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This document describes the embedded software design of Wavecom Fastrack M1306B module. This module is GSM/GPRS Module.

Version 1.0

Revision History

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1 Introduction

1.1 Purpose

The purpose of this document is to describe the detailed design of the Wavecom module and how it works.

1.2 Definitions, Acronyms, and Abbreviations

GSM Global System for Mobile communications

PIN Personal Identity Number

SIM Subscriber Identification Module

SMS Short Message Service

1.3 References

Item	Name	link
[1]	fastrack_m1306b	
[2]	gsm822w	
[3]	SIM900_AT Command Manual_V1.03	

1.4 Overview

The Wavecom Fastrack M1306B is a discrete, rugged cellular Plug & Play Wireless CPU offering state-of-the-art GSM/GPRS connectivity for machine to machine application.

The Dual Band 900/1800 MHz Fastrack M1306B offers GPRS class 10 capability. Fastrack M1306 is controlled by firmware through a set of AT commands.

1.5 Folders and files structure

Wavecom Fastrack module was implemented by two files: Wavecom.c and Wavecom.h .

1.6 Features

Features	GSM	DCS	
Open AT®	Open AT® programmable: Native execution of embedded standard ANSI C applications, Custom AT command creation,		
	Custom application library creation, Standalone operation.		
Standard	900 MHz.	1800 MHz	
	E-GSM compliant.		
	Output power: class 4 (2W).	Output power: class 1 (1W).	
	Fully compliant with ETSI GSM phase 2 + small MS.	Fully compliant with ETSI GSM phase 2 + small MS.	
GPRS	Class 10.		
	PBCCH support.		
	Coding schemes: CS1 to CS4.		
	Compliant with SMG31bis.		
	Embedded TCP/IP stack (optional).		
Interfaces	RS232 (V.24/V.28) Serial interface supporting:		
	Baud rate (bits/s): 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200,		
	 Autobauding (bits/s): 2400, 4800, 9600, 19200, 38400, 57600. 		
	2 General Purpose Input/Output gates (GPIOs) available.		
	3 V SIM interface.		
	AT command set based on V.25ter and GSM 07.05 & 07.07.		
	Open AT® interface for embedded application.		
SMS	Text & PDU.		
	Point to point (MT/MO).		
	Cell broadcast.		

Features	GSM DCS
Data circuit asynchronous.	
	Transparent and Non Transparent modes.
	Up to 14.400 bits/s.
	MNP Class 2 error correction.
	V42.bis data compression.
Fax	Automatic fax group 3 (class 1 and Class 2).
Audio	Echo cancellation
	Noise reduction
	Telephony.
	Emergency calls.
	Full Rate, Enhanced Full Rate and Half Rate operation (FR/EFR/HR).
	Dual Tone Multi Frequency function (DTMF).
GSM	Call forwarding.
supplement services	Call barring.
	Multiparty.
	Call waiting and call hold.
	Calling line identity.
	Advice of charge.
	USSD
Other	DC power supply
	Real Time Clock with calendar
	Complete shielding

1.7 Connection:

The Complete package contents of the Wavecom Fastrack M 1306B consists of:

- 1. M 1306B Modem.
- 2. One power supply cable with fuse integrated.
- 3. Antenna with its cable.
- 4. Sub D High HD 15-pin to serial 9 pin cable.

Enter your SIM card and if Modem led indication toggles, it will work correctly.

You can connect 3 cables only to your Kit and work. RX, TX and Ground cable and connect as this Figure.

2 Detailed Design

2.1 AT Commands Overview

Any Command must started by AT then anther things depends on every command such as "AT<x>" or "AT+<x><n>" as <x>: command and <n>: arguments.

And to read command "AT+<x>?", to test "AT+<x>=?", to write "AT+<x>=<parameters>" and to execute "AT+<x>".

Any Command must be ended by <CR>, where <CR>: '\r' or 0x0D.

You should disable Echo in starting as the default is enabling the Echo so if you send "AT" at the start you will receive "AT<CR><LF>CR><LF>OK<CR><LF>" and if disabled it you will receive "<CR><LF>OK<CR><LF>", where <LF>: \n' or 0x0A.

