



User Guide

LM-SRX-ATC Host Interface firmware

Document Version 1.3

Profiles Supported: HFP, A2DP, AVRCP, SPP, PBAP

Compatible with LM747 and LM746

Revision History

Version	Date	Description
v1.0	30-03-2012	First Version
v1.1	22-05-2012	<ol style="list-style-type: none"> 1. Add some more AT Commands related to Hands free and General Bluetooth® settings 2. Add SPP commands 3. Remove the carriage return (\n) from AT Command description as it is not needed
v1.2	17-10-2012	<ol style="list-style-type: none"> 1. Add PBAP Commands description 2. Change firmware name to SRX-ATC to LM-SRX-ATC 3. Update LED enhancements 4. Add HFP Call waiting notification and HFP Conference calling command 5. Add A2DP Streaming start stop indication
v1.3	15-11-2012	<ol style="list-style-type: none"> 1. Add information about Call waiting notification 2. Add information about call hold and conference calling commands 3. Update pin code command description as per the firmware change 4. Add Registered Trademark to Bluetooth® keyword 5. Remove IND:*N since pin code is set by AT*N command. So no pin code request no longer comes from the firmware 6. Change description of Reply to Pin code command (AT*N) to set pin code command. AT*N stores a fixed pin code to be used by firmware for authentication 7. Remove AT-X and AT+X commands since they have been replaced by AT-V? and AT+V? Commands 8. Add extra HFP states 9. Add command to connect PBAP

Contents

1	Introduction	5
2	LED Indications.....	5
3	General Protocol.....	5
3.1	Classes of AT Commands	6
3.2	Types of Response	7
3.3	Report	7
3.4	Event	7

4	System Control Command Set	7
4.1	Enter Pairing Mode	8
4.2	List Paired Device Names	8
4.3	Set Pin Code	9
4.4	Connect to Remote Device	9
4.5	Drop Bluetooth® Connection.....	10
4.6	Set PIO for Output.....	10
4.7	Read Input value from PIO.....	10
4.8	Baud Rate Control	11
4.9	Set Stop Bit.....	11
4.10	Set Parity bit.....	11
4.11	Deep Sleep Mode.....	12
4.12	Get Current Bluetooth® State.....	12
4.13	Bluetooth® Link Dropped Indication.....	12
4.14	Get Local Bluetooth® Address	13
4.15	Echo Setting	13
4.16	Local Name.....	13
4.17	Get Firmware version.....	13
4.18	DFU Command	14
4.19	Reset or Restore Factory Settings	14
5	A2DP Command Set.....	15
5.1	Volume Control	15
5.2	Get Current A2DP State	15
5.3	Playback Control	15
5.4	Mute Indication.....	16
5.5	Streaming Indication.....	16
6	HFP/HSP Command Set.....	16

6.1	Answer Incoming Call.....	18
6.2	Reject Incoming Call.....	18
6.3	Hang Up Call.....	18
6.4	Last Number Dialing.....	18
6.5	Specified Number Dialing.....	19
6.6	Toggle Call Transfer.....	19
6.7	Volume Control.....	19
6.8	Get Current HFP/HSP State.....	20
6.9	Get phone Operator Name/GSM Signal Strength.....	20
6.10	Volume Changed.....	20
6.11	Call Setup.....	21
6.12	Call Connected.....	21
6.13	Call Idle.....	21
6.14	Outgoing Call.....	21
6.15	Call Waiting Indication.....	21
6.16	Multi-Call Indication.....	21
7	SPP Command Set.....	21
7.1	Escape Sequence.....	22
7.2	Switch to Data Mode.....	22
7.3	Set Flow Control.....	22
7.4	Get RSSI Value.....	22
8	PBAP Command Set.....	23
8.1	Pull Phone Book.....	23
8.2	Get Complete Call History.....	23
8.3	Connect to PBAP Profile.....	24

1 Introduction

LM-SRX-ATC (or Firmware v2.51) is an embedded firmware running on LM Technologies Bluetooth® LM740 modules which are based on BlueCore® 5-MM processor from CSR®. It implements the Bluetooth® profiles stack include the A2DP, AVRCP, HFP, HSP, SPP and PBAP.

The host interface to LM-SRX-ATC firmware is through the UART interfaces. The host processor can control LM-SRX-ATC by using AT commands via UART interface. With these AT commands, the host can access the Bluetooth® functionalities without involving the Bluetooth® protocol stack. The AT commands act like an application interface of LM-SRX-ATC.

