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APN Content Level	BASIC	✓	INTERMEDIATE		ADVANCED		Confidentiality		Public	✓	Private		

Software Compatibility*	FW:	6.61	Open AT® SDK:	4.11	Plug-Ins:	TCP/IP	✓	C-GPS	✓	Compiler Used:	ADS	Reference Hardware	Yes
						Internet	✓	Bluetooth			GCC	Reference Software	Yes
			M2mpower			MQTT		M2MC		RTE:	✓		

* refer to software compatibility matrix section for more detail

Wireless CPU Compatibility	Plug & Play:	M1306B	M2106B									
	Quik (CDMA):	Q2438F	Q2438R	CM52								
	Quik (GSM):	Q2400A	Q2406A	Q2406B		Q2426B		Q2501B				
		GR64	GS64	Q2686H	✓	Q2687H	✓					
		Q24 Classic	Q24 Plus	Q24 Extended		Q24 Auto						
	Wireless Microprocessor	WMP100	WMP150									

1 VERSION

Application Notes may be updated over their lifetime. To ensure you design with the correct version, please check the application notes page in the support section for www.wavecom.com.

2 INTRODUCTION

This APN (Application Note) is provided to Wavecom distributors and clients to aid more rapid development of embedded applications using the Wavecom portfolio of cellular solutions. To request a new application note, contact your regional Wavecom Product Marketing Manager.

3 APPLICATION NOTE DESCRIPTION

The acronym C-GPS stands for Companion GPS. Wavecom offers its customers to ease the integration process of the GPS functionalities with its GSM/GPRS Wireless CPU's by offering a ready-made library within the Open AT® environment. This library allows driving a Companion GPS chipset. In this release, the GPS solution is the Opus One from eRide, Inc. In order to facilitate evaluation, testing and development, Wavecom makes available a development kit which includes a C-GPS Daughter board. This development kit can be ordered from Wavecom and Wavecom distributors. The C-GPS chipset receives the GPS data, performs the preliminary processing on the data and forwards the data to the Wavecom Wireless CPU. The Open AT® application executed on the Wavecom Wireless CPU receives this data and performs processing based on the received data. The application need not take care for low level interfacing with the GPS chipset as Wavecom provides C-GPS library which performs the task of managing the lower level details.

The C-GPS chipset uses one of the available UART to send/receive data from the Wavecom Wireless CPU. Hence, to be able to receive the C-GPS data from the C-GPS chipset, FCM flow must be subscribed by the Open AT® application. As one of the UART is internally used by the GPS chipset, it is not possible to use this UART for any external application (like Terminal Emulator, TMT or Hyperterminal). However, the UART which is not used by GPS chipset can be used to interface with an external application. This UART can be used to send/receive AT commands/responses and also send the NMEA sentences.

Wavecom provides sample Open AT® applications which can be used to provide guidelines to create customized application based on the requirements.

4 HARDWARE CONFIGURATION

The C-GPS Daughter board is connected to the J201 connector of the wireless CPU development board. This is shown in the picture below:
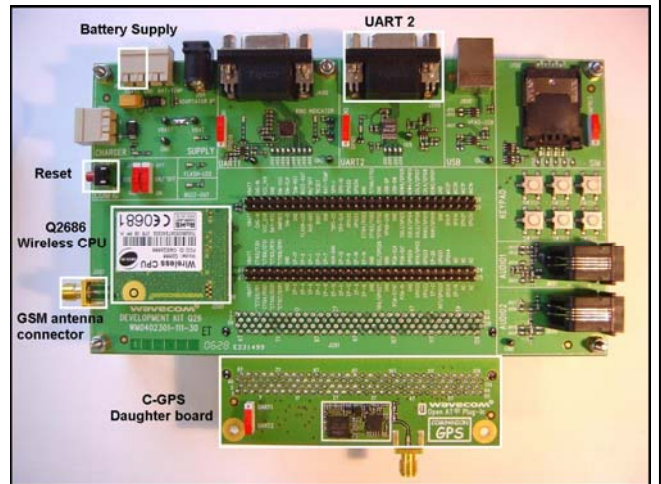
The C-GPS Daughter board hence gets access to all the pins that are provided on the J201 connector. Using these pins, the C-GPS Daughter board is able to send/receive data to/from the Wavecom Wireless CPU and hence able to interact with it.

