Version

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# Introduction

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

This Application Note describes the steps to setup a PPP connection in Linux Operating System using the Sierra Wireless module. As Windows® and Linux® have different procedure for creating a PPP connection; this application note gives details about the process for Linux environment. The steps to create the connection are well supported with images depicting those steps in a graphical manner.

# Overview

This document is relevant for all mini cards and variants of the SL80xx series that support GPS.

All minicards and certain variants of the SL80xx family have an integrated GPS in the chipset being used, this is referred to as GPSOne. This document describes the detailed technical features, operation of this feature.

# Glossary

|  |  |
| --- | --- |
| Initials | Definition |
| APN | Access Point Name |
| PPP | Point to Point Protocol |

# Technical features

Current MC card units implement generation 7 of the GPSOne while later units implement generation 8, for a detailed list and differences between the generations please see the next section.

Below the technical features of the current GPS implementation are described briefly outlined.

* 12 Tracker
* Ability to operate independently of the GSM/GPRS/3G radio
* GPS position retrievable via AT commands and over specific USB end point assigned for NMEA data.
* Active or passive antenna’s supported (see section 2.2).

## Generational differences

The table below listed the feature differences between gpsOne’s generation 7 and 8.

|  |  |  |
| --- | --- | --- |
|  | gpsOne Gen 7 | gpsOne Gen 8 |
| Acquisition sensitivity – MSA Synchronous A-GPS (dBm) | -159 | -159 |
| Acquisition sensitivity – MSA Synchronous A-GPS w/ Sensitivity assistance (dBm) | -160 | -160 |
| Cold Start Sensitivity (dBm) | -145 | -145 |
| Tracking Sensitivity Standalone or MSB (dBm) | -160 | -161 |
| Accuracy in Open Sky | <2m CEP-50 | <2m CEP-50 |
| Standallone TTFF (Super Hot / Warm / Cold) | 1s/29s/35s | 1s/29s/32s |
| Total number of SV available | ~30 SVs | ~55 SVs |
| Support for Predicted orbits | Yes | Yes |
| Predicted Orbit CEP-50 accuracy | 5m | 5m |
| Glonass/GPS support | No | Capable, feature demand dependent |
| Dead reckoning | No | Yes |

Below is a table outlining the generation implementation in specific units.

|  |  |
| --- | --- |
| gpsOne Generation | Unit |
| 7 | MC879x, MC8705 |
| 8 | MC77xx, MC8801, SL808x, SL809x |

## Antenna

All MC8xxx cards and SL8xxx only support passive GPS antenna’s. The unit is able to be used with an active antenna using upto 5V as a supply but this needs to be supplied to the antenna separately

The MC7xxx MC cards have a 3rd, separate, GPS antenna port through which it is able to generate a 3V DC supply to power an active antenna.

# Modes of operation

There are three main modes of operation

1. Stand alone – Here the unit is operating with no form of assistance data.
2. Assisted GPS – Unit is operating using commercially available SUPL AGPS data with ephemeris and almanac data being downloaded from a server rather than waiting for it to be downloaded through normal GPS operation.
3. Standalone using 1 Xtra data – Unit will automatically connect through the currently available network to the 1Xtra server and download the current data (around 50KB). This is the default mode, the user needs to actively turn 1Xtra data off through AT commands if additional data charges are to be avoided.
Note : The unit will attempt to make a data connection even if the radio has been put into low power mode.

## Operation

The GPS, on most of the MC’s, need to be turned on through AT commands. When turned on the unit will create a dedicated NMEA port (USB end point) to output the NEMA strings from the GPS. The below window shows what should be seen on a unit with the GPS turned on.

The following section demonstrates how to perform this action.



# Examples of running GPS

Below are some examples showing how to enable and run gpsOne.

## Set up running the unit with NMEA strings

At!entercnd=’A710’ //On several units GPS is not enabled by default to enable it extended commands need to be turned on

OK

at!custom? //GPS not enabled

!CUSTOM:

 PUKPRMPT 0x01

 MEPCODE 0x01

 ISVOICEN 0x02

 PRLREGION 0x01

 PCSCDISABLE 0x03

OK

at!custom="GPSENABLE",1 //Enable GPS

OK

at!reset //After this power up a new port will be created for the NMEA data

at!custom?