2 LED Indications

The firmware controls the LED0 (RED) and LED1 (BLUE) lines on the LM740 as below

Firmware State	LED State
Power Off	BLUE : OFF, RED: OFF
Idle, Power ON	BLUE: OFF, RED: ON
Discoverable & Connectable	BLUE and RED LED blink alternatively
Bluetooth® Connecting	BLUE: Blink 2 times/second, RED: OFF
Bluetooth® Connected	BLUE: Blinking twice every 3 seconds, RED: OFF
Deep Sleep Mode	BLUE : OFF, RED: OFF

3 General Protocol

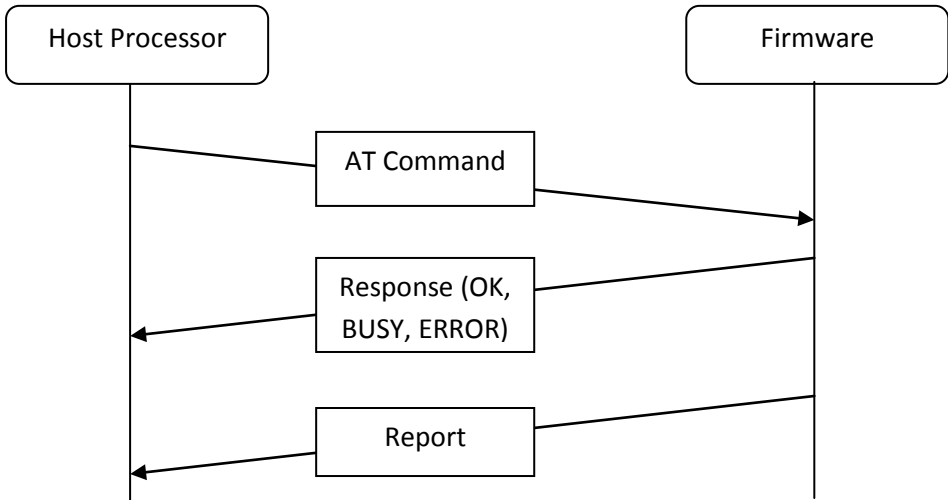
The AT Commands and their response are in ASCII text format and case-insensitive. The AT Command syntax begins with the text “AT” followed by the Profile Identifier, the Command Character and the Parameters. The command line shall be ended with a carriage return (\r).

The syntax is shown below:

A	T	Profile Identifier (optional)	Command Character (optional)	Parameter (optional)	\r (0x0D)
			*	System Control	
			-	A2DP/AVRCP Control	
			+	HFP profile	
			null	SPP profile	
			#	PBAP	
)	Reserved	
			.	Reserved	
			/	Reserved	
			,	Reserved	

A typical AT Command example is “at*n1234\r”, which is used to set the Bluetooth® Pin code. The AT command transaction is shown in below. It can include three phases, the Command phase, the Response phase and the Report phase. The Command phase usually is initiated by host processor

who will send the AT command to firmware. In the Response phase, when firmware accept the AT command, it will reply the response immediately. The host can, then, send next command once it gets the response of last command. Firmware will introduce Report phase if the command require a report. The latency time of the report phase depends on the type of command. Most of the reports are replied to in very short latency time while some of others, such as Discovery, may need longer time to complete.



Some events occurred during the communications will be indicated as the Event. The Event is usually asynchronous to the AT command. The typical examples of the Event are Paired, Connect, and Disconnect. The Event can be presented by the firmware to the host at any timing. Sometime, the Event is the consequence of previous AT command. The host may expect the Event as part of the control flow.

All the Response, Report and Event packets shall be ended with carriage return (\r) and line feed (\n).

Note: A simple ‘AT’ command without any argument to LM-SRX-ATC is treated as health check. The LM-SRX-ATC firmware will simply respond with ‘OK’ to the host.

3.1 Classes of AT Commands

In order to support profiles of different applications, the AT Commands are classified into different sections by Profile Identifiers. The sections are:

Identifier	Description
*	System Control command, the generic commands to configure the BC5-MM based Bluetooth® module
-	A2DP/AVRCP profile command for stereo audio transporting and playback control
+	HFP profile command for mono headset (mobile phone) application
null	SPP profile command for serial port application
#	PBAP profile command for phone book access features
)	Reserved

.	Reserved
/	Reserved
,	Reserved

3.2 Types of Response

The syntax of response is

\r (0x0D)	\n (0x0A)	Response	\r (0x0D)	\n (0x0A)
----------------------------	----------------------------	-----------------	----------------------------	----------------------------

There are three types of Response defined to indicate the processing status of AT Command by RX-ATC. These are:

Response	Description
OK	Firmware accepts the incoming AT Command and will perform the requested function
ERROR	The ERROR indicates that the AT Command cannot be carried out*.

*Note: The causes of ERROR can be introduced by syntax error of AT Command or non-applicable operating state for the incoming command.

3.3 Report

If the incoming AT command requests certain information from the firmware, the information will be provided in the Report packet to the host.

