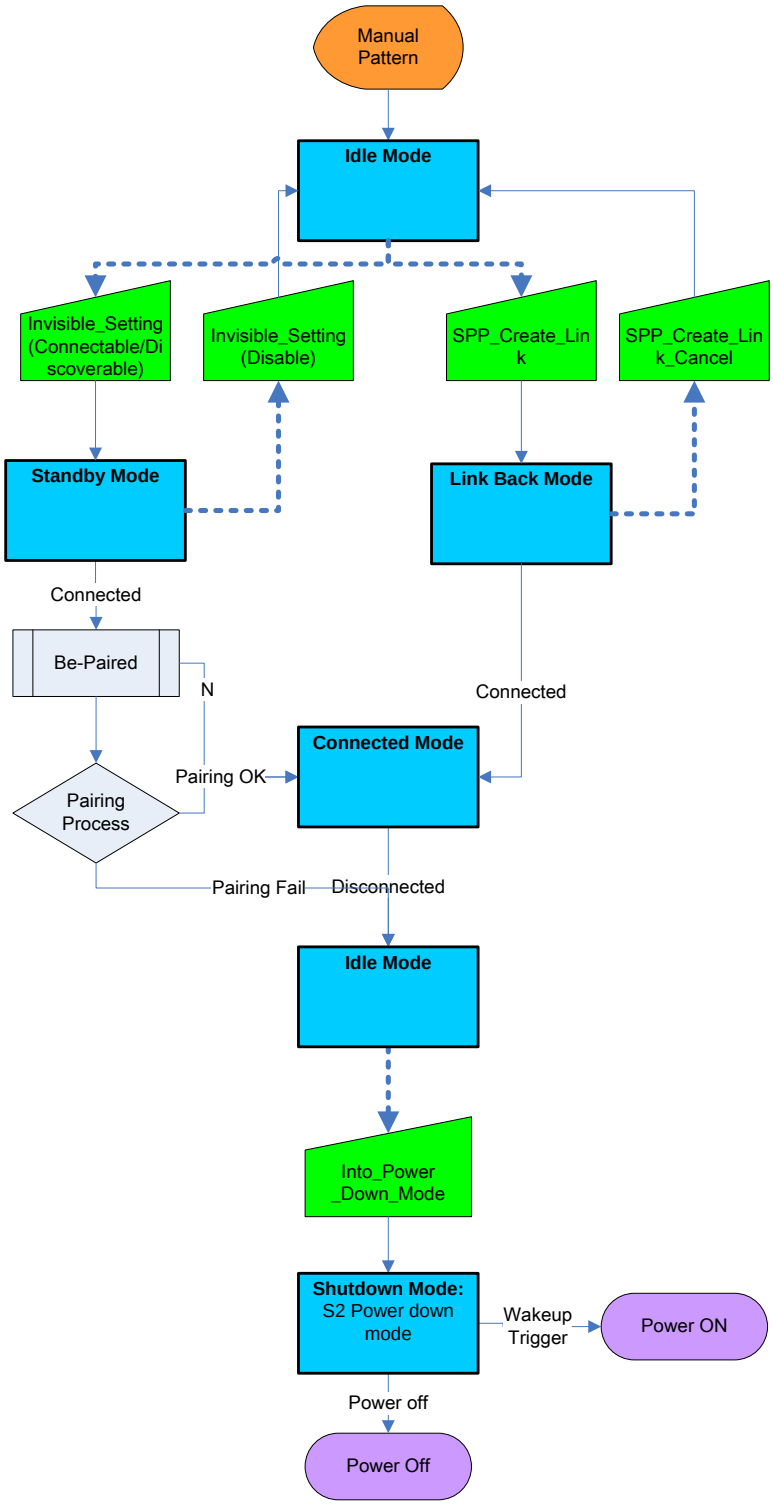
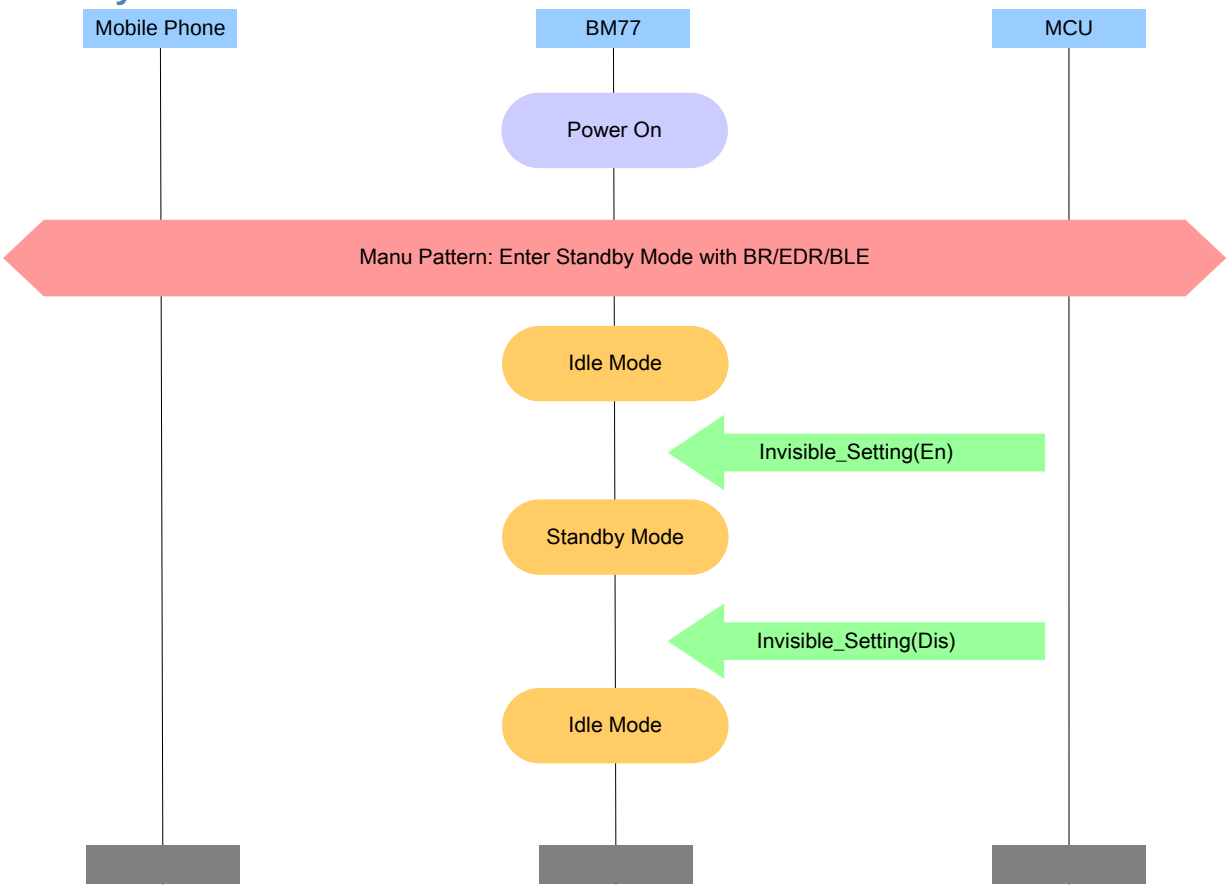
6.3 Manual Pattern