4.1 Daughter Board

The C-GPS Daughter board has the following layout:
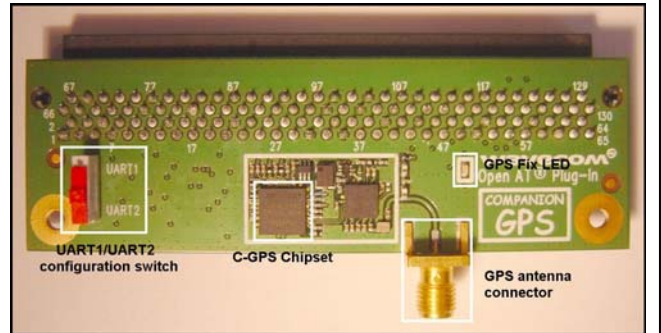
The Daughter Board has the following main components:
1. **GPS Antenna Connector:** This connector is used to connect the external GPS antenna with the C-GPS chipset. Please note that the connection should be made using an active antenna.
2. **UART1/UART2 configuration switch:** This switch is used to select whether UART1 or UART2 is used by the C-GPS Daughter board to communicate with the Wireless CPU. If the switch is set to "UART1", then the Rx and Tx pins of UART2 will be used by C-GPS Daughter board to send/receive the GPS data. Hence, this UART cannot be used by the external application (like TE/Hyperterminal). The "UART1" in this case, becomes the debug UART and can be used to send/receive AT commands and receive the NMEA messages. Similarly, if the configuration switch is set to UART2, then the C-GPS Daughter board is configured to

use UART1 for communicating with the Wireless CPU (by using the Tx and Rx pins internally). Hence, UART1 cannot be used for any external application (like TE or Hyperterminal). In this case, UART2 becomes the Debug UART and Hyperterminal/TE can be connected to UART2 to receive the Debug Traces and GPS data.

3. **GPS Fix LED:** A LED has been provided on the C-GPS Daughter board. This LED indicates whether GPS fix has been achieved or not. The behaviour of this LED is as follows.
   - If GPS fix has not been achieved, the LED keeps on glowing.
   - As soon as GPS fix is achieved, the LED starts blinking. The LED blink frequency is the same as the one with which the NMEA frames are sent to the external application.
   - If GPS fix is lost, then again, the LED stops blinking and keeps on glowing.

NOTE: The GPS FIX LED is internally connected to GPIO20 of the Wireless CPU.

4.1.1 Configuration of Daughter Board

The C-GPS Daughter board should be connected to the J201 connector on the Wavecom Wireless CPU. In case, the user is planning to use UART1 for C-GPS, then UART1/UART2 configuration switch must be set to UART2. Selection of incorrect switch position might lead to non-working of the C-GPS Daughter board. The C-GPS Daughter board has the following serial communication parameters:
- **Baud Rate:** 57600 bps
- **Character Framing:** 8 Data bits, 1 stop bit and Odd Parity.
- **Flow control:** No flow control

These parameters need to be set by the Open AT® application which is interacting with the C-GPS Daughter board.

In addition to the above interface characteristics of the C-GPS board, the C-GPS chipset requires the following signals to be driven:
- **NRST:** This input signal is used to reset the C-GPS Daughter board.
- **GPS_ENABLE:** This signal is used to enable the acquisition of GPS NMEA sentences by the GPS Daughter board.
- **TCXO_ENABLE:** This signal is used to enable the temperature compensated crystal oscillator.

Warning: DC voltage (VBATT) is always present on the "RF" connector in order to power supply an antenna with LNA.

References: For further reference on the details of working of Daughter board, please refer to C-GPS Development kit User Guide (document [2]).