The syntax of Report begins with the key word 'REP:' and then followed by the processing results that correspond to the AT command. The contents of each type of Report will be described with corresponding AT Command in the following section.

REP:	Profile Identifier	Command Character	Parameter (optional)	\r (0x0D)	\n (0x0A)
-------------	---------------------------	--------------------------	-----------------------------	----------------------------	----------------------------

3.4 Event

Event occurs at any time during the communication such as Pairing successfully, connected, disconnected, and so on. These are usually asynchronous to the transaction of AT Commands. Therefore, it is usually initiated by the firmware to notify the host about situation of existing Bluetooth® link.

The syntax of Event begins with the key word 'IND:' and then followed by the related messages from RX-ATC.

IND:	Profile Identifier	Attribute Character	Parameter (optional)	\r (0x0D)	\n (0x0A)
-------------	---------------------------	----------------------------	-----------------------------	----------------------------	----------------------------

4 System Control Command Set

The System Control command set include the AT commands that are common to the Bluetooth® module. The control settings are effective to all profiles.

4.1 Enter Pairing Mode

This command set module to enter pairing mode i.e., the Discoverable state. The module stays in discoverable state for 90 seconds before going back to being non-discoverable.

Syntax	
AT*P{conn}\r	
Description	
{conn} =None, To enter Pairing mode = ?, To inquire the number of paired devices	
Response	
\r\nOK\r\n	
Report	
REP:*P{number}\r\n	{number} = The number of paired devices

The pairing activity can induce one of the following Events:

Event	Descriptions
IND:*P{result}\r\n	{result} =1, Pairing successful {result} =0, Pairing failed
IND:*C{link}\r\n	{link} = 0, HFP link has been connected = 1, A2DP link has been connected = 2, SPP link has been connected = 3, PBAP link has been connected

4.2 List Paired Device Names

This command is used to get the list of paired device names.

Syntax	
AT*F\r	
Description	
No parameter is required	
Response	
\r\nOK\r\n	The command is accepted and starting to get the all paired device names in record.
\r\nERROR\r\n	There is no paired device in the record. The AT*P command should be used first to force the A2DP-ATC enter Pairing mode
Report	
REP:*F{name}\r\n	{name} = The paired device names, the Max size of each name are 16 characters. Example : there are 8 paired devices in the record, the report will be: REP:*F4e 6f 6b 69 61 20 37 33 31 30 63\r\n (en:Nokia 7310c) REP:*F49 70 68 6f 6e 65 34 73\r\n (en:Iphone4s) REP:*F53 61 6d 73 75 6e 67 20 53 33 35 30 30\r\n (en:Samsung S3500) REP:*F4c 65 6e 6f 76 6f 50 61 64\r\n (en:LenovoPad) REP:*F53 6f 6e 79 45 72 69 63 73 73 6f 6e 53 33 31 32\r\n (en:SonyEricssonS312) REP:*F b2 e2 ca d4 cc a8\r\n(Please note that some phone will provide with Chinese characters code.)

	REP:*Fc5 b5 bb f9 d1 c7 20 4e 37 33\r\n (cn+en:基N73)
	REP:*F4d 6f 74 6f 72 6f 6c 61 20 5a 4e 32 30 30\r\n (en:Motorola ZN200)

4.3 Set Pin Code

This command is used to set and query fixed pin code to be used by the firmware during Bluetooth® Authentication. **The default pin code setting is 0000.**

Syntax	
AT*N{PIN code}\r	
Description	
{PIN code} = Bluetooth® PIN code in ASCII format = ?, query current pin code	
Response	
\r\nOK\r\n	
Report	
REP:*N{pin}\r\n	{pin} = Current pin code

The pairing activity can induce one of the following Events:

Event	Descriptions
IND:*P{result}\r\n	{result} =1, Pairing successful {result} =0, Pairing failed
IND:*C{link}\r\n	{link} = 0, HFP link has been connected = 1, A2DP link has been connected = 2, SPP link has been connected = 3, PBAP link has been connected

4.4 Connect to Remote Device

This command asks firmware to initiate the connection to remote device. It will try to connect to the last connected device. The firmware will initiate HFP and A2DP connection in case of phones or SPP connection in case of SPP devices. There is a separate command AT#C for creating PBAP connection which works only if there is a HFP connection already present.

Syntax	
AT*C{conn}\r	
Description	
{conn} =None, Connect to the last connected device =Number, This can be a ASCII character of 1~8, which is an index to the list of paired device names	
Response	
\r\nOK\r\n	The command is accepted and starting to connect to the last connected remote device or the specified remote device in the paired devices list
\r\nERROR\r\n	There is no paired device in the record. The AT*P command should be used first to force the device enter Pairing mode

The connecting activity can induce one of the following Events:

Event	Descriptions
<i>IND:*B\r\n</i>	Creating outgoing Bluetooth connection
<i>IND:*C{link}\r\n</i>	{link} = 0, HFP link has been connected = 1, A2DP link has been connected = 2, SPP link has been connected = 3, PBAP link has been connected

4.5 Drop Bluetooth® Connection

This command will force the firmware to drop Bluetooth® connection.