Response:

- If command syntax is incorrect, an **ERROR** string is returned.
- If command syntax is correct but with some incorrect parameters, the +CME ERROR: <Err> or +CMS ERROR: <SmsErr> strings are returned with different error codes and <Err> or <SmsErr> is a number define the Error Type.
- If the command line has been performed successfully, an **OK** string is returned. In some cases, such as "AT+CPIN?" or (unsolicited) incoming events, the product does not return the **OK** string as a response.

IMPORTANT NOTE:

- 1. The Default Baud Rate is "115200" and at AVR-ATMEGA 115200 doesn't work correctly because of the difficult for baud rate divider register to get its value so there is 8.5% error, so change this Baud by PC terminal to be (as ex.) 9600 then change it in the Code at UART configuration then Connect to ATMEGA KIT.
- 2. Flow control should be disabled by Pc terminal also as the default is enabling flow control.

2.2 Initializing module

2.2.1 Disable Echo:

This happened by sending "ATEO" command.

14.13.2 Syntax:

Command Syntax: ATE

COMMAND	POSSIBLE RESPONSES
ATE0	0K
Note: Characters are not echoed	Note: Done
ATE1	OK
Note: Characters are echoed	Note: Done

2.2.2 Enable General Indication:

By "AT+WIND=63" command

Wavecom has introduced a general mechanism to send unsolicited non-standardized indications to the application. The identified unsolicited non-standardized indications are:

- Indication of a physical change on the SIM detect pin from the connector (meaning SIM inserted, SIM removed).
- Indication during mobile originated call setup that the calling party is ringing.

• Indication of the availability of the product to receive AT commands after boot. For each of these indications, a "bit flow" has to be indicated.

2.2.3 Enable General Error Indication

This command disables or enables the use of the "+CME ERROR : <xxx>" or "+CMS ERROR : <xxx>" result code instead of simply "ERROR".

4.14.2 Syntax:

Command Syntax: AT+CMEE=<error reporting flag>

COMMAND	POSSIBLE RESPONSES	
AT+CMEE=0	OK	
Note: Disable ME error reports, use only « ERROR »		
AT+CMEE=1	OK	
Note: Enable «+CME ERROR: <xxx>» or</xxx>		
«+CMS ERROR: <xxx>»</xxx>		

2.2.4 No flow Control

14.3.2 Syntax:

Command Syntax: AT+IFC=<DCE_by_DTE>,<DTE_by_DCE>

COMMAND	POSSIBLE RESPONSES
AT+IFC?	+IFC: 2,2
	OK
Note:	Note: Current values
AT+IFC=?	+IFC: (0,2),(0,2)
	OK
Note:	Note: Possible values
AT+IFC=0,0	0K
Note:	Note: New values

2.2.5 Check for PIN

Normally "AT+CPIN" command should return READY "the first response" if there is no PIN required.

AT+CPIN?

The possible responses are:

+CPIN: READY	ME is not pending for any password
+CPIN: SIM PIN	CHV1 is required
+CPIN: SIM PUK	PUK1 is required
+CPIN: SIM PIN2	CHV2 is required
+CPIN: SIM PUK2	PUK2 is required
+CPIN: PH-SIM PIN	SIM lock (phone-to-SIM) is required
+CPIN: PH-NET PIN	Network personnalisation is required
+CME ERROR: <err></err>	SIM failure (13) absent (10) etc

2.2.6 Check the Activity Status

Check if Module is ready to receive commands or not.

Command Syntax: AT+CPAS

COMMAND	POSSIBLE RESPONSES
AT+CPAS	+CPAS: <pas></pas>
Note: Current activity status	OK

4.13.3 Defined values:

<pas>

- 0: ready (allow commands from TA/TE)
- 1: unavailable (does not allow commands)
- 2: unknown
- 3: ringing (ringer is active)
- 4: call in progress
- 5: asleep (low functionality)

2.2.7 Check Network Registration

Should give this command 1 in argument, and if OK, you will receive "CREG: 1".