7. Message Sequence Charts

7.1 Standby Mode



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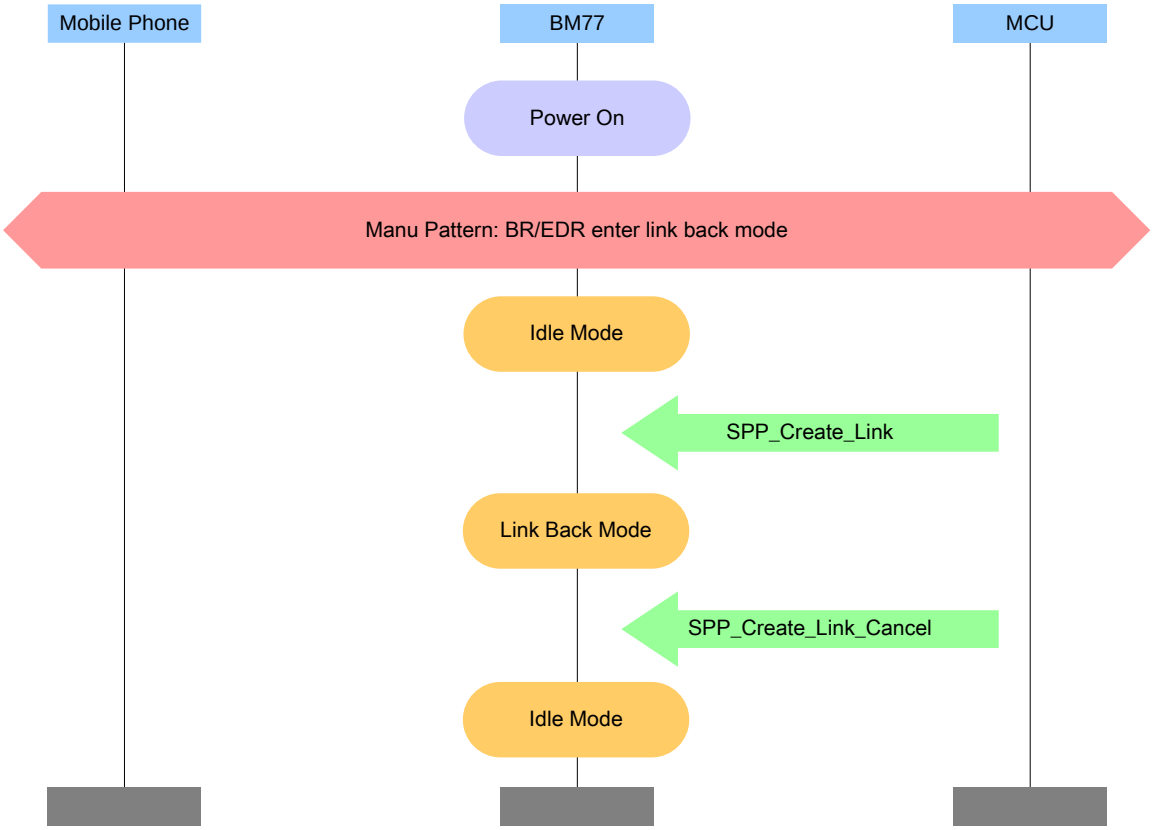
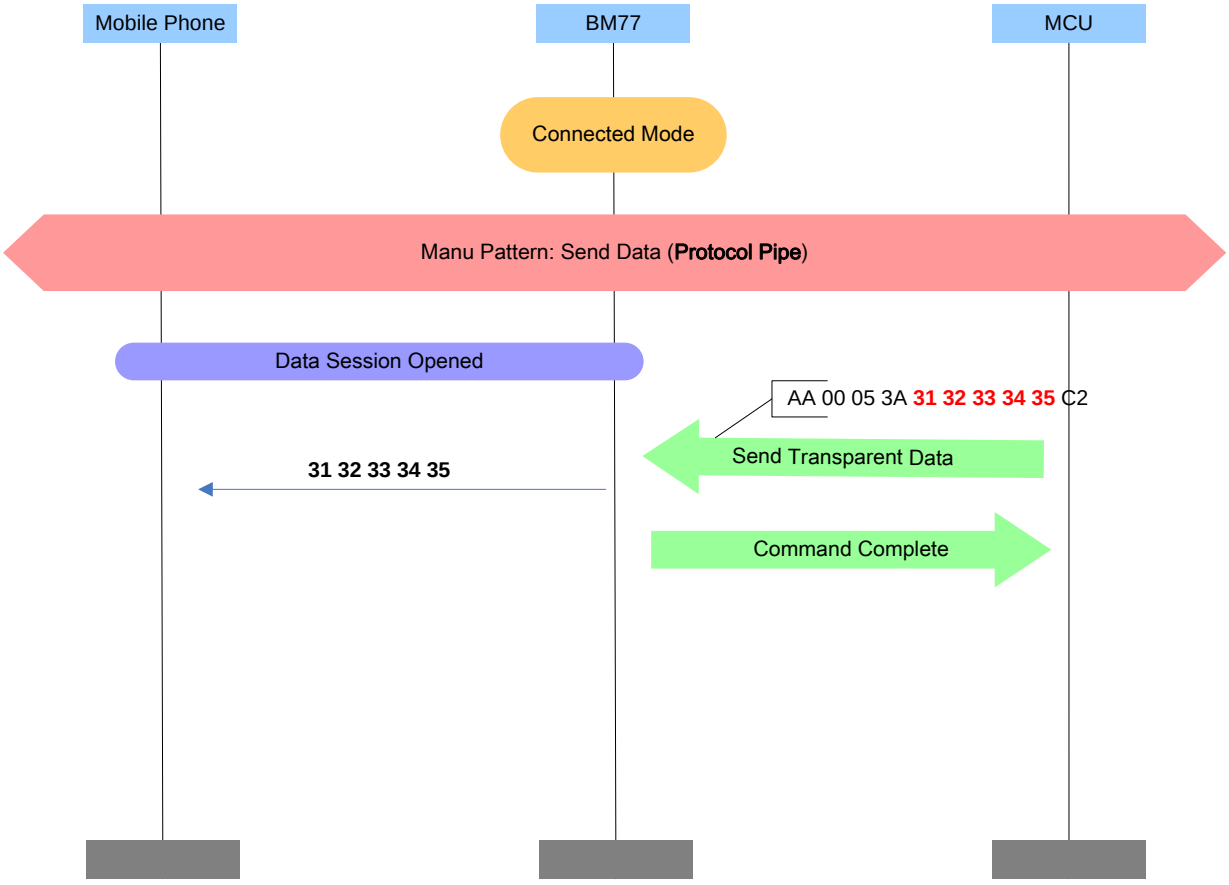
7.2 Link Back Mode