Syntax
<i>AT*D{conn}\r</i>
Description
{conn} = 1 Disconnect the Bluetooth® link = 2 Disconnect the Bluetooth® link and clear all the authorized devices and their names in the pairing record
Response
<i>\r\nOK\r\n</i>

The consequence of drop link activity can induce the following Event:

Event	Descriptions
<i>IND:*Z{link}\r\n</i>	{link} = 0, HFP link has been dropped = 1, A2DP link has been dropped = 2, SPP link has been dropped = 3, PBAP link has been dropped

4.6 Set PIO for Output

This command set the specified PIO for output.

Syntax
<i>AT*O{PIO number}{value}\r</i>
Description
{PIO number} = This can be a ASCII character of 0,1,2,3,4...,A,B or C. where A means PIO10, B means PIO11 and C mean PIO12.
{value} = The desired output value for PIO. It can be 1 or 0.
Response
<i>\r\nOK\r\n</i>

4.7 Read Input value from PIO

This command read the input value from the specified PIO.

Syntax	
<i>AT*I{PIO number}\r</i>	
Description	
{PIO number} = This can be a ASCII character of 0,1,2,3,4...,A,B or C. where A means PIO10, B means PIO11 and C mean PIO12.	
Response	
<i>\r\nOK\r\n</i>	
Report	
<i>REP:*I{value}\r\n</i>	{value}= The input value of the specified PIO. It can be ASCII '0' or '1'

4.8 Baud Rate Control

This command is used for changing and querying the baud rate of UART interface.

Syntax	
AT*L{Baud Rate}\r	
Description	
{Baud Rate} = * set to 1,200bps; # set to 2,400bps; 0 set to 4,800bps; 1 set to 9,600bps; 2 set to 19,200bps (Default); 3 set to 38,400bps; 4 set to 57,600bps; 5 set to 115,200bps; 6 set to 230.4Kbps; 7 set to 460.8Kbps; 8 set to 921.6Kbps; ? gets current value;	
Response	
\r\nOK\r\n	
Report	
REP:*L{Baud Rate}\r\n	{Baud Rate} = *, 1200 bps = #, 2400 bps = 0, 4800 bps = 1, 9600 bps = 2, 19200 bps = 3, 38400 bps = 4, 57600 bps = 5, 115200 bps = 6, 230400 bps = 7, 460800 bps = 8, 921600 bps

4.9 Set Stop Bit

This command is used for changing and querying the Stop bit setting of UART interface

Syntax	
AT*K{Stop Bit}\r	
Description	
{Stop Bit} = 0 set to one Stop bit (Default); 1 set to two Stop bits; ? gets current setting;	
Response	
\r\nOK\r\n	
Report	
REP:*K{Stop Bit}\r\n	{Stop Bit} = 0, One Stop Bit = 1, Two Stop Bits

4.10 Set Parity bit

This command is used for changing and querying the Parity bit setting of UART interface

Syntax	
AT*M{Parity Bit}\r	
Description	
{Parity Bit} = 0 set to none Parity bit (Default); 1 set to Odd Parity bits; 2 set to Even Parity bits; ? gets the current setting;	
Response	
\r\nOK\r\n	
Report	
REP:*M{Parity}\r\n	{Parity} = 0, None Parity = 1, Odd Parity = 2, Even Parity

4.11 Deep Sleep Mode

This command is only valid when Bluetooth® link is disconnected. It will set the deep sleep timer and start down counting. The Bluetooth® module will fall into deep sleep mode when the timer is expired. The timer can be restarted by any activity at UART or PIO4. The Deep Sleep mode can be terminated by any activity at UART or PIO4. The current value can also be queried using this command. If a timer value less than 60 seconds is used, the timer is disabled and user gets a response **Value is too small, and reset to zero.**

Syntax	
AT*G{timer}\r	
Description	
{timer} = the value between 60 – 65536 (seconds). The tolerance is +/- 2 seconds. = 0, disable the Deep Sleep timer. =?, query the current value of deep sleep timer	
Response	
\r\nOK\r\n	
Report	
REP:*G{timer}\r\n	{timer} = value between 60-65536(seconds) = 0, if timer is disabled

4.12 Get Current Bluetooth® State

This command gets the current Bluetooth® link state.