4.2 Configuration on Wavecom Motherboard

The motherboard of the Wavecom Wireless CPU which is connected to the C-GPS Daughter board should also be configured for proper working of the C-GPS Daughter board. The following image depicts the wireless CPU motherboard which can be connected to the C-GPS Daughter board.
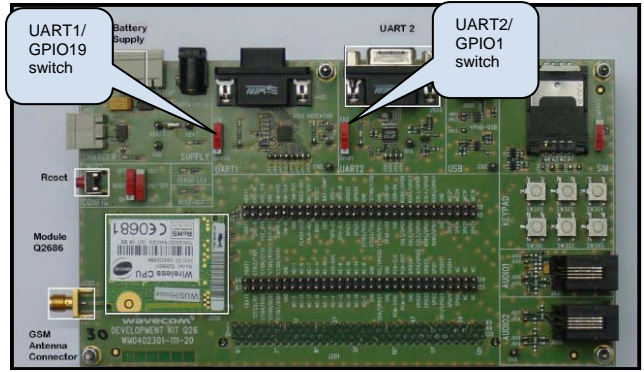
C-GPS Daughter board requires the NRST, GPS_ENABLE and TCXO_ENABLE to be driven by the Open AT® application. These pins are connected with the following GPIOs on the Motherboard:

S.No.	Signal to be connected	GPIO providing the signal
1.	NRST	GPIO19
2.	GPS_ENABLE	GPIO 22
3	TCXO_ENABLE	GPIO 23
4.	LED	GPIO 20

4.2.1 Configuration of Motherboard

The motherboard should be configured by providing the correct switch position for "EN1/GPIO19" switch and "EN2/GPIO1" switch.

In case the user is planning to use UART1 for C-GPS, the "EN1/GPIO19" switch must be set to select GPIO19. Also, "EN2/GPIO1" switch must be set to EN2 to enable UART2 for the PC.

In case the user is planning to use UART2 for C-GPS, the "EN2/GPIO1" switch must be set to select GPIO1. Also, "EN1/GPIO19" switch must be set to EN1 to enable UART1 for the PC.

In addition to these configurations, the ON/OFF switch must be set to ON and the Boot switch must be set to OFF.

5 C-GPS Open AT® Applications

Wavecom provides sample Open AT® applications which demonstrate how Open AT® applications can be created which can be used to interface with the C-GPS Daughter board.
The following samples are provided by Wavecom:
1. Query Application
2. Interval Update Application
3. TCP Internet Connection Application

Important Note:
RTE mode is available with restrictions; see the Open AT® SDK Customer Release Note.

RTE mode may work with C-GPS if the baud rate is 460800 for the UART used with the PC.

In Open AT® SDK v4.11 in RTE mode you have to set the RTE_PRODUCT_TYPE definition in "gpioconfig.h" (header file used in the samples) to select your target.

The following statements should be added to be able to execute the application correctly in RTE mode.

-> When Q2686 Wireless CPU is used, add the following lines of code:
```
/***********/
/*Constants*/
/***********/
#if defined ( __REMOTETASKS__ )
/* Define the product type only for RTE mode */
/* ADL_IO_PRODUCT_TYPE_Q2686 or
ADL_IO_PRODUCT_TYPE_Q2687 */
```

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```
#define RTE_PRODUCT_TYPE
ADL_IO_PRODUCT_TYPE_Q2686
#endif
```

-> When a Q2687 Wireless CPU is used, use the following code.