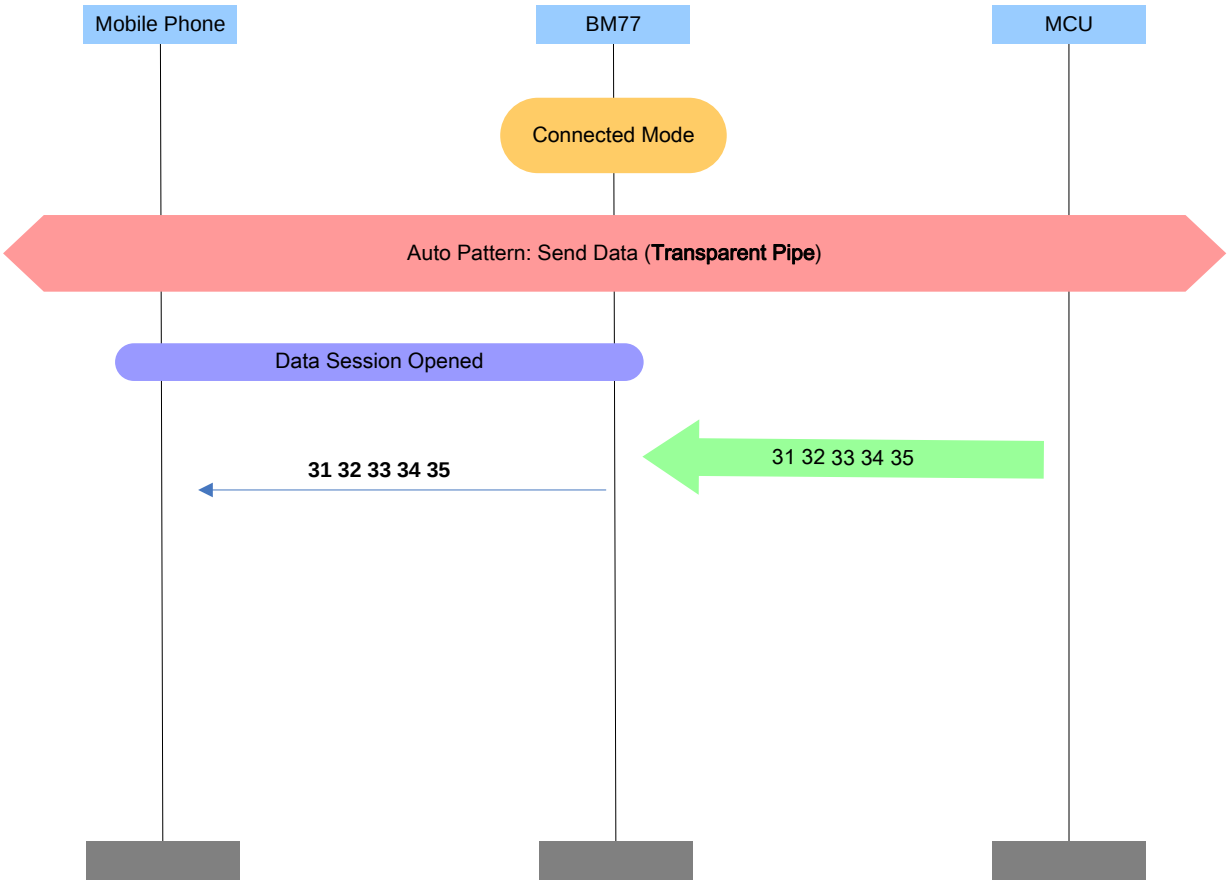


7.3 Connected Mode

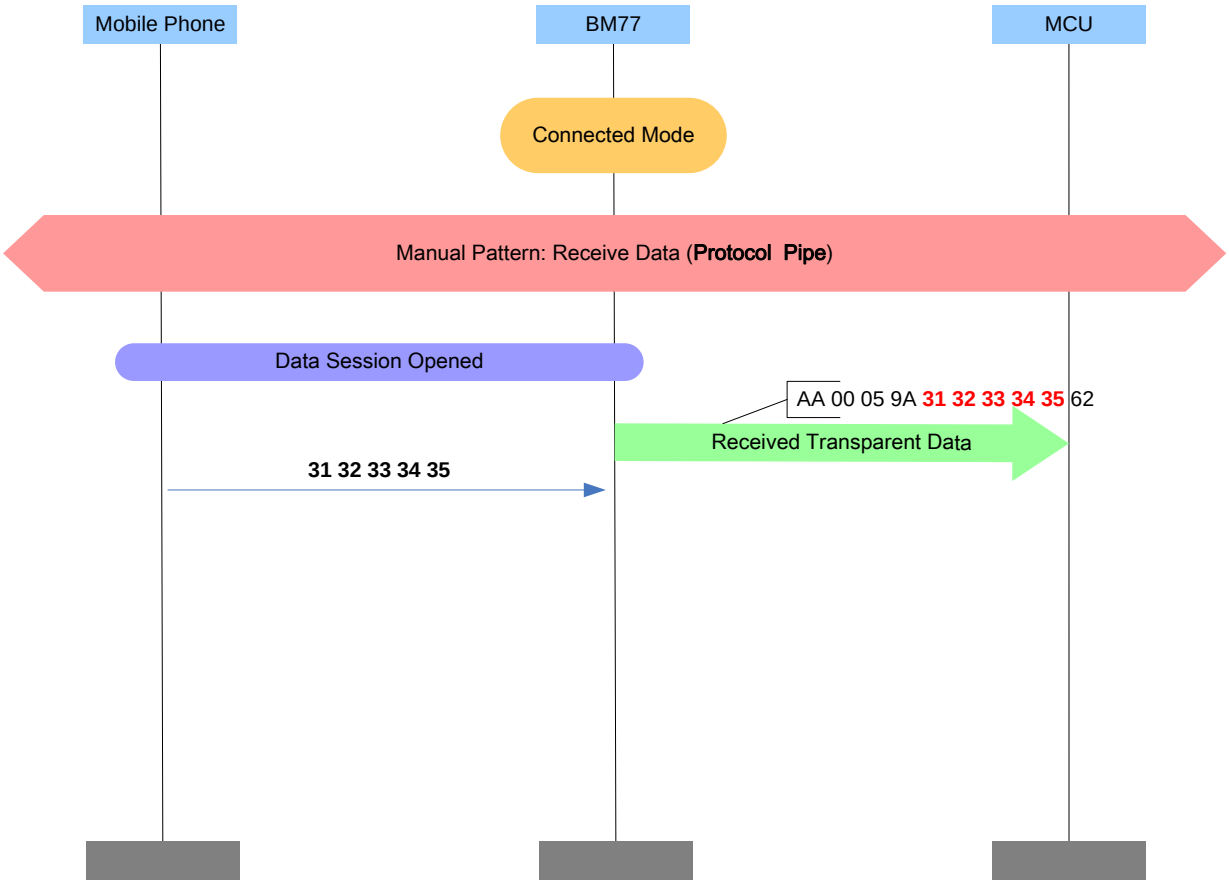
7.3.1 Manual Pattern Send Data