Syntax	
AT*S\r	
Description	
No parameter is required	
Response	
\r\nOK\r\n	
Report	
REP:*S{value}\r\n	{value} = 0, The firmware is ready to accept command = 1, The firmware is in Pairing state = 2, The firmware is in Connecting state = 3, The firmware is in Connected state

4.13 Bluetooth® Link Dropped Indication

The Bluetooth® link can be dropped due to unexpected events such as out of range, disconnected requested from remote device. The Event 'No Carrier' will be indicated to host.

The unexpected link dropped can induce the following Event 'No Carrier':

Event	Description
IND:*Z{link}\r\n	{link} = 0, HFP link has been dropped = 1, A2DP link has been dropped = 2, SPP link has been dropped =3, PBAP link has been dropped

4.14 Get Local Bluetooth® Address

The command will display the local Bluetooth® device address

Syntax	
AT*B?\r	
Description	
No parameter is required	
Response	
\r\nOK\r\n	
Report	
REP:*B{addr}\r\n	{addr} = The local Bluetooth® address

4.15 Echo Setting

This command is used to enable or disable echo characters to the host and read the current setting

Syntax	
AT*E{control}\r	
Description	
{control} = 0, To disable the local echo = 1, To enable the local echo = ?, To inquire the current setting	
Response	
\r\nOK\r\n	
Report	
REP:*E{echo}\r\n	{echo} = 1, echo enabled =0, echo disabled

4.16 Local Name

This command is used to set or read the local device name

Syntax	
AT*A{name}\r	
Description	
{name} = XXXX.....X, characters in ASCII code. Maximum 16 characters are allowed = ?, To inquire the current local name	
Response	
\r\nOK\r\n	
Report	
REP:*A{name}\r\n	{name} = Local Name

4.17 Get Firmware version

This command retrieves the current firmware version

Syntax	
AT*I?\r	
Description	
No parameter is required	

Response
S/W VERSION: LM-SRX-ATC-{YYYYMMDD} {the firmware version (Year.Month.Day)}

The current firmware version at the time of release of this document is LM-SRX-ATCv20121115

4.18 DFU Command

This command is used to initiate firmware upgrade procedure over USB. This commands put the device in firmware upgrade mode. **START DFU** message is received when upgrade mode is entered.

Syntax
ATU=Upgrade\r
Description
No parameter is required
Response
Enter DFU mode, Are you sure(y/n)?
'Y' to put device in firmware upgrade mode

4.19 Reset or Restore Factory Settings

This command restores the device to default factory settings.

Syntax
AT*R{param}\r
Description
param = 1, restart the module = 2, restore factory settings, clear pairing records and restart the module
Response
\r\nOK\r\n

Default Factory Settings

The default factory for the firmware settings are:

Baud Rate: 19200

Parity: 0 (None)

Stop Bits: 1

Flow Control: 0 (None)

Deep Sleep Mode: 0 (Disabled)

Local Echo: Enabled

Pin Code: 0000

Name: LM-SRX-ATC

HFP Volume Level: 15

A2DP Volume Level: 8

5 A2DP Command Set

The A2DP command set include the AT commands that control the audio streaming (A2DP) as well as the playback operations (AVRCP).

5.1 Volume Control

This command is used to control the volume up/down when music is streaming. The valid value of volume level is between 1 and 15. This command can also query the current volume level. **This command is effective only when music streaming is active**

Syntax	
AT-V{control}\r	
Description	
{control}	= '+', volume up one step = '-', volume down one step = '?', query current volume level
Response	
\r\nOK\r\n	
Report	
REP:-V{volume}\r\n	{volume} = The current local volume setting, valid value is between 1 and 15

5.2 Get Current A2DP State

This command gets the current A2DP State. This command is useful when the host needs to know if the audio streaming is running on.

Syntax	
AT-S\r	
Description	
No parameter is required	
Response	
\r\nOK\r\n	
Report	
REP:-S{value}\r\n	{value} = 0, The A2DP/AVRCP is not ready because the Bluetooth® link is not established = 1, The A2DP/AVRCP is ready to accept playback control command = 2, The A2DP streaming is running on (playing music) and ready to accept playback control command.

5.3 Playback Control

This command set the music playback controls.

Syntax	
AT-B{control}\r	
Description	
{control}	= 0, To end the Forward/Backward repeat = 1, Play/Pause = 2, Backward = 3, Forward = 4, To start Backward Repeat = 5, To start Forward Repeat
Response	

```
\r\nOK\r\n
```

5.4 Mute Indication

When the firmware carries out the Playback Control command, the A2DP streaming will be stopped accordingly. That will induce the Event 'Mute' and the Event 'Unmute'. The playback control activity can induce the following Event:

Event	Description
IND:-M{stream}\r\n	{stream} = 1, Mute due to Forward/Backward operation. The A2DP streaming was stopped = 0, Un-mute due to Forward/Backward operation was ended. The A2DP streaming was resumed

