**Cook Book:
GSM2228CB001**

Enfora® Mini-MT Mobile Tracker Event Cookbook

Revision 1.01

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Objective:

The intent of this document is to provide information that details the steps necessary to configure the Enfora® Mini-MT LED interface.

Supported devices:

- GSM2228 Mini-MT

Equipment Needed:

In this example the requirements are:

- An Enfora GSM2228 Mini-MT modem

- A notebook or desktop computer with any version of Microsoft Windows that has the HyperTerminal communications program. If this hardware is not available, the user could use a DOS terminal emulation program or DUMB ASCII terminal.

References:
- GSM2228UG001   - Enfora Mini-MT User Guide
- GSM2228AT001   - Enfora Mini-MT AT Command Set Reference
- GSM0000AN015   - Event Monitor and Reporting Overview

Procedures:

Please note that the following event commands are examples only. When implementing, use the command AT$EVENT? to query the event table and use the next sequential event group number. Failure to do so could potentially cause unpredictable results.

Some of these examples require that communication is established with a remote server. Read and understand the appropriate Quick Start Guide for your device prior to attempting these examples. Always verify that the local serial connection session is actually established with the Enfora Mini-MT modem.

Please note that the following event commands are examples only. For these events to operate the Mini-MT must be in the wake state or connected to a power source.

1. **Mini-MT Mobile Tracker LED Definitions**

There are four LED's used to provide status to the user. They are (from left to right) CALL, ON, GPS, and BAT. The LED functions are defined in the table below.

| Power Mode	CALL	ON	GPS	BAT
	Yellow	*Yellow*	*Yellow*	*Red*
Hibernate	OFF	OFF	OFF	Low Battery, less than 20% Slow Blink 250mS/10Sec Low Battery, less than 5% OFF
Active / Battery	Blink when receiving or originating call 500mS/1 Sec Blink for missed call 2 Sec/2 Sec Solid during call	Slow blink 500mS/10Sec	Blink when locked 500mS/2 Sec	Low Battery, less than 20% Slow Blink 250mS/10Sec Low Battery, 5% or less, or turns OFF
Active / Aux	Blink when receiving or originating call 500mS/1 Sec Blink for missed call 2 Sec/2 Sec Solid during call	ON solid	Blink when locked 500mS/2 Sec	Fast Blink, during charge 500mS/2 Sec OFF when charged

2. Max Speed Exceeded Reporting Configuration

Note: The following examples require the Mini-MT device to report to a remote server. If you do not have one configured, refer to the appropriate Quick Start guide to enable communication with Enfora's test server.

Type the following commands to send a GPS RMC NMEA message OTA when the Mini-MT exceeds 30 Knots.
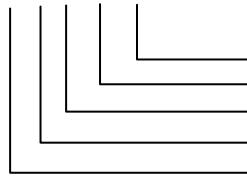
Maximum Speed = *30* (knots) (*30* Knots ≈ 35 mph ≈ 56 Km/Hr)

AT$EVENT=11,0,17,30,250
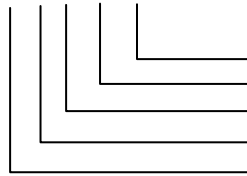
Should always be 250 (max speed)
Max Speed to monitor (0 – 249)
Monitor speed (Input Event Number)
Input transition event
Event group 11

AT$EVENT=11,3,40,7,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
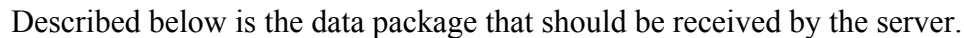Output event
Event group 11

Results:

Parameter 2 Decode is as follows:

Param2 decode = 4230
Bit 00 > ASCII
Bit 01 > PARAM1 11 bytes ASCII
Bit 02 > MDMID added 22 bytes ASCII
Bit 03 >
Bit 04 >
Bit 05 >
Bit 06 >
Bit 07 > Input Event Number 3 bytes ASCII
Bit 08 >
Bit 09 >
Bit 10 >
Bit 11 >
Bit 12 > RMC NMEA Data max 80 bytes ASCII
Bit 13 >
Bit 14 >
Bit 15 >
Bit 16 >
Bit 17 >
Bit 18 >
Bit 19 >
Bit 20 >
Bit 21 >

A GPS RMC NMEA message will be sent to the IP address (set by **AT$FRIEND**) and port number (set by **AT$UDPAPI**) every time the device exceeds speed of 30 Knots. The MT modem has to go below the set speed of 30 Knots in order to trigger the event again.

The output message format is generated based on the number "**4230**" set in the second **AT$EVENT** command.

Below is the example output that would be seen if the modem were setup to report to the Enfora test server.

GSM/GPRS Applet HTML Page

Described below is the data package that should be received by the server.

- Row 1 indicates the Byte number.

   Note: Bytes 0 through 27 are part of IPV4 header. Bytes 28 and greater are the actual packet Payload. Bytes 32 and greater are controlled by the Parameter 2 value.