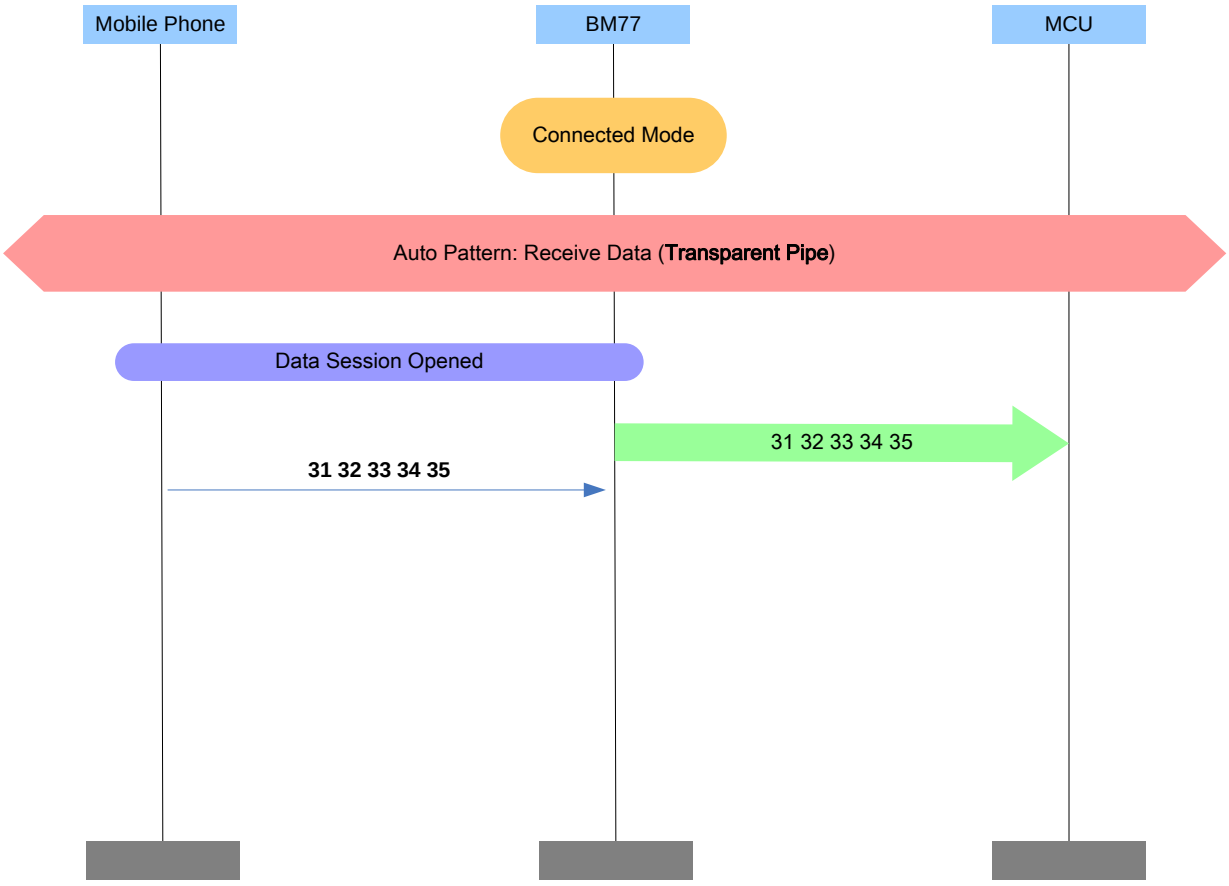
7.3.2 Auto Pattern Send Data



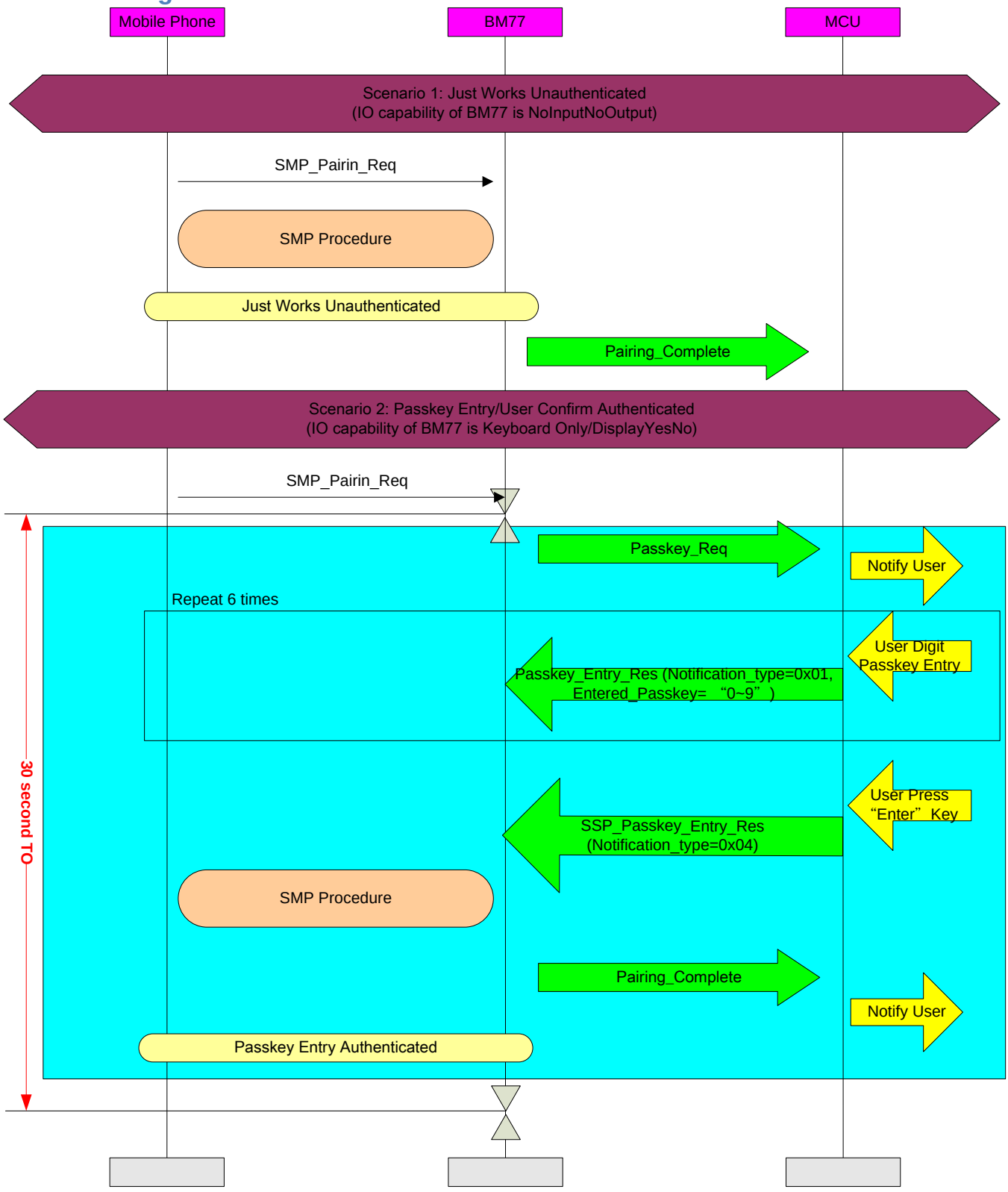