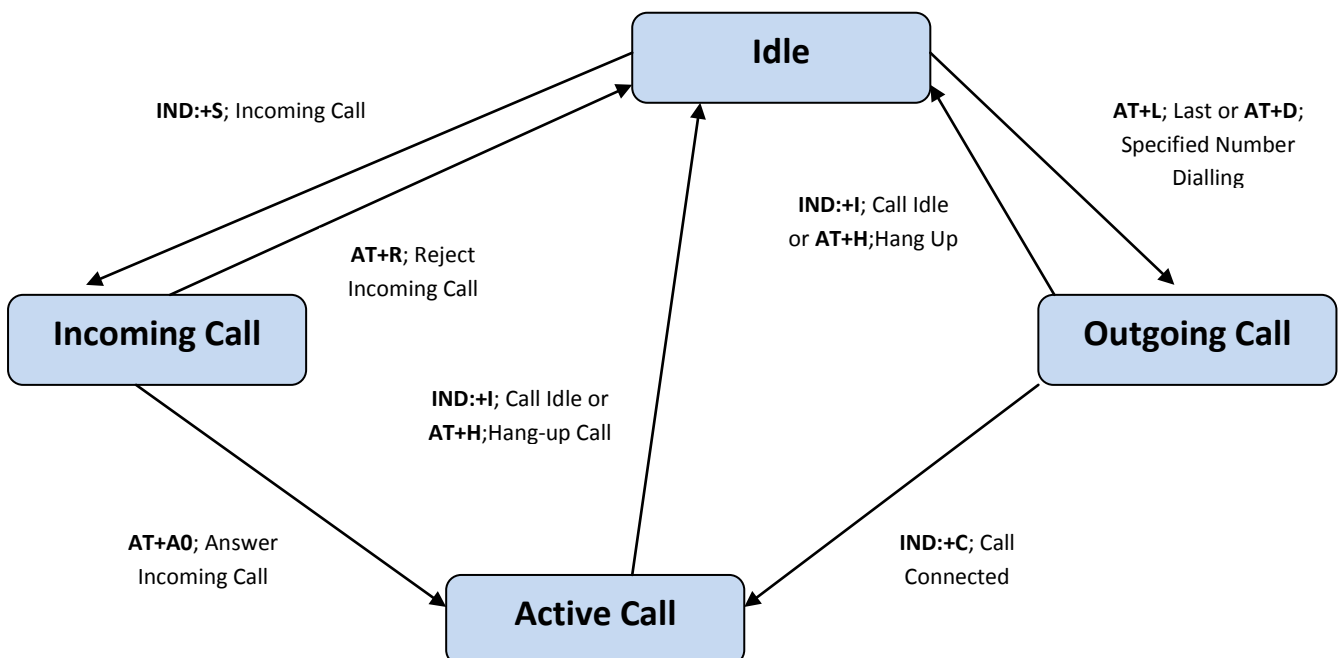
5.5 Streaming Indication

This indication is generated when music/audio streaming is started or stopped/paused. This indication can be used when the various audio sources have to multiplexed to a single output.

Event	Description
IND:-A{stream}\r\n	{stream} = 0, Audio Streaming stopped/paused/inactive = 1, Audio Streaming active

6 HFP/HSP Command Set

The HFP/HSP command set include the AT commands that control the hand free/headset function. The following diagram shows the state transitions of HFP/HSP operations and the associated Event and Commands. Please note that Command should be sent at proper state otherwise will cause response of error.



HFP: Call Setup State Diagram

6.1 Answer Incoming Call

This command is used for answering the incoming call, swap the hold status and enable conference calling. AT+A0 answers incoming call, AT+A1 puts current call on hold and if there is another incoming call, it makes it active. AT+A2 brings all the active/held calls in conference.

Syntax	
AT+A{control}\r	
Description	
{control} = '0', Answer Incoming Call = '1', Call Waiting Option = '2', Conferencing Option	
Response	
\r\nOK\r\n	Command accepted and will answer the incoming call.
\r\nERROR\r\n	The HFP/HSP is not in correct state

The answering activity can induce the following Event 'Call Connected':

Event	Description
IND:+C\r\n	Call Connected that indicates the call is built up.

6.2 Reject Incoming Call

This command will reject the incoming call.

Syntax	
AT+R\r	
Description	
No Parameter Required	
Response	
\r\nOK\r\n	Command accepted and will reject the incoming call
\r\nERROR\r\n	The HFP/HSP is not in Incoming Call state

6.3 Hang Up Call

This command will hang up the active call (or outgoing call).

Syntax	
AT+H\r	
Description	
No Parameter Required	
Response	
\r\nOK\r\n	Command accepted and will hang up the call.
\r\nERR\r\n	The HFP/HSP is not in proper state (none of Incoming Call, Outgoing Call, Active Call)

The hanging up activity can induce the following Event 'Call Idle':

Event	Description
IND:+I\r\n	Call Idle that indicate the call is ended and the line is back to idle

6.4 Last Number Dialing

This command will issue the Last Number Dialing request to mobile phone.