```
/*Constants*/
/***********/
#if defined ( __REMOTETASKS__ )
/* Define the product type only for RTE mode */
/* ADL_IO_PRODUCT_TYPE_Q2686 or
ADL_IO_PRODUCT_TYPE_Q2687 */
#define RTE_PRODUCT_TYPE
ADL_IO_PRODUCT_TYPE_Q2687
#endif
```

5.1 Query Application

This sample application uses the C-GPS Daughter board and receives the GPS data from it. The user can send an SMS (called configuration SMS) to the Wavecom Wireless CPU where the application is in execution to get the PVT (Position, Velocity and Time) data. The PVT data is sent using an SMS to the user. The user has to specify a password (which is configured at the Wireless CPU where the Query Application Sample is running) to be able to receive the PVT data. The user can also specify a different phone number to which the SMS containing the PVT data would be sent. The application can also be configured to display the NMEA sentences received from the C-GPS Daughter board (either in formatted NMEA format or in RAW format) using a customer AT command (AT+NMEA). These frames can be received over the Debug UART. Hence, the user can use mapping software to get the GPS coordinates.

References: For more information, as to how the sample works, please refer to the Query Application sample description HTML document. (This document is present in the /Samples/QueryApp directory in Open AT® installation) This document describes the custom AT commands which can be used to configure various parameters for the sample application and the format in which the PVT information is sent.

NOTE: To retrieve the PVT information, the user has to send a configuration SMS to the Wireless CPU where the Query Application is in execution. The Configuration SMS should have the following format:
INFO:<Password>:<Phonenumber>

1. <Password>: This is the Password which is configured using AT+PASSWORD command. The default value of the password is "CGPS".
2. <Phonenumber>: This is the optional field which conveys the phone number to which the PVT information is sent. If the phone number is missing, the information is sent to the number from which the configuration SMS has been received.

For instance,
INFO:CGPS:994587883

5.2 Interval Update Application

This sample application uses the C-GPS Daughter board to receive the GPS information. The user can send an SMS (called the configuration SMS) to the Wavecom Wireless CPU where the application is executing. The configuration SMS is used to configure the sample to send the PVT information after a fixed interval of time repeatedly using either SMS or TCP socket as a bearer. It must be noted that the user must specify the correct password in the configuration SMS (which is configured on the Wireless CPU where the sample is in execution). The password is configured using AT+PASSWORD command. The user also specifies the bearer to be used (SMS/TCP socket i.e. IP connection) to repeatedly send the PVT information along with the update interval (interval after which the PVT information will be sent). In case, TCP socket is used to send the PVT information, the user must specify the IP address and Port of the server which will be used by the sample application to connect to. In addition to this, the configuration SMS must also specify the Access Point

name, Access Point Username and Access Point Password to be able to activate the PDP context for GPRS connection. This application can also be configured to send the GPS frames (either in formatted NMEA format or in RAW format) over the Debug UART (using AT+NMEA command). Hence, the user has the flexibility to receive the NMEA frames locally and hence can use mapping software to calculate the GPS position of the Wireless CPU.

References: For more information, as to how the sample works, please refer to the Interval Update Sample Description HTML document. This document is present in the /Samples/IntervalUpdate directory in Open AT® installation). This document describes the custom AT commands which can be used to configure various parameters for the sample application and the format in which the PVT information is sent.