7.3.3 Manual Pattern Receive Data



7.3.4 Auto Pattern Receive Data



7.4 LE Pairing Method



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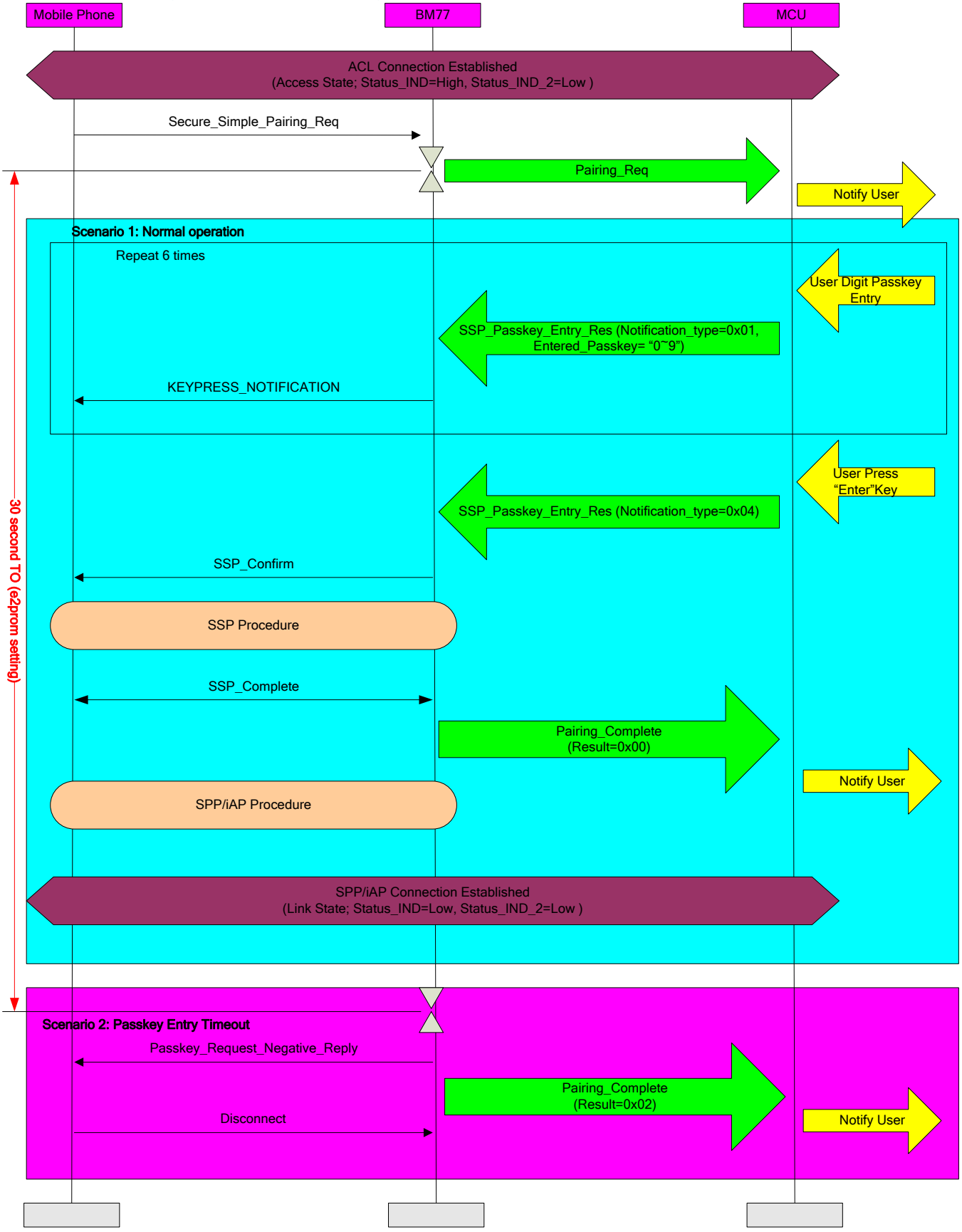
7.5 SSP Pairing Method: Passkey Entry