Syntax	
AT+L\r	
Description	
No Parameter Required	

Response	
r\nOK\r\n	Command accepted and will issue the Last Number Dialing request to remote device
r\nERROR\r\n	The HFP/HSP is not in idle state

6.5 Specified Number Dialing

This command will issue the dialing request to mobile phone with specified telephone number.

Syntax	
AT+D{number}\r	
Description	
{number}=Specified dialing number in ASCII format, the maximum size of dialing number is 20 digits. Example: AT+D13800138000\r, the dialing number is 13800138000.	
If HFP is at 'Outgoing Call' state, this command will cause the HFP to transmit DTMF tone signals to mobile phone. The DTMF tone signals can be correspond to the ASCII code of 0-9, #,A-D.	
Response	
r\nOK\r\n	Command accepted and will issue the Number Dialing request to remote device.
r\nERROR\r\n	The HFP/HSP is not in idle state

6.6 Toggle Call Transfer

This command will toggle the transfer of the call between LM-SRX-ATC firmware and remote device.

Syntax	
AT+T\r	
Description	
No Parameter Required	
Response	
r\nOK\r\n	Command accepted and will send the Call Transfer request to remote device.
r\nERROR\r\n	The HFP/HSP is not in proper state (none of Incoming Call, Outgoing Call, Active Call)

The toggle Call transferring activity can induce the following Event 'Audio Stream':

Event	Description
IND:+B{stream}\r\n	{stream} = 0, The audio streaming was stopped because the call was transferred to remote device = 1, The audio streaming is resumed because the call was transferred back to the firmware

6.7 Volume Control

This command set the audio volume up/down for an ongoing call. The valid value of volume level is between 1 and 15. This command can also query the current volume level. **This command is effective only when there is an active ongoing call.**

Syntax	
AT+V{control}\r	
Description	
{control}	= '+', volume up one step = '-', volume down one step ='?' get current volume level

Response	
\r\nOK\r\n	
Report	
REP:+V{volume}\r\n	{volume} = The current local volume setting, whose value is between 1 to 15

6.8 Get Current HFP/HSP State

This command gets the current HFP/HSP State. The information of current state is useful for the host's reference when issuing the AT Command to the firmware.

Syntax	
AT+S\r	
Description	
No Parameter Required	
Response	
\r\nOK\r\n	
Report	
REP:+S{value}\r\n	{value} = 0, The HSP/HFP is not ready because the Bluetooth® link is not established = 1, The HSP/HFP is in Idle state and ready = 2, The HSP/HFP is in Incoming Call state = 3, The HSP/HFP is in Outgoing Call state = 4, The HSP/HFP is in Active Call state = 5, The HSP/HFP is in Waiting Call state = 6, The HSP/HFP is in Multi Call state

6.9 Get phone Operator Name/GSM Signal Strength

This command returns the phone's operator or service provider name and GSM Signal Strength depending on the parameter.

Syntax	
AT+Y{param}\r	
Description	
param = 1, Get phone's operator/service provider name = 2, Get GSM Signal Strength	
Response	
\r\nOK\r\n	
Report	
REP:+Y{param}{value}\r\n	{param} = 1, Get Operator/Service Provider Name = 2, Get GSM Signal Strength {value} = Operator/Service Provider Name in ASCII format = GSM Signal Strength (in dBm) in integer format

6.10 Volume Changed

This Event would be initiated if the remote device changes the audio volume. This will be effective only when call is active

Event	Description
IND:+V{volume}\r\n	{volume} = The current volume after the change. Its value is between 1 and 15

6.11 Call Setup

This Event is generated when there is an incoming call.

Event	Description
IND:+S{Caller ID}\r\n	Caller ID: CLIP information of the calling party

6.12 Call Connected

This Event is generated when the call is active/answered.

Event	Description
IND:+C\r\n	This Event indicates that the Call is connected and audio connection is established

6.13 Call Idle

This Event is generated when the call was disconnected by remote device.

Event	Description
IND:+I\r\n	This Event indicates that the call was hang up and back to idle state

6.14 Outgoing Call

This Event is generated that there is an outgoing made by the remote device.

Event	Description
IND:+O\r\n	This Event is generated when there is an outgoing call made by the remote device.

6.15 Call Waiting Indication

This Event is generated when there is a call waiting notification because of incoming call by the remote device.

Event	Description
IND:+W<Caller ID>\r\n	Caller ID: CLIP information of the calling party

6.16 Multi-Call Indication

This Event is generated when all the active and held calls are brought into conference.