NOTE: To retrieve the PVT information, the user has to send a configuration SMS to the Wireless CPU where the Interval Update Application is in execution. The Configuration SMS should have the following format:
*   SMS bearer
INFO:<Password>:SMS:<OptionalPhonenumber>:<Optional Interval>

For Instance,
INFO:CGPS:SMS:994598883:30
*   IP Bearer
INFO:<Password>:IP:<IPAddr>:<Port>:<APN>,<Username>,<Password>:<Optional Interval>

For Instance,
INFO:CGPS:IP:10.15.22.33:80:testapn,myusername,mypwd:20

 Stopping a Bearer:
INFO:<Password>:STOP
For Instance,
INFO:CGPS:STOP

Please refer to the Interval Update Sample Description HTML document form more information on the above mentioned fields in the configuration SMS.

5.3 TCP Internet Connection application

This sample application depicts a use case scenario in which the user wants to send the NMEA frames to a TCP server socket which is using mapping software for GPS to calculate the position of the Wireless CPU. The application interfaces with C-GPS Daughter board to receive the GPS information. A configuration SMS is sent to the Wavecom Wireless CPU where the application is in execution and configures the IP address, port, access point name, access point username and access point password for establishing a TCP socket. The configuration SMS also provides the update interval (interval after which the NMEA data is sent to the TCP server). Like the previous samples, this application too requires the user to give a password in the configuration SMS which is configured using AT+PASSWORD command. After receiving the configuration SMS, the sample establishes a TCP socket and sends the NMEA sentences over the established socket.

References: For more information, as to how the sample works, please refer to the TCP Internet Connection Sample Description HTML document. This document is present in the /Samples/TCP Server directory in Open AT® installation). This document describes the custom AT commands which can be used to configure various parameters for the sample application.

NOTE: The configuration SMS that is to be sent to the Wireless CPU should have the following format:
INFO:<Password>:IP:<IPAddr>:<Port>:<APN>,<Username>,<Password>:<Optional Interval>
For Instance,
INFO:CGPS:IP:10.22.33.44:80:myapn,myun,mypwd:20

To stop the bearer use:
INFO:<Password>:STOP

For Instance,
INFO:CGPS:STOP

For more information on the meanings of various fields of the configuration SMS, please refer to the TCP Internet Connection Sample Description HTML document.

POINTS TO REMEMBER:
1. The difference between the TCP Internet Connection sample and the Interval Update sample is that the TCP Internet Connection sample sends the data in exact NMEA format over the established TCP socket. The Interval Update sample, on the other hand, sends data in a particular format (used for sending PVT information).
Another difference between the TCP Internet Connection sample and the Interval Update sample is that the TCP Server sample sends NMEA sentences only over TCP socket after a specified update interval whereas the Interval Update sample can be used to send PVT data over TCP socket or SMS after a specified update interval.
2. All the sample applications use the following serial port communication parameters for the Debug UART:
Speed: 115200 Bauds/second.
Character Framing: 8 data bits, 1 stop bits, parity ignored.
Flow control: No flow control.

5.4 Steps to Download the Samples

NOTE: UART2 or USB cannot be used to download the Open AT® application.

5.4.1 Downloading using XModem Protocol

The user can download the sample using the XModem protocol using Hyperterminal (or a similar serial port utility which provides XModem protocol to transfer information). Following steps should be taken to download the sample