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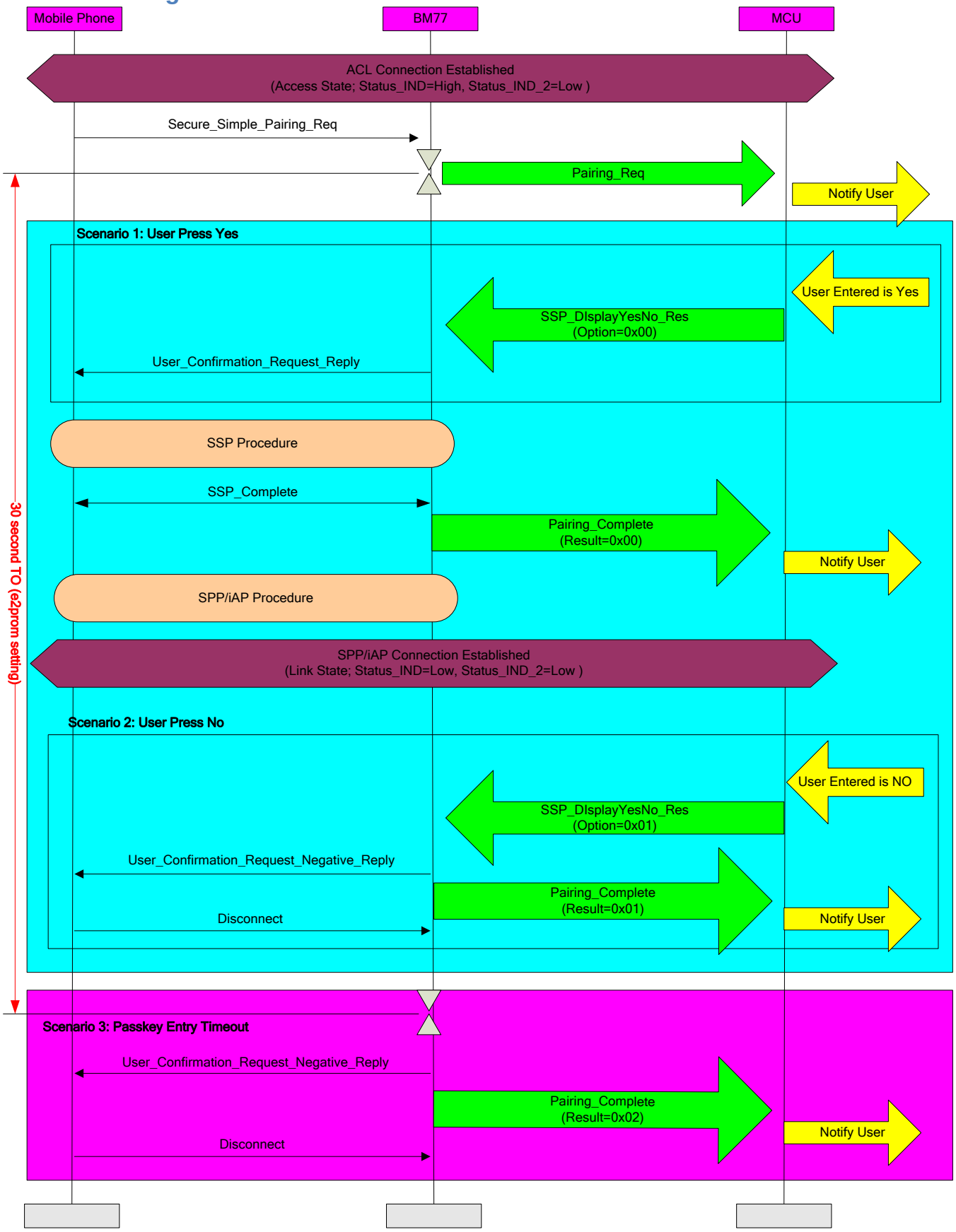
7.6 SSP Pairing Method: User Confirm