- Row 2 displays the data in HEX format, and
- Row 3 and/or 4 describe each block of the message.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
IP Header data															
IP Header															

Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31
				UDP Header data								00	04	02	00
IP Header (contd…)				UDP Header								ASCII GPS data		Status	reserved
												UDP-API Header			

Byte 32	Byte 33	Byte 34	Byte 35	Byte 36	Byte 37	Byte 38	Byte 39	Byte 40	Byte 41	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46	Byte 47
20	20	20	20	20	20	20	20	20	37	20	20	20	20	20	20
User Specified Number (**7**)											Modem ID				

Byte 48	Byte 49	Byte 50	Byte 51	Byte 52	Byte 53	Byte 54	Byte 55	Byte 56	Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63
20	20	20	20	20	20	20	20	20	4D	54	5F	54	65	73	74
Modem ID continued… (**MT_Test**)															

Byte 64	Byte 65	Byte 66	Byte 67	Byte 68	Byte 69	Byte 70	Byte 71	Byte 72	Byte 73	Byte 74	Byte 75	Byte 76	Byte 77	Byte 78	Byte 79
20	66	39	2C	20	36	2C	20	31	37	34	38	20	31	37	34
Modem ID continued	Mask		comma	Data		space	A/D 1					A/D 2			
	GPIO														

Byte 80	Byte 81	Byte 82	Byte 83	Byte 84	Byte 85	Byte 86	Byte 87	Byte 88	Byte 89	Byte 90	Byte 91	Byte 92	Byte 93	Byte 94	Byte 95
38	20	31	37	20	24	47	50	52	4D	43	2C	31	39	32	35
A/D 2 continued	Input Event Number (**17**)			ASCII NMEA RMC message ($GPRMC,193612.00,A,3259,819460,N,09642.849539,W,0,0,0,040208,,,A*40)											

Byte 96	Byte 97	Byte 98	Byte 99	Byte 100	Byte 101	Byte 102	Byte 103	Byte 104	Byte 105	Byte 106	Byte 107	Byte 108	Byte 109	Byte 110	Byte 111
34	31	2E	38	38	2C	41	2C	33	33	30	31	2E	35	32	39
ASCII NMEA RMC message continued…															

Byte 112	Byte 113	Byte 114	Byte 115	Byte 116	Byte 117	Byte 118	Byte 119	Byte 120	Byte 121	Byte 122	Byte 123	Byte 124	Byte 125	Byte 126	Byte 127
32	2C	4E	2C	30	39	36	34	32	2E	35	36	37	35	2C	57
ASCII NMEA RMC message continued…															

Byte 128	Byte 129	Byte 130	Byte 131	Byte 132	Byte 133	Byte 134	Byte 135	Byte 136	Byte 137	Byte 138	Byte 139	Byte 140	Byte 141	Byte 142	Byte 143
2C	33	31	2E	38	2C	30	30	36	2E	31	2C	32	31	30	37
ASCII NMEA RMC message continued…															

Byte 144	Byte 145	Byte 146	Byte 147	Byte 148	Byte 149	Byte 150	Byte 151	Byte 152	Byte 153	Byte 154	Byte 155	Byte 156			
30	34	2C	30	35	2C	45	2A	35	33	0D	0A	00			
ASCII NMEA RMC message continued…															

3. Time-Distance Reporting Configuration

Type the following commands to send a GPS RMC NMEA message OTA to a remote Server when time and/or distance settings are violated. Users must use Event Timer 1 ($EVTIM1) for minimum time and Event Timer 2 ($EVTIM2) for maximum time when setting up for this feature. The time and/or distance feature is designed as described in the example table below:

Minimum Time (seconds)	Maximum Time (seconds)	Distance (meters)	Comments
0	0	0	FEATURE DISABLED
0	0	100	GPS message sent every 100 meters
0	60	0	GPS message sent every 60 seconds
0	60	100	GPS message sent every 60 seconds if the vehicle has not moved 100 meters. GPS messages will be sent every 100 meters if the vehicle is moving and traveling the distance of 100 meters in less than 60 seconds. In short, message is sent upon expiration of time or moving of distance – whichever occurs first.
30	x	0	GPS message sent every 30 seconds (x = don't care)
30	0	100	GPS message sent when the vehicle has moved 100 meters and 30 seconds have elapsed.
30	60	100	GPS message sent every 60 seconds if the vehicle is idle and not moving or moving slowly. If the vehicle is moving, then GPS message will be sent when 30 seconds have expired and 100 meters have been moved.

Choose only one option, from options 1 – 6 below, using section as a reference.
Before attempting another option delete the existing events by issuing the following commands:
AT$EVDEL=12
AT$EVDEL=13

The following AT command settings provide examples of the use of event processing to configure the Time and/or Distance feature.
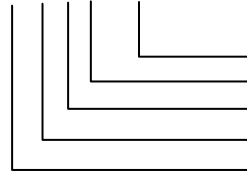
a. **Send GPS message when a predefined distance is moved**.
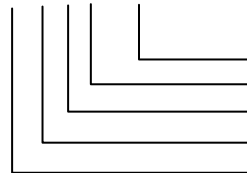
Minimum Time = 0
Maximum Time = 0
Distance = z (z = 0 – 1000000 meters)

AT$EVENT=12,0,16,z,1000000

```
                                    Should always be 1000000 (max distance)
                                    Replace z with actual distance to monitor
                                    Monitor Distance displaced value
                                    Input transition event
                                    Event group 12
```

AT$EVENT=12,3,40,8,4230

```
                                    OTA Message (ASCII RMC NMEA msg)
                                    User Specified number
                                    Send OTA UDP Message
                                    Output event
                                    Event group 12
```