Command Syntax: AT+CREG= < mode>

Response Syntax: +CREG: <mode>, <stat>[,<lac>,<ci>] for AT+CREG? Command only

COMMAND	POSSIBLE RESPONSES
AT+CREG?	+CREG: <mode>,<stat></stat></mode>
	OK
	Note: As defined here-above
AT+CREG=0	OK
Note: Disable network registration unsolicited res	sult code Note: Command valid
AT+CREG=1	OK
Note: Enable network registration unsolicited resu	ult code Note: Command valid
AT+CREG=2	OK
Note: Enable network registration and location	
information unsolicited result code	Note: Command valid
AT+CREG=?	+CREG: (0-2)
	Note: 0,1,2 <mode> values are supported</mode>

6.3.3 Defined values:

<mode:

- 0: Disable network registration unsolicited result code (default)
- 1: Enable network registration code result code +CREG : <stat>
- Enable network registration and location information unsolicited result code +CREG: <stat>,<lac>,<ci> if there is a change of network cell.

<stat>

- 0: not registered, ME is not currently searching for a new operator.
- 1: registered, home network.
- 2: not registered, ME currently searching for a new operator to register to.
- 3: registration denied.
- 4: unknown.
- 5: registered, roaming.

<lac>

string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>

string type; two byte cell ID in hexadecimal format.

2.3 Call

2.3.1 Initialize Call

2.3.1.1 Enable Incoming Call Number Presentation

This command allows control of the calling line identification presentation supple-mentary service. When presentation of the CLI (Calling Line Identification) is enabled (and calling subscriber allows), +CLIP response is returned after every RING (or +CRING) result code.

Command Syntax: AT+CLIP=<n>

Response Syntax: +CLIP: <n>,<m for AT+CLIP?

+CLIP: <number>, <type>[,<subaddr>, <satype>, <alpha>] for an incoming call, after each RING or +CRING indication

COMMAND	POSSIBLE RESPONSES
AT+CLIP=1	0K
Note: Enable CLIP	Note: CLIP is enabled
AT+CLIP?	+CLIP: <n>,<m></m></n>
	OK
Note: Ask for current functionality	Note: <n> and <m> defined as below</m></n>
	RING
	Note: Incoming call
	+CLIP: "0146290800",129,1,,,"FRED"
	or
	+CLIP: "0146290800",129,1,,,"8000204212FFFF"
	(UCS2 format)
	Note: Incoming call with number and name presentation
AT+CLIP=0	ОК
Note: Disable CLIP presentation	Note: Command valid

10.6.3 Defined values:

parameter sets/shows the result code presentation in the TA

<n>

0: Disable

1: Enable

parameter shows the subscriber CLIP service status in the network

0: CLIP not provisioned

1: CLIP provisioned

2: Unknown (no network...)

2.3.1.2 Extended Incoming Call Indication

This command gives more detailed ring information for an incoming call (voice or data). Instead of the string "RING", an extended string is used to indicate which type of call is ringing (e.g. +CRING: VOICE).

These extended indications are:

+CRING: ASYNC	for asynchronous transparent
+CRING: REL ASYNC	for asynchronous non-transparent
+CRING: VOICE	for normal speech.
+CRING : FAX	for fax calls

11.5.2 Syntax:

Command Syntax: AT+CRC

COMMAND POSSIBLE RESPONSES	
AT+CRC=0	0K
Note: Extended reports disabled	Note: Command valid
AT+CRC=1	OK
Note: Extended reports enabled	Note: Command valid

2.3.2 Call Number

The ATD command is used to set a voice, data or fax call. As per GSM 02.30, the dial command also controls supplementary services. For a voice call, the application sends the following ASCII string to the product: (the bearer may be selected previously, if not a default bearer is used). ATD<nb>; where <nb> is the destination phone number.

The response to the ATD command is one of the following:

Verbose result code	Numeric code with ATV0 set	Description
ОК	0	if the call succeeds, for voice call only
CONNECT <speed></speed>	10,11,12,	if the call succeeds, for data calls only,
	13,14,15	<speed> takes the value negotiated</speed>
		by the product.
BUSY	7	If the called party is already
		in communication
NO ANSWER	8	If no hang up is detected after a fixed network time-out
NO CARRIER	3	Call setup failed or remote user
		release. Use the AT+CEER command
		to know the failure cause

2.3.3 Answer and Release Call

Command Syntax: ATA

COMMAND	POSSIBLE RESPONSES	
	RING	
	Note: Incoming call	
ATA	OK	
Note: Answer to this incoming call	Note: Call accepted	
ATH	OK	
Note: Disconnect call	OK Note: Call disconnected	

2.4 **SMS**

2.4.1 Initialize SMS

2.4.1.1 New Message Indication

Put "AT+CNMI=0,1,1,1,0" to Enable New Message Indication, SMS-DELIVERs are directly stored, SMS-STATUS- REPORTs are displayed, more details at data sheet.