8. Listing of Command Status Error Code

Error Code	Description
0x00	Command succeeded
0x01	Unknown Command
0x02	Unknown Connection Identifier
0x03	Hardware Failure
0x05	Authentication Failure
0x06	PIN or Key Missing
0x07	Memory Capacity Exceeded
0x08	Connection Timeout
0x09	Connection Limit Exceeded
0x0B	ACL Connection Already Exists
0x0C	Command Disallowed
0x0D	Connection Rejected due to Limited Resources
0x0E	Connection Rejected Due To Security Reasons
0x0F	Connection Rejected due to Unacceptable BD_ADDR
0x10	Connection Accept Timeout Exceeded
0x11	Unsupported Feature or Parameter Value
0x12	Invalid Command Parameters
0x13	Remote User Terminated Connection
0x14	Remote Device Terminated Connection due to Low Resources
0x15	Remote Device Terminated Connection due to Power Off
0x16	Connection Terminated By Local Host
0x18	Pairing Not Allowed
0x1F	Unspecified Error
0x28	Instant Passed
0x29	Pairing With Unit Key Not Supported
0x2F	Insufficient Security
0x39	Connection Rejected due to No Suitable Channel Found
0x3A	Controller Busy
0x3B	Unacceptable Connection Interval
0x3C	Directed Advertising Timeout
0x3D	Connection Terminated due to MIC Failure
0x3E	Connection Failed to be Established
0x81	Invalid Handle
0x82	Read Not Permitted
0x83	Write Not Permitted
0x84	Invalid PDU
0x85	Insufficient Authentication
0x86	Request Not Supported
0x77	Invalid Offset
0x88	Insufficient Authorization
0x89	Prepare Queue Full
0x8A	Attribute Not Found
0x8B	Attribute Not Long
0x8C	Insufficient Encryption Key Size
0x8D	Invalid Attribute Value Length
0x8E	Unlikely Error
0x8F	Insufficient Encryption
0x90	Unsupported Grout Type
0x91	Insufficient Resources
0xFF	UART_Check_Sum_Error

9. Listing of BM77 Status

BM77 Status	Description
0x00	Power On
0x03	Standby Mode
0x04	Link Back Mode
0x07	SPP Connected Mode
0x08	LE Connected Mode
0x09	Idle Mode
0x0a	Shutdown Mode. **BM77** go to power down mode (S2 mode).

10. Revision History

Version	Date	History
0.90	2014/01/17	Initial this document.
0.91	2014/01/24	Add new command/Event
0.92	2014/01/28	Modify command/event parameter
0.93	2014/02/19	Modify command/event parameter
0.94	2014/03/11	Modify command parameter - Write_Device_Name - Write_Pairing_Mode_Setting - Write_PIN_Code - Leave_Configure_Mode
0.95	2014/04/15	Add new commands - Write_Adv_Data - Write_Scan_Res_Data
0.96	2014/04/17	Add note in Send_Transparent_Data Command Add new parameter in Read_All_Paired_Device_Information Command
0.97	2014/08/05	Add new command - Read_Remote_Device_Name - Set_Advertising_Parameter Modify command parameter - Write_Adv_Data - Invisible_Setting - LE_Connection_Complete - SPP_Connection_Complete
	2014/09/24	Modify session 6.1 typo issue