Results: A GPS RMC NMEA message will be sent to a remote user at every z meters. The output message is described under **Section 7, Results.**
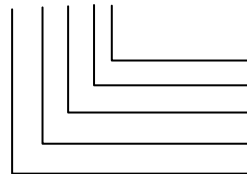
b. **Send GPS message when Maximum Time expires.**

Minimum time = 0
Maximum time = y (y = 0 – 604800 seconds)
Distance = 0

AT$EVTIM2=y   ($y$ = 0 – 604800 seconds)

AT$EVENT=12,1,13,1,1

```
                                    Ending range of 1 (high)
                                    Starting range of 1 (high)
                                    Activate Timer 2 ($EVTIM2)
                                    Input occurrence event
                                    Event group 12
```
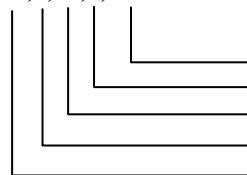
AT$EVENT=12,3,40,8,4230

```
                                    OTA Message (ASCII RMC NMEA msg)
                                    User Specified number
                                    Send OTA UDP Message
                                    Output event
                                    Event group 12
```

Results: A GPS RMC NMEA message will be sent to a remote user at every y time interval. The output message is described under **Section 7, Results.**
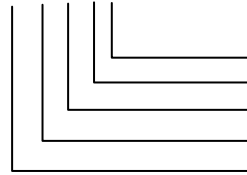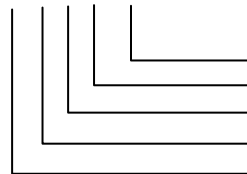
c. Send GPS message when Minimum Time expires.

Minimum time = x (x = 0 – 604800 seconds)
Maximum time = 0
Distance = 0

**AT$EVTIM1=$x$**   ($x$ = 0 – 604800 seconds)

AT$EVENT=12,1,12,1,1

Ending range of 1 (high)
Starting range of 1 (high)
Activate Timer 2 ($EVTIM1)
Input occurrence event
Event group 12

AT$EVENT=12,3,40,8,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 12

Results: A GPS RMC NMEA message will be sent to a remote user at every x time interval. The output message is described under **Section 7, Results.**

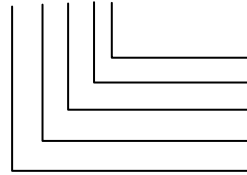**d. Send GPS message when Time OR Distance has elapsed.**

Minimum time = 0
Maximum time = y (y = 0 – 604800 seconds)
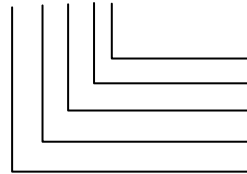Distance = z (z = 0 – 1000000 meters)

**AT$EVTIM2=$y$**   ($y$ = 0 – 604800 seconds)
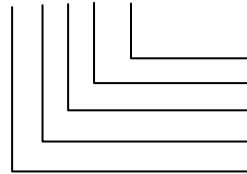
AT$EVENT=12,1,13,1,1

Ending range of 1 (high)
Starting range of 1 (high)
Activate Timer 2 ($EVTIM2)
Input occurrence event
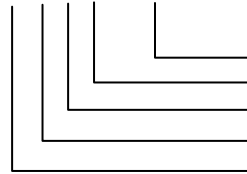Event group 12

AT$EVENT=12,3,43,2,0

Reserved
Reset Timer 2
Reset/Restart Timer
Output event
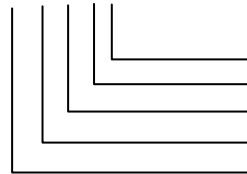Event group 12

AT$EVENT=12,3,40,8,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 12
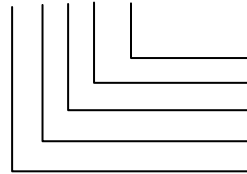
AT$EVENT=13,0,16,z,1000000

Should always be 1000000 (max distance)
Replace z with actual distance to monitor
Monitor Distance displaced value)
Input transition event
Event group 13

AT$EVENT=13,3,43,2,0

Reserved
Reset Timer 2
Reset/Restart Timer
Output event
Event group 13

AT$EVENT=13,3,40,9,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 13

Results: A GPS RMC NMEA message will be sent to a remote user every time the device travels z distance or y time interval has elapsed. The output message is described under **Section 7, Results.**

e. Send GPS message based on Time AND Distance.

In this instance, a GPS message will not be sent to the remote user until the device travels specified distance and time has expired.
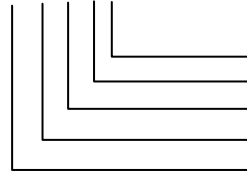
Minimum time = x (x = 0 – 604800 seconds)
Maximum time = 0
Distance = z (z = 0 – 1000000 meters)
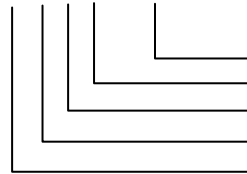
**AT$EVTIM1=$x$**   ($x$ = 0 – 604800 seconds)

AT$EVENT=12,1,12,1,1

          Ending range of 1 (high)
          Starting range of 1 (high)
          Activate Timer 2 ($EVTIM1)
          Input occurrence event
          Event group 12

AT$EVENT=12,0,16,z,1000000

          Should always be 1000000 (max distance)
          Replace z with actual distance to monitor
          Monitor Distance displaced value
          Input transition event
          Event group 12

AT$EVENT=12,3,43,1,0

          Reserved
          Reset Timer 1
          Reset/Restart Timer
          Output event
          Event group 12

AT$EVENT=12,3,40,8,4230

          OTA Message (ASCII RMC NMEA msg)
          User Specified number
          Send OTA UDP Message
          Output event
          Event group 12

Results: A GPS RMC NMEA message will be sent to a remote user every time the device travels *z* distance and *x* time interval has elapsed. The output message is described under **Section 7, Results.**

f.   Send GPS message based on Minimum Time AND Distance OR when Maximum Time has elapsed.