2.4.1.2 Set Mode Parameters

Send "AT+CSMP=17,169,0,0" to Set text mode parameters ,SMS-SUBMIT message with a validity period (one day).

2.4.1.3 Set Text Format

The message formats supported are text mode (ASCII) and PDU mode (HEX).

COMMAND	POSSIBLE RESPONSES
AT+CMGF?	+CMGF: 1
	OK
Note: Current message formatNote: Text mode	
AT+CMGF=?	+CMGF: (0-1)
	OK
Note: Possible message format	Note: Text or PDU modes are available

Example, sending an SMS Message in PDU mode

COMMAND	POSSIBLE RESPONSES
AT+CMGF=0	OK
Note: Set PDU mode	Note: PDU mode valid
AT+CMGS=14 <cr></cr>	+CMGS: 4
0001030691214365000004C9E9340B	OK
Note: Send complete MSG in PDU mode, no SC address	Note: MSG correctly sent, <mr> is returned</mr>

2.4.2 Read SMS

2.4.2.1 Read list

This command allows the application to read stored messages, by indicating the type of the message to read.

Command Syntax: AT+CMGL=<stat> Response syntax for text mode:

+CMGL: <index>,<stat>,<da/oa>[,<alpha>], [<scts>, <tooa/toda>, <length>] <CR><LF><data> (for **SMS-DELIVER and SMS-SUBMIT**, may be followed by other <CR><LF>+CMGL:<index>...)

+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (for SMS-STATUS-REPORT only, may be followed by other

<CR><LF>+CMGL:<index>...)

Response syntax for PDU mode:

+CMGL: <index>,<stat>, [<alpha>], <length> <CR><LF> <pdu> (for SMS-DELIVER, SMS-SUBMIT and SMS-STATUS-REPORT, may be followed by other <CR><LF>+CMGL:<index>...)

COMMAND	POSSIBLE RESPONSES
AT+CMGL="REC UNREAD"	+CMGL: 1,"REC UNREAD","0146290800",
	<cr><lf> Unread message !</lf></cr>
	+CMGL: 3,"REC UNREAD", "46290800", <cr><lf></lf></cr>
	Another message unread!
	OK
Note: List unread messages in text mode	Note: 2 messages are unread, these messages will then
	have their status changed to "REC READ" (+CSDH:0)
AT+CMGL="REC READ"	+CMGL: 2,"REC READ","0146290800",
	<cr><lf></lf></cr>
	Keep cool
Note: List read messages in text mode	OK
AT+CMGL="STO SENT"	OK
Note: List stored and sent messages in text mode	Note: No message found
AT+CMGL=1	+CMGL: 1,1,,26
	<cr><lf></lf></cr>
	07913366003000F3040B913366920547F4001300119041
	2530400741AA8E5A9C5201
Note: List read messages in PDU mode	OK

<stat> possible values (status of messages in memory):

Text mode possible values	PDU mode possible values	Status of messages in memory
"REC UNREAD"	0	received unread messages
"REC READ"	1	received read messages
"STO UNSENT"	2	stored unsent messages
"STO SENT"	3	stored sent messages
"ALL"	4	all messages

2.4.2.2 Read One SMS

Example:

COMMAND	POSSIBLE RESPONSES
	AT+CMTI: "SM",1
	Note: New message received
AT+CMGR=1	+CMGR: "REC UNREAD","0146290800",
	"98/10/01,18 :22 :11+00", <cr><lf></lf></cr>
	ABCdefGHI
	OK
	Note: Read the message
AT+CMGR=1	+CMGR: "REC UNREAD","0146290800",
	"98/10/01,18 :22 :11+00", <cr><lf></lf></cr>
	ABCdefGHI
	0K
Note: Read the message again	Note: Message is read now
AT+CMGR=2	+CMS ERROR: 321
Note: Read at a wrong index	Note: Error : invalid index

2.4.3 Send SMS

The <address> field is the address of the terminal to which the message is sent. To send the message, simply type, <ctrl-Z> character (ASCII 26). The text can contain all existing characters except <ctrl-Z> and <ESC> (ASCII 27).