Event	Description
IND:+M\r\n	This Event is generated when all the active and held calls are brought into conference

7 SPP Command Set

The SPP application has two operating modes, the Data mode and the Command mode. In Data mode, the UART interface becomes transparent to the host processor and remote Bluetooth® device. That is, the host processor can exchange data with remote Bluetooth® device directly. In this manner, the firmware can no longer receive any AT command from the host until the escape sequence “+++” is received. Upon the presence of escape sequence, the firmware will switch the UART interface back to the Command mode which allows it to receive and response to the AT command.

The ATO command can make the firmware entering the Data mode from Command Mode while in connected state.

7.1 Escape Sequence

The Escape Sequence will switch the UART interface back to the Command mode when SPP connection is present. If no response comes it means the firmware did not enter Command mode from Data Mode.

Syntax
+++
Description
No Parameter Required
Response
\r\nOK\r\n

7.2 Switch to Data Mode

This command switches the UART interface to from Command Mode to data mode when the firmware is in SPP connection state.

Syntax
ATO\r
Description
No Parameter Required
Response
\r\nOK\r\n

7.3 Set Flow Control

This command enables/disables the flow control signals (The CTS/RTS) of UART interface. With the flow control enabled, the data can only be exchanged when CTS/RTS is in logic low level. **This setting will cause reboot of the firmware and any present connections will be disconnected.**

Syntax	
ATC{ctrl}\r	
Description	
{ctrl} = '0', Disable flow control. = '1', Enable flow control. = '?', inquire the current setting	
Response	
\r\nOK\r\n	
Report	
REP:C{ctrl}\r\n	{ctrl} = '0', Disable flow control. = '1', Enable flow control.

7.4 Get RSSI Value

This command gets the Bluetooth® Received Signal Strength Indication (RSSI) value from the remote connected device. This command should be executed in Online Command mode i.e. by switching the device into command mode (Escape Sequence) while SPP connection is present.

Syntax
ATH\r
Description
No Parameter Required

Response	
\r\nOK\r\n	
Report	
REP:H{value}\r\n	{value} = RSSI Value

8 PBAP Command Set

The Phone Book Access Profile is used to browse and transfer the phone address entries and call records like outgoing calls, missed calls, incoming calls and complete call history via Bluetooth®. For these commands to work phone should support Phone Book Access Profile Server role and the LM-SRX-ATC firmware will behave as PBAP Client.

8.1 Pull Phone Book

This command pulls the complete phone book of the connected phone. It is the responsibility of the host application to parse the response in suitable format. The phone book is provided in vCard3.0 or vCard2.1 format. The vCard messages will keep on coming until all the phone book is not downloaded

Syntax	
AT#B{control}\r	
Description	
{control} = '0', Pull phone book from phone's SIM Card = '1', Pull phone book from phone's internal memory	
Response	
\r\nOK\r\n	
Report	
	Phone book provided in vCard3.0 format BEGIN:VCARD VERSION:3.0 REV:20100116T010751Z UID:f6aa3a173dfaee8e-00e15af0cefb86b8-348 +DLPBC=0 +DLPBD= N:Angel Vision;;;; FN: TEL;TYPE=VOICE:0172212322112 TEL;TYPE=CELL:98181810092 END:VCARD BEGIN:VCARD VERSION:3.0 REV:20100116T010751Z UID:f6aa3a173dfaee8e-00e15af0cefa7548-347 N:Tommy Haas;;;; FN: TEL;TYPE=VOICE:+44776622881122 END:VCARD

8.2 Get Complete Call History

This command will download the complete call history from the phone. The supplied data will also be in vCard3.0 or vCard2.1 format.

Syntax	
AT#H\r	
Description	
No Parameter Required	
Response	
\r\nOK\r\n	
Report	
	<p>Call History is provided in vCard3.0 or vCard2.1 format</p> <pre>+DLPBD=BEGIN:VCARD VERSION:3.0 N:Tommy Hil FN: TEL:07789876777 X-IRMC-CALL-DATETIME;TYPE=RECEIVED:20121017T162837 END:VCARD BEGIN:VCARD VERSION:3.0 N:LM Technologies FN: TEL:02074282647 X-IRMC-CALL-DATETIME;TYPE=DIALED:20121017T162720 END:VCARD BEGIN:VCARD VERSION:3.0 N: FN: TEL:078000987871 X-IRMC-CALL-DATETIME;TYPE=MISSED:20121017T161252 END:VCARD</pre>

8.3 Connect to PBAP Profile

This command connects to the PBAP server on the phone. The HFP connection with the phone should be present for this command to work

Syntax	
AT#C\r	
Description	
No Parameter Required	
Response	
\r\nOK\r\n	

This command activity can induce the following Events:

Event	Descriptions
IND:*C{link}\r\n	{link} = 3, PBAP link has been connected