In this instance, a GPS message will not be sent to the remote user until the device travels specified distance and minimum time has expired or distance has not been traveled and maximum time has expired.

Note: Maximum Time has to be greater than Minimum Time

Minimum time = *x* (*x* = 0 – 604800 seconds)
Maximum time = *y* (*y* = 0 – 604800 seconds)
Distance = *z* (*z* = 0 – 1000000 meters)

AT$EVTIM1=*x*   (*x* = 0 – 604800 seconds)

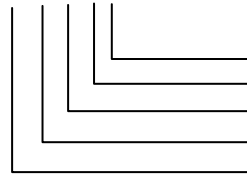**AT$EVTIM2=*y***   (*y* = 0 – 604800 seconds)

AT$EVENT=12,1,12,1,1

Ending range of 1 (high)
Starting range of 1 (high)
Activate Timer 2 ($EVTIM1)
Input occurrence event
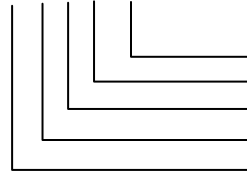Event group 12

AT$EVENT=12,0,16,*z*,1000000

Should always be 1000000 (max distance)
Replace z with actual distance to monitor
Monitor Distance displaced value
Input transition event
Event group 12

AT$EVENT=12,3,43,1,0

Reserved
Reset Timer 1
Reset/Restart Timer
Output event
Event group 12

AT$EVENT=12,3,43,2,0

> Reserved
> Reset Timer 2
> Reset/Restart Timer
> Output event
> Event group 12

AT$EVENT=12,3,40,8,4230

> OTA Message (ASCII RMC NMEA msg)
> User Specified number
> Send OTA UDP Message
> Output event
> Event group 12
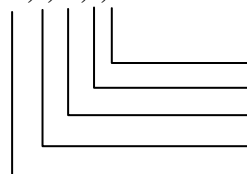
AT$EVENT=13,1,13,1,1

> Ending range of 1 (high)
> Starting range of 1 (high)
> Activate Timer 2 ($EVTIM2)
> Input occurrence event
> Event group 13

AT$EVENT=13,3,43,1,0
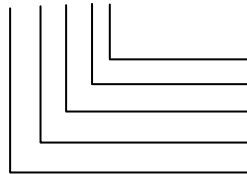
> Reserved
> Reset Timer 1
> Reset/Restart Timer
> Output event
> Event group 13
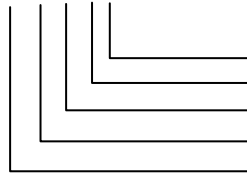
AT$EVENT=13,3,43,2,0

> Reserved
> Reset Timer 2
> Reset/Restart Timer
> Output event
> Event group 13

AT$EVENT=13,3,40,9,4230
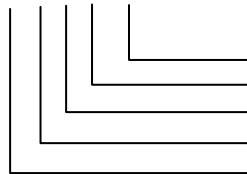
> OTA Message (ASCII RMC NMEA msg)
> User Specified number
> Send OTA UDP Message
> Output event
> Event group 13

Results: A GPS RMC NMEA message will be sent to a remote user every time the device travels z distance and x time interval has elapsed **OR** y time interval has elapsed The output message is described under **Section 7, Results.**

g. Results:

A GPS RMC NMEA message will be sent to the IP address (set by **AT$FRIEND**) and port number (set by **AT$UDPAPI**).

The output message format is generated based on the number "**4230**" set in section a above with the **AT$EVENT** command.

The output message format is generated based on the number "**4230**" set in the second **AT$EVENT** command.

Below is the example output that would be seen if the modem were setup to report to the Enfora test server based on example A-3.

Bytes 32 – 42 and 81 – 83 will change depending on which option (1 – 6) was selected during section a.

Described below is the data package that should be received by the Server.

- Row 1 indicates the Byte number.
  Note: Bytes 0 through 27 are part of IPV4 header. Bytes 28 and greater are the actual packet Payload. Bytes 32 and greater are controlled by the Parameter 2 value.