COMMAND	POSSIBLE RESPONSES
AT+CMGS="+33146290800" <cr></cr>	+CMGS: <mr></mr>
Please call me soon, Fred. <ctrl-z></ctrl-z>	0K
Note: Send a message in text mode	Note: Successful transmission

3 Driver Functions

3.1 Internal Functions

3.1.1 CheckMobileNumber

Format	Void CheckMobileNumber (U8_t* MobileNumber_ptr,
	U8_t NumberLength)
Description	This function used to check the mobile number is correct
	or not, check for the first number = 0 , second = 1 , (third =
	0 or 1 or 2) and length=11
Argument	-NumberLength : should be equalled
	MAX_DIGITS_Of_MOBILE_NUMBER
	-pointer to the ASCII number
Return value	BOOLEAN to check for Errors

3.1.2 itoa_Convert

Format	Void itoa_Convert (U16_t Number , U8_t *
	NumberASCII_ptr)
Description	This function used to convert integer number to ASCII
Argument	-Number, max. digits of it should be equaled
	MAX_DIGIT_FOR_ITOA
	-pointer to the ASCII number after Conversion
Return value	none

3.2 Global Functions

3.2.1 EF_B_Wavecom_InitModule

Format	<pre>EF_B_Wavecom_InitModule (void);</pre>
Description	This function used to initialize GSM Module:
	 disable Echo
	 Enable General Indication
	 Enable General Error Indication
	 no flow control
	 check for PIN code ready
	 check if the module is ready to receive or not
	 check the network registration
Argument	NONE
Return value	BOOLEAN to check for Errors

3.2.2 EF_B_Wavecom_InitSms

Format	EF_B_Wavecom_InitSms (Wavecom_Sms_cfg_str*
	Wavecom_Sms_cfg_ptr);
Description	This function used to set the SMS Indication Commands
Argument	Wavecom_Sms_cfg_ptr is a pointer to
	Wavecom_Sms_cfg_ptr is a pointer to Wavecom_Sms_cfg_str to configure the SMS Indication
	Commands.
Return value	BOOLEAN to check for Errors

3.2.3 EF_B_Wavecom_SendSms

Format	EF_B_Wavecom_SendSms (U8_t* MobileNumber_ptr,
	U8_t NumberLength, U8_t* SendData_ptr, U16_t
	DataLength);
Description	This function used to Send SMS
Argument	MobileNumber_ptr: pointer to Mobile Number in "ASCII"
	NumberLength : has the length of Mobile Number

	SendData_ptr : pointer to the data which you want to
	send as SMS
	DataLength : length of the data which you want to send
	as SMS
Return value	BOOLEAN to check for Errors

3.2.4 EF_B_Wavecom_ReadSms

Format	EF_B_Wavecom_ReadSms (Wavecom_ReadSms_cfg_str*
	Wavecom_ReadSms_cfg_ptr);
Description	This function used to Read SMS
Argument	Wavecom_ReadSms_cfg_ptr is pointer to
	Wavecom_ReadSms_cfg_str to define what types of SMS
	which you want to read
Return value	-1 : Error
	0 : SMS is not found
	<number>: SMS length</number>

3.2.5 EF_B_Wavecom_InitCall

Format	EF_B_Wavecom_InitCall (Wavecom_Call_cfg_str*
	Wavecom_Call_cfg_ptr);
Description	This function used to configure the indication for incoming
	Call.
Argument	Wavecom_Call_cfg_ptr is pointer to
	Wavecom_Call_cfg_str to define which indication is
	wanted to be enabled.
Return value	BOOLEAN to check for Errors

3.2.6 EF_B_Wavecom_Call

Format	EF_B_Wavecom_Call (U8_t* MobileNumber_ptr ,U8_t
	NumberLength)
Description	This function used to check number then call
Argument	MobileNumber_ptr: pointer to Mobile Number in "ASCII"
	NumberLength : has the length of Mobile Number
Return value	-1: Communication error
	0: MobileNumber is wrong
	1: OK

3.2.7 EF_B_Wavecom_CallAnswer

Format	EF_B_Wavecom_CallAnswer (void);
Description	This function used to answer to the incoming call.
Argument	NONE
Return value	BOOLEAN to check for Errors

3.2.8 EF_B_Wavecom_CallRelease

Format	EF_B_Wavecom_CallRelease (void);
Description	This function used to end the call.
Argument	NONE
Return value	BOOLEAN to check for Errors