1. Connect UART1 with the PC which has the application binary. The connection parameters for Hyperterminal (or similar application should be):
    a.   Baud Rate: 115200 bauds/sec
    b.   Data bits: 8 data bits, no parity, 1 stop bit.
2. Set the BOOT switch on the Wavecom Wireless CPU Motherboard to OFF. The ON/OFF switch should be set to ON. Make sure that the CGPS Daughter board is not connected.
3. Execute the command AT+WDWL. The XModem NACK characters ('$") would start to appear.
4. Transfer the sample binary application (compilerused_workspacename_H.wpb.dwl or compilerused_workspacename_H.dwl). NOTE: The literal compilerused can have the values "ads" or "gcc" depending on the compiler which is used to compile the application.
5. After the download is complete, execute AT+CFUN=1 command to reset the Wireless CPU.
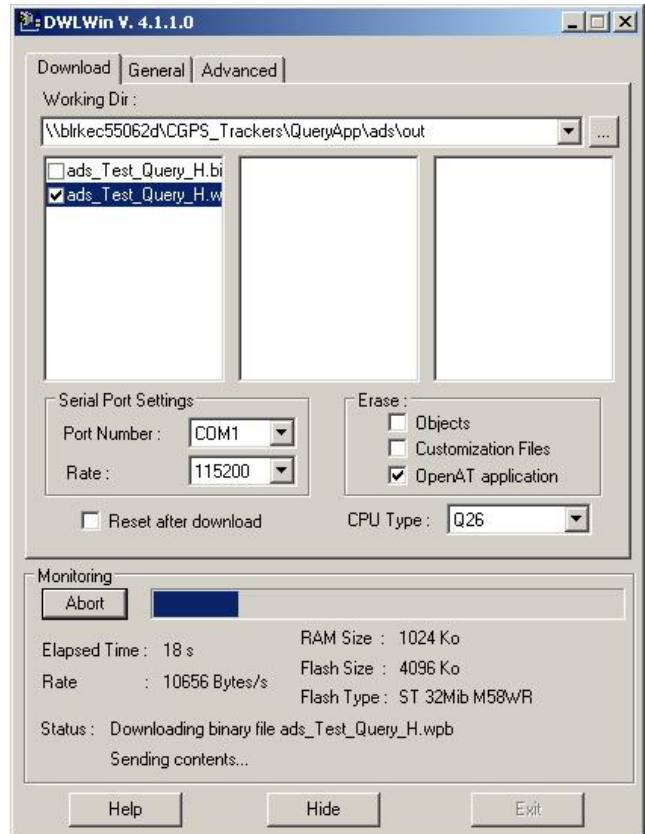6. Execute AT+WOPEN=1 command to start the Open AT® sample application.

5.4.2 Downloading using DwlWin

Wavecom provides a utility called DwlWin which can be used to download the sample applications.
The steps to download the sample are:
1. Connect to UART1 (115200 bauds, 8 data bits, no parity, 1 stop bit).
2. On the Wavecom Wireless CPU Development Board set the boot switch to ON.
3. Configure DWLWIN as shown below.
4. Make sure the C-GPS Daughter board is not connected.
5. Select the sample application having the extension .wpb at the end.
6. Start the download.
7. Once completed, switch the boot back to OFF.
8. Connect the C-GPS Daughter board.

9. Set UART1/UART2 switch on C-GPS Daughter board to UART2.
10. Push the hardware reset.
11. If needed start the Open AT® application using AT+WOPEN=1.
12. Connect to the port UART2 (115200 bauds, 8 data bits, no parity, 1 stop bit).
13. NMEA should be sent to the UART2.

5.5 Steps to Execute the Samples

To start the Open AT® application, the command AT+WOPEN=1 needs to be given. The user must configure the switch positions on the Daughter board (to select the UART to be used for C-GPS) and the switch positions on the Wavecom Wireless CPU motherboard as described earlier in this document.
All the samples subscribe to a set of custom AT commands which define the way in which the sample behaves. The set of AT commands along with their description are:
1. **AT+NMEA:** This command specifies if the NMEA frames (either in formatted or in RAW format) are to be received over the Debug UART.
2. **AT+PASSWORD:** This command specifies the password to be used in the configuration SMS to authenticate a valid user. The password is stored in flash memory. The default value of the password is "CGPS" and the password is case sensitive.
3. **AT+CGPS:** This command provides information as to which UART is to be used for C-GPS Daughter board. The UART which is left automatically becomes the Debug UART. After giving this command, the sample starts executing.
4. **AT+CONFIG:** If a value of 1 is specified as an argument to this command, then the values for AT+NMEA and AT+CGPS are saved in flash memory. Hence, if the Wireless CPU resets, the sample application automatically starts executing (without user intervention) using the previously saved parameters for +NMEA and +CGPS commands. Please note that to disable this

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feature, the user should give AT+CONFIG=0 command and then reset the Wireless CPU.

Using the above mentioned commands, the following steps should be used to execute the sample applications:

1. Execute AT+WOPEN=1 command.
2. Set the password (if required) for authenticating the configuration SMS using AT+PASSWORD command.
3. Set the availability of NMEA frames over the Debug UART using AT+NMEA command.