- Row 2 displays the data in HEX format, and
- Row 3 and/or 4 describe each block of the message.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
						IP Header data									
						IP Header									

Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31
						UDP Header data						00	04	02	00
												ASCII GPS data		Status	reserved
IP Header (contd…)				UDP Header								UDP-API Header			

Byte 32	Byte 33	Byte 34	Byte 35	Byte 36	Byte 37	Byte 38	Byte 39	Byte 40	Byte 41	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46	Byte 47
20	20	20	20	20	20	20	20	20	38	20	20	20	20	20	20
User Specified Number (8)											Modem ID				

Byte 48	Byte 49	Byte 50	Byte 51	Byte 52	Byte 53	Byte 54	Byte 55	Byte 56	Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63
20	20	20	20	20	20	20	20	20	4d	54	5f	54	65	73	74
Modem ID continued… (**MT_Test**)															

Byte 64	Byte 65	Byte 66	Byte 67	Byte 68	Byte 69	Byte 70	Byte 71	Byte 72	Byte 73	Byte 74	Byte 75	Byte 76	Byte 77	Byte 78	Byte 79
20	66	39	2C	20	36	20	31	37	34	38	20	31	37	34	38
Modem ID continued	Mask		comma	Data		space	A/D 1					A/D 2			
	GPIO														

Byte 80	Byte 81	Byte 82	Byte 83	Byte 84	Byte 85	Byte 86	Byte 87	Byte 88	Byte 89	Byte 90	Byte 91	Byte 92	Byte 93	Byte 94	Byte 95
20	31	32	20	24	47	50	52	4d	43	2c	31	39	35	33	34
A/D 2 continued	Input Event Number (12)			ASCII NMEA RMC message ($GPRMC,193198.00,A,3259.809572,N,09642.853881,W,0.0,0.0,040208,,,A*43)											

Byte 96	Byte 97	Byte 98	Byte 99	Byte 100	Byte 101	Byte 102	Byte 103	Byte 104	Byte 105	Byte 106	Byte 107	Byte 108	Byte 109	Byte 110	Byte 111
37	2e	39	32	2c	41	2c	33	33	32	32	2e	37	32	38	34
ASCII NMEA RMC message continued…															

Byte 112	Byte 113	Byte 114	Byte 115	Byte 116	Byte 117	Byte 118	Byte 119	Byte 120	Byte 121	Byte 122	Byte 123	Byte 124	Byte 125	Byte 126	Byte 127
2c	4e	2c	30	39	36	32	34	2e	36	38	33	39	2c	57	2c

| ASCII NMEA RMC message continued… | | | | | | | | | | | | | | | |

Byte 128	Byte 129	Byte 130	Byte 131	Byte 132	Byte 133	Byte 134	Byte 135	Byte 136	Byte 137	Byte 138	Byte 139	Byte 140	Byte 141	Byte 142	Byte 143
35	36	2e	32	2c	30	35	39	2e	30	2c	32	31	30	37	30

| ASCII NMEA RMC message continued… | | | | | | | | | | | | | | | |

Byte 144	Byte 145	Byte 146	Byte 147	Byte 148	Byte 149	Byte 150	Byte 151	Byte 152	Byte 153	Byte 154					
34	2c	30	34	2c	45	2a	35	46	0d	0a					

| ASCII NMEA RMC message continued… | | | | | | | | | | | | | | | |

4. Geo-Fencing Configuration

The Enfora Mini-MT allows a user to configure maximum of 25 circular shape geo-fences. Enfora Mini-MT can be configured to send GPS messages to a remote user (server) whenever a device enters or exits a geo-fenced area. The geo-fence feature has to be configured with two commands: **AT$GEOFNC** and **AT$EVENT**. To configure sending messages when a device enters or exits the geo fenced area, follow the example below:

NOTE:

- NMEA messages provide Latitude and Longitude information in "*Degrees Minute.Minute*" format.
- To obtain the decimal value for Degrees, take *Minute.Minute* of the actual Latitude or Longitude and divide it by *60*.
- Latitude value should be between –90.0 to +90.0 Degrees
- Longitude value should be between –180.0 to +180.0 Degrees.
- Latitude North of Equator line should always be positive Value.
- Latitude South of the Equator line should always be negative value.
- Longitude East of the GMT line should always be positive.
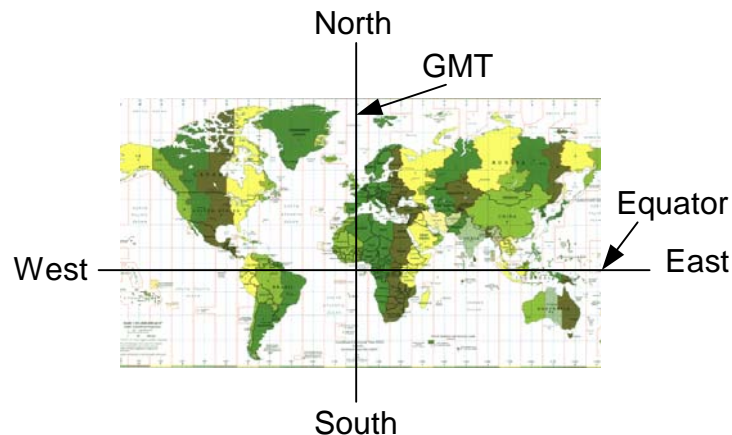- Longitude West of the GMT line should always be negative

Figure 1. Map of World Displaying Latitude and Longitude

Ex: Send a NMEA RMC GPS message when the Mini-MT moves **in/out** of the geo-fence area 1. Geo fence 1 is a **100** meter radius from the center point defined by Latitude = 33 01.5023 (North) and Longitude = 096 42.3853 (West). According to figure 6 above, Latitude of 33 01.5023 (North) would be a positive value (since its above the Equator line) but Longitude of 96 42.3853 (West) would be a negative value since it is west of the GMT line.

Verify each AT command sent to the modem returns **OK**.

Radius: **100** meters
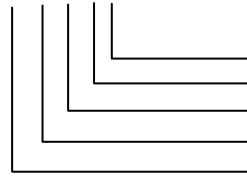Latitude: **33 01.5023 North   = 33 + 01.5023/60**
                                        = 33.02503833
Longitude: **096 42.3853 West   = -96 + 42.3853/60**
                                        = -96.70642167

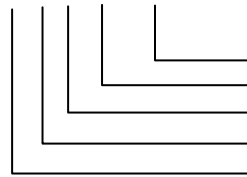**AT$GEOFNC=1,100,33.02503833,-96.70642167**

    a. Send a GPS message when the unit leaves geo-fence 1

AT$EVENT=14,0,21,0,0

Transition OUT of geo-fence area
Transition OUT of geo-fence area
Geo-Fence 1
Input transition event
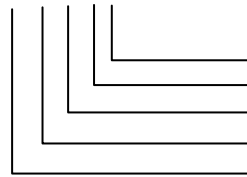Event group 14

AT$EVENT=14,3,40,14,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
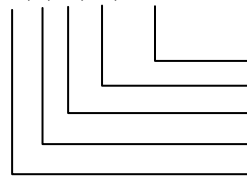Send OTA UDP Message
Output event
Event group 14

    b. Send a GPS message when the unit enters geo-fence 1

AT$EVENT=15,0,21,1,1

Transition IN the geo-fence area
Transition IN the geo-fence area
Geo-Fence 1
Input transition event
Event group 15

AT$EVENT=15,3,40,15,4230

OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 15

Results: A GPS RMC NMEA message will be sent to a remote user every time the device enters or exits the geo fence area. The output message is described under **Section B, Results.**

To add Geo-Fence 2, send the following commands to the Mini-MT and verify that an **OK** is returned.

AT$GEOFNC=2,100,34.02503833,-97.70642167
AT$EVENT=16,0,22,0,0
AT$EVENT=16,3,40,16,4230
AT$EVENT=17,0,22,1,1
AT$EVENT=17,3,40,17,4230

For additional Geofences, repeat the 5 commands below by changing the GeoFence (index) number (**A**), radius (**100**), latitude (**34.02503833**), and longitude (**-97.70642167**) information for **AT$GEOFNC** command.
And, increment the Event group numbers (**B, C**), Input Event (**D**), and User Specified Number (**E, F**) for **AT$EVENT** command.

Use the following table for the relationship between the numbers

AT$GEOFNC=A,100,34.02503833,-97.70642167
AT$EVENT=B,0,D,0,0
AT$EVENT=B,3,40,E,4230
AT$EVENT=C,0,D,1,1
AT$EVENT=C,3,40,F,4230

GeoFence	Input Trigger Event number	Leave GeoFence		Enter GeoFence	
		Event	User Number	Event	User Number
A	D	B	E	C	F
1	21	14	14	15	15
2	22	16	16	17	17
3	23	18	18	19	19
4	24	20	20	21	21
5	25	22	22	23	23
6	31	24	24	25	25
7	32	26	26	27	27
8	33	28	28	29	29
9	34	30	30	31	31
10	35	32	32	33	33
11	36	34	34	35	35
12	37	36	36	37	37
13	38	38	38	39	39
14	39	40	40	41	41
15	40	42	42	43	43
16	41	44	44	45	45
17	42	46	46	47	47
18	43	48	48	49	49
19	44	50	50	51	51
20	45	52	52	53	53
21	46	54	54	55	55
22	47	56	56	57	57
23	48	58	58	59	59
24	49	60	60	61	61
25	50	62	62	63	63

Results:

A GPS RMC NMEA message will be sent to the IP address (set by **AT$FRIEND**) and port number (set by **AT$UDPAPI**) when it enters or exits a defined geo fence.

The output message format is generated based on the number "**4230**" set in above example with the **AT$EVENT** command.

GSM/GPRS Applet HTML Page

Created by Chirag Patel 8/03/06, updated by mjc 07/11/07

Bytes 32 – 42 will change depending on what is programmed in the "user specified field". Bytes 81 – 83 will change with geo-fence number

Described below is the data package that should be received by the Server when the modem exits GeoFence 1.

- Row 1 indicates the Byte number.

  Note: Bytes 0 through 27 are part of IPV4 header. Bytes 28 and greater are the actual packet Payload. Bytes 32 and greater are controlled by the Parameter 2 value.

- Row 2 displays the data in HEX format, and
- Row 3 and/or 4 describe each block of the message.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
IP Header data															
IP Header															

Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31
				UDP Header data								00	04	02	00
IP Header (contd…)				UDP Header							ASCII GPS data	Status	reserved
												UDP-API Header		

Byte 32	Byte 33	Byte 34	Byte 35	Byte 36	Byte 37	Byte 38	Byte 39	Byte 40	Byte 41	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46	Byte 47
20	20	20	20	20	20	20	20	31	34	20	20	20	20	20	20
User Specified Number (14)											Modem ID				

Byte 48	Byte 49	Byte 50	Byte 51	Byte 52	Byte 53	Byte 54	Byte 55	Byte 56	Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63
20	20	20	20	20	20	20	20	20	4d	54	5f	54	65	73	74
Modem ID continued… (**MT_Test**)															