4. Execute the AT+CGPS command to select the UART which must be used by the C-GPS Daughter board. The parameter given for the command must be coherent with the switch position provided on the C-GPS Daughter board. The C-GPS sample application will start at this point of time and will take roughly 15 seconds to receive the NMEA frames. If AT+NMEA command is configured to display the NMEA frames over the Debug UART, then the frames will be received over the UART after 15 seconds.
5. If the parameters set using AT+NMEA and AT+CGPS commands are to be saved, then the command AT+CONFIG=1 should be issued. In this case, after Wireless CPU reset, the application would automatically start using the saved parameters and there is no need for the user to execute AT+NMEA and AT+CGPS commands again. To prevent the Wireless CPU from using the same configuration again and again (after reset), the command AT+CONFIG=0 should be given and the Wireless CPU should be reset.
6. The configuration SMS should be sent to the Wireless CPU. If the password and the format of the configuration SMS is correct, the PVT information will be sent to the provided phone number.

Reference: Please refer to the HTML help available in the corresponding samples directory for more information on the format of configuration SMS and the PVT information.

6 Annexes

This section provides vital statistical information regarding the performance and NMEA Frame description.

6.1 Performances

6.1.1 Footprint

C-GPS ARM lib footprint
Memory Footprint:
- ROM : 245397 Bytes
- RAM (static): 106293 Bytes

C-GPS CPU load:
Normal mode
C-GPS	48%
C-GPS with NMEA frame	49%

Boost activated
C-GPS	40%
C-GPS with NMEA frame	45%

C-GPS GCC lib footprint
Memory Footprint:
- ROM : 304371 Bytes
- RAM (static): 29263 Bytes

C-GPS CPU load:
Normal mode
C-GPS	47%
C-GPS with NMEA frame	53%

Boost activated
C-GPS	40%
C-GPS with NMEA frame	45%

6.1.2 GPS

Open AT® SDK v 4.11	Conditions	Notes	Value	
Accuracy	-130 dBm(outdoor) In dynamic mode	50% percentile	3,7 m CEP	
	-130 dBm(outdoor) In dynamic mode	95% percentile	6,8 m CEP	
	-140 dBm In dynamic mode	50% percentile	6,1 m CEP	
	-145 dBm In dynamic mode	50% percentile	13,9 m CEP	
Velocity Accuracy	Static mode	First fix only	0,1 m/s	Typ
	Static mode	Continuous fixes	0 m/s	Typ
TTFF Hot Start		Mean	3,5 s	Typ
TTFF Warm Start		Mean	30s	Typ
TTFF Cold Start	Clear Sky conditions	Mean	38 s	Typ
	Clear Sky conditions	95% percentile	45 s	Typ
Update Rate	-130 dBm	Continuous fixes	1 Hz	Typ
Desensitization due to GSM Tx bursts	1 GSM burst over 8 slots	Continuous fixes	1,1 dB	Typ

6.2 Description of NMEA Frames

NMEA 0183 standard defines the NMEA sentences and for each of these sentences the first word, called a data type defines how the rest of the sentence is interpreted. Each data has its own unique interpretation, as defined by the NMEA standard.

Sentences vary in the information they contain. Some sentences will repeat some of the information already provided, while others provide new data.

Type of NMEA tags included in the C-GPS sample application are:
- $GPGLL Geographic Position, Latitude/Longitude
- $GPGSV GPS Satellites in View Data
- $GPZDA UTC Date & Time
- $GPGGA Global Positioning System Fix Data
- $GPVTG Course over ground and ground speed
- $GPGSA GPS DoP (Dilution of Precision) and Active Satellites
- $GPRMC Recommended Minimum Specific GNSS GPS/TRANSIT Data

This section describes what information is included in which NMEA sentence and how to interpret various fields in the NMEA sentence:

6.2.1 GLL (Geographic Position Latitude Longitude)

$GPGLL,llll.ll,E,yyyyy.yy,F,hhmmss.ss,A*hh

- llll.ll Destination waypoint latitude
- E N or S (for latitude)
- yyyyy.yy Destination waypoint longitude
- F E or W (for longitude)
- hhmmss.ss UTC of position fix (time)
- A Data Status (A = OK, V = Void)
- *hh Checksum

6.2.2 GSV (Satellites in View Data)

$GPGSV,A,B,C,D1,E1,Az1,SNR1,D2,E2,Az2,SNR2,D3,E3,Az3,SNR3,D4,E4, Az4,SNR4*hh

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- A Number of messages required to hold data on all SVs in view
- B Message number
- C Total number of satellites in view
- D1-D4 Satellite PRN number
- E1-E4 Elevation in degrees (90 maximum)
- Az1-Az4 Azimuth (measured in degrees from True north, 000 to 359
- SNR1-SNR4 Signal-to-noise ratio (the higher the number the better the signal)
- *hh Checksum

6.2.3 ZDA (Date and Time)

$GPZDA,hhmmss.ss,dd,mm,yyyy,xx,yy,*hh

- hhmmss.ss UTC of position fix (time)
- dd Day
- mm Month
- yyyy Year
- xx Local zone hours (-13 to 13)
- yy Local zone minutes (00 to 59)
- *hh Checksum

6.2.4 GGA (Global Positioning System Fix Data)

$GPGGA,hhmmss.ss,llll.ll,E,yyyyy.yy,F,A,bb,x.x,y.y,M,z.z,M,s.s,####,*hh

- hhmmss.ss UTC of position fix (time)
- llll.ll Destination waypoint latitude
- E N or S (for latitude)
- yyyyy.yy Destination waypoint longitude
- F E or W (for longitude)
- A Fix quality:
  - 0 = Invalid
  - 1 = GPS fix (SPS)
  - 2 = DGPS fix
  - 3 = PPS fix
  - 4 = Real Time Kinematic
  - 5 = Float RTK
  - 6 = Estimated (dead reckoning)
  - 7 = Manual input mode
  - 8 = Simulation mode
- bb Number of satellites in use
- x.x Horizontal error (precision)
- y.y,M Antenna height in meters
- z.z,M Height of geoid (mean sea level) in meters
- s.s Time in seconds since last update
- #### DGPS station ID
- *hh Checksum

6.2.5 VTG (Course over Ground and Ground Speed)

$GPVTG,COG,T,COG,M,SOG,N,SOG,K,A*hh

- COG,T Course over Ground (T = true)
- COG,M Course over Ground (M = magnetic)
- SOG,N Speed over Ground (N= knots)
- SOG,K Speed over Ground (K = km/h)
- M Mode indicator
  - A= Autonomous
  - D= Differential
  - E= Estimated (Dead Reckoning)
  - N= None
- *hh Checksum

6.2.6 GSA (GNSS DOP – Dilution of Precision and active satellites)

$GPGSA,OM,NM,D1-D12,PDOP, HDOP, VDOP*hh

- OM Operation Mode
- M : Manual forced to operate in 2D or 3D
- A : Automatic 2D/3D

- NM Navigation Mode
  - 1 : Fix not available
  - 2 : 2D
  - 3 : 3D
- D1-D12 Satellite Vehicles Used in Position Fix
- PDOP Position Dilution of Precision (PDOP)
- HDOP Horizontal Dilution of Precision (HDOP)
- VDOP Vertical Dilution of Precision (VDOP)
- *hh Checksum

6.2.7 RMC (Recommended Minimum Specific Data)

$GPRMC,hhmmss.ss,A,llll.ll,E,yyyyy.yy,F,SOG,COG,ddmmyy,MV,F,M*hh

- hhmmss.ss UTC of position fix (time)
- A Data Status (A = OK, V = Void)
- llll.ll Destination waypoint latitude
- E N or S (for latitude)
- yyyyy.yy Destination waypoint longitude
- F E or W (for longitude)
- SOG Speed Over Ground (knots)
- COG Course Over Ground (°)
- Ddmmyy Date Stamp coordinated
- MV Magnetic Variation (°)
- F East or West Magnetic Variation Direction
- M Mode indicator
  - A= Autonomous
  - D= Differential
  - E= Dead Reckoning,
  - N= None
- *hh Checksum

7 PACKAGE DELIVERABLES

This application note is delivered as a single compressed zip archive as follows:

Filename	Description
WM_DEV_C-GPS_APN_001-001.zip	Application Note

7.1 DOCUMENTATION

- This application note
- eRide APIs Technical Manual
- C-GPS Development kit User Guide
- Samples description document

8 RELATED DOCUMENTS

	Filename	Description
[1]	eTM-GCLAPI-CoreLib_API.pdf	eRide APIs Technical Manual
[2]	WM_DEV_C-GPS_UGD_001	C-GPS Development kit User Guide
[3]	MiniRide Datasheet.pdf	MiniRide Datasheet
[4]	Prelude1 RF Receiver Datasheet.pdf	Prelude1 Datasheet
[5]	Opus1, GPS Receiver Datasheet.pdf	Opus1 Datasheet
[6]	MG-001ApprovalSheet.pdf	Specification for approval

9 SOFTWARE COMPATIBILITY MATRIX

List all current software configurations and compatibility with this application note.

Open AT® FW	Open AT® SDK	Open AT® Plug-Ins
6.61	4.11	WIP v1.10.02

10 SUPPORT

For direct clients: contact your Wavecom FAE
For distributor clients: contact your distributor FAE
For distributors: contact your Wavecom FAE

11 DOCUMENT HISTORY

Level	Date	History	Author
001	23/11/2006	Creation	Wavecom Support Consultant

12 LEGAL NOTICE

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