Byte 64	Byte 65	Byte 66	Byte 67	Byte 68	Byte 69	Byte 70	Byte 71	Byte 72	Byte 73	Byte 74	Byte 75	Byte 76	Byte 77	Byte 78	Byte 79
20	66	39	2C	20	36	20	31	37	34	38	20	31	37	34	38
Modem ID continued	Mask		comma	Data		A/D 1					A/D 2			
	GPIO														

Byte 80	Byte 81	Byte 82	Byte 83	Byte 84	Byte 85	Byte 86	Byte 87	Byte 88	Byte 89	Byte 90	Byte 91	Byte 92	Byte 93	Byte 94	Byte 95
20	32	31	20	24	47	50	52	4d	43	2c	31	39	32	35	32
A/D 2 continued	Input Event Number (21)			ASCII NMEA RMC message ($GPRMC,194232.00A,3259.812618,N,09642.856616,W,0.0,0.0,040208,,,A*47)											

Byte 96	Byte 97	Byte 98	Byte 99	Byte 100	Byte 101	Byte 102	Byte 103	Byte 104	Byte 105	Byte 106	Byte 107	Byte 108	Byte 109	Byte 110	Byte 111
37	2e	38	38	2c	41	2c	33	33	30	31	2e	34	38	35	30
ASCII NMEA RMC message continued…															

Byte 112	Byte 113	Byte 114	Byte 115	Byte 116	Byte 117	Byte 118	Byte 119	Byte 120	Byte 121	Byte 122	Byte 123	Byte 124	Byte 125	Byte 126	Byte 127
2c	4e	2c	30	39	36	34	32	2e	35	35	30	34	2c	57	2c

ASCII NMEA RMC message continued…

Byte 128	Byte 129	Byte 130	Byte 131	Byte 132	Byte 133	Byte 134	Byte 135	Byte 136	Byte 137	Byte 138	Byte 139	Byte 140	Byte 141	Byte 142	Byte 143
32	31	2e	31	2c	32	36	39	2e	38	2c	32	31	30	37	30

ASCII NMEA RMC message continued…

| Byte 144	Byte 145	Byte 146	Byte 147	Byte 148	Byte 149	Byte 150	Byte 151	Byte 152	Byte 153	Byte 154					
34	2c	30	35	2c	45	2a	35	39	0d	0a					

ASCII NMEA RMC message continued…

5. GPS Idle Trigger

The Enfora Mini-MT maintains GPS Idle count. The Idle count is incremented every second that the unit has not moved and is stationary in one position. The user can elect to receive a GPS message when the Idle count is exceeded. Idle count is measured in seconds.

> **Note**: A GPS Idle Trigger message will only be sent once when the timer expires. The message will not be repeated if the device/vehicle has not moved.

a. To send a GPS message when the device/vehicle stays idle for 2 minutes (120 seconds), configure as follows:

AT$EVENT=68,0,30,120,1000000
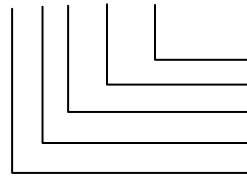
Max timeout value
Idle time in seconds (120 seconds)
GPS Idle Trigger Input Event
Input transition event
Event group 68

AT$EVENT=68,3,40,68,4230
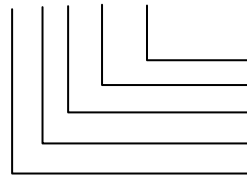
OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 68

b. Query the EVENT table:

AT$EVENT?

The table should reflect the following:

$EVENT:	evgp	evtyp	evcat	p1	p2
	68A	0	30	120	1000000
	68B	3	40	68	4230

6. GPS Invisible Trigger

The Enfora Mini-MT maintains GPS Invisible count. The Invisible count is incremented every second when the unit does not have valid GPS data. The user can elect to receive a message when the Invisible count exceeds a set period. Invisible count is measured in seconds.

Note: A GPS Invisible Trigger message will only be sent once when the timer expires. The message will not be repeated if the device/vehicle has not acquired valid GPS data.

a. To send a message when the GPS has not locked for 1 minute (60 seconds), configure as follows:

AT$EVENT=69,0,29,60,1000000
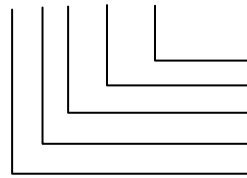
Max timeout value
Idle time in seconds (60 seconds)
GPS Invisible Trigger Input Event
Input transition event
Event group 69

AT$EVENT=69,3,40,69,4230
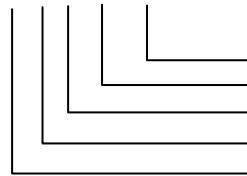
OTA Message (ASCII RMC NMEA msg)
User Specified number
Send OTA UDP Message
Output event
Event group 69

b. Query the EVENT table:

AT$EVENT?

The table should reflect the following:

$EVENT:	evgp	evtyp	evcat	p1	p2
	69A	0	29	60	1000000
	69B	3	40	69	4230

7. Set geo-fence with button press (This is the default condition)

The following procedure will configure the Mini-MT to set a geo-fence when the
"☉" button is pressed.

Configure the EVENT engine for the following events:

AT$EVENT=40,1,58,0,0
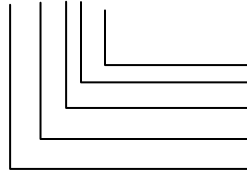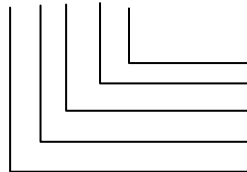
                                          Geo-fence key
                                          Geo-fence key
                                          Key press event
                                          Input occurrence event
                                          Event group 40

AT$EVENT=40, 3, 49, 1, 805

                                          Geo-fence radius
                                          fence number 1
                                          Set Geo-fence
                                          Output event
                                          Event group 40

8. Send a SMS message at a preset battery level percent

The following procedure will configure the Mini-MT to set a SMS to a defined user when the battery level is between 21 to 19 percent.

a. Enter the following 'Stored AT Command"

AT$STOATEV=1,AT$MSGSND=1,"LOW BATTERY"

b. Configure the telephone number and or email address to send the SMS to.

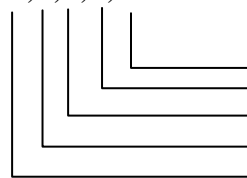**AT$SMSDA=1,"somebody@nowhere.com","0000"**
AT$SMSDA=2,"555-555-1212"

c. Configure the EVENT engine for the following events:

AT$EVENT=35, 0, 59, 19, 21
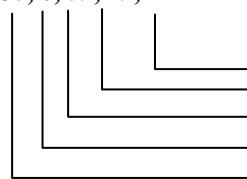
    21 Percent
    19 Percent
    Battery Level event
    Input transition event
    Event group 35

AT$EVENT=35, 2, 9, 1, 1

    State 1 (Home Network)
    State 1 (Home Network)
    +CREG
    Input AND event
    Event group 35

AT$EVENT=35, 3, 44, 1, 0
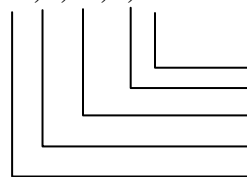
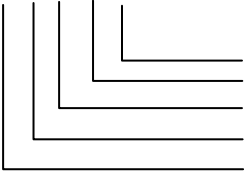   N/A
    Slot 1
    Execute Stored AT-Command
    Output event
    Event group 35

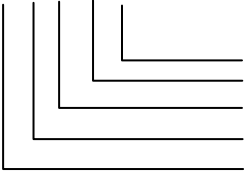**AT$EVENT=36, 0, 59, 19, 21**
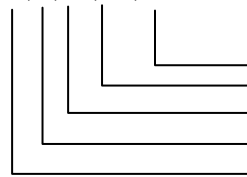
    21 Percent
    19 Percent
    Battery Level event
    Input transition event
    Event group 36

AT$EVENT=36, 2, 9, 5, 5

State 5 (Roaming)
State 5 (Roaming)
+CREG
Input AND event
Event group 36

AT$EVENT=36, 3, 44, 1, 0

N/A
Slot 1
Execute Stored AT-Command
Output event
Event group 36

9. Configure the user button "<" to send a UDP message

The following procedure will configure the Mini-MT to set a UDP message to a server defined in the friends list.
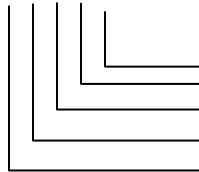
    a. Enter the following AT Commands**:**

Note: The following settings assume the user is using the Enfora test UDP server.

AT$FRIEND=1,1,"apitest.enfora.com",1721,3
AT$UDPAPI=,1721
AT$MDMID="TEST-MINIMT"
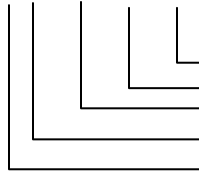**AT$WAKEUP=1,1**
AT$AREG=2

    b. Configure the EVENT engine for the following events:

AT$EVENT=20,1,58,1,1

> User Defined key
> User Defined key
> Key press event
> Input occurrence event
> Event group 20

AT$EVENT=20, 3, 40, 123, 4102

> ASCII $GPRMC
> PARAM1 = Message Identifier
> Set Geo-fence
> Output event
> Event group 20

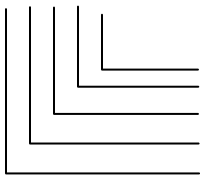### 10. Configure the Mini-MT to emit a tone on wakeup

The following procedure will configure the Mini-MT to emit a tone on wakeup.

a. Enter the following AT Commands:
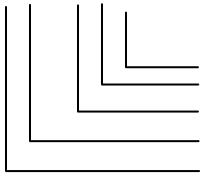
AT$STOATEV=2,AT+STTONE=1,7,1000

b. Configure the EVENT engine for the following events:

AT$EVENT=80,0,8,1,1

User Defined key
User Defined key
Power Up
Input transition event
Event group 20

AT$EVENT=80, 3, 44, 2, 0

N/A
Slot 2
Execute Stored AT-Command
Output event
Event group 20

Revision History

Date	Rev	Author	Description
12/13/06	1.00	MCook	Initial Release.
03/21/08	1.01	DONeil	Edited Param2 value from 4350 to 4230
			Cleared BIT information for BITs 03, 04, 05 and 06
			Added new screen shots and edited ASCII NMEA RMS messages
			Corrected the description in chapter 11
			Removed "stay awake while moving" section