!CUSTOM:

 PUKPRMPT 0x01

 MEPCODE 0x01

 ISVOICEN 0x02

 PRLREGION 0x01

 PCSCDISABLE 0x03

 GPSENABLE 0x01

OK

at!gpstrack=1,255,1000,30,1 //Command to initiate GPS tracking and output NMEA strings

OK

at!gpsloc? //After time x the unit as obtained a fix which is also be visible through the NMEA strings

Lat: 51 Deg 12 Min 11.24 Sec N (0x0091A4FA)

Lon: 0 Deg 47 Min 44.76 Sec W (0xFFFDBC8A)

Time: 2011 05 13 4 11:32:23 (GPS)

LocUncAngle: 73.1 deg LocUncA: 2.0 m LocUncP: 3.0 m HEPE: 3.605 m

3D Fix

Altitude: 170 m LocUncVe: 6.0 m

Heading: 0.0 deg VelHoriz: 0.0 m/s VelVert: 0.0 m/s

OK

## GPS status and satellite information

at!gpssatinfo? //Note this can be sent regardless of whether the unit has a fix or not

Satellites in view: 6

\* SV: 7 ELEV: 0 AZI: 0 SNR: 43

\* SV: 8 ELEV: 0 AZI: 0 SNR: 37

\* SV: 21 ELEV: 0 AZI: 0 SNR: 35

\* SV: 10 ELEV: 0 AZI: 0 SNR: 33

\* SV: 26 ELEV: 0 AZI: 0 SNR: 32

\* SV: 5 ELEV: 0 AZI: 0 SNR: 31

OK

at!gpsstatus?

Current time: 2011 05 13 4 11:31:42

2011 05 13 4 11:31:41 Last Fix Status = SUCCESS

2011 05 13 4 11:30:54 Fix Session Status = ACTIVE

TTFF (sec) = 41

OK

# Assisting data

There are two services using external data sources and the network radio connection which allows the unit to assist the GPS in getting a faster fix.

## 1Xtra data

1Xtra data is a service that has been provided for by Qualcomm and is designed to provide enhanced standalone performance through supplying the following

* Ephemeris, almanac, iono, UTC and health information
* Coarse time assistance via SNTP (needs active implementation)
* Coarse position assistance by internal country code-based lookup table in AMSS

To maintain full performance improvements it is recommended to update the 1Xtra data held on the unit every 24 hours, this will reduce the TTFF by 18 to 30 seconds in harsh environments.

Points to note about connection to the server are as follows

* This is disabled by default and needs to be specifically turned on.
* Connection to the server is done through the ‘default’ connection. This is set via the at!scdftprof command and refers to the AT+CGDCONT account/APN.
* An automatic update timer can be set to update the information on a

Note the MC software will automatically connect across the network using the APN that has been specific for the normal connection to the 1Xtra server. This can be turned off through AT commands as shown below.

### Connecting to 1Xtra sever

The below example shows how to set up the 1Xtra paramters, turn it on and force a download of the 1Xtra data from the server.

AT!ENTERCND="A710" //Enable all AT commands

OK

AT!GPSXTRADATAENABLE=1,3,10,0,24 //Set to 0 to disable, turn xtra data on but auto update off

OK

AT!GPSXTRATIMEENABLE=1,100,100 //Set to 0 to disable

OK

AT!RESET //Reset is required for these settings to become effective

 Re open serial port

AT!ENTERCND="A710"

OK

at!gpsxtradataurl? //!Xtra server URL’s which should be resolved through DNS after the IP connection is made.

XTRA Primary Server: "http://xtra1.gpsonextra.net/xtra.bin"

XTRA Secondary Server: "http://xtra2.gpsonextra.net/xtra.bin"

XTRA Tertiary Server: <http://xtra3.gpsonextra.net/xtra.bin>

at!scdftprof? //Check to see what the default connection is set to, in this case CDGCONT account 4.

!SCDFTPROF: 4

OK

at+cgdcont?

+CGDCONT: 1,"IP","orangeinternet","",0,0

+CGDCONT: 2,"IP","orangeinternet","",0,0

+CGDCONT: 3,"IP","orangeinternet","",0,0

+CGDCONT: 4,"IP","orangeinternet","",0,0 //Default configuration

+CGDCONT: 5,"IP","orangeinternet","",0,0

+CGDCONT: 15,"IP","orangeinternet","",0,0

OK

AT!GPSTRACK=1,255,30,1000,1 //For the 1Xtra data to be downloaded there must be a tracking session on going.

OK

at!gpsxtrainitdnld

 Xtra command sent successfully

OK

at!gpsxtrastatus?

 Xtra Time status = Valid

 Xtra Data status = Invalid

 Validity Start = 1980 01 06 6 00:00:00

 Validity End = 1980 01 06 6 00:00:00

OK

## A GPS

The unit is also able to connect to a standard A GPS SUPL data server if available, this provides much the same functionality as the 1Xtra information and in some cases can provide data that is valid for a longer period of time reducing the number of recommended connections and hence overall data consumption. The server URL or IP address needs to be input to the unit through the AT commands

Please contact your Sierra Wireless FAE for further information if required.

# Package Deliverables

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

|  |  |
| --- | --- |
| Filename | Description |
|  |  |

## Documentation

List all of the files that will be included in the zip file.

|  |  |
| --- | --- |
| Filename | Description |
|  |  |

## Software

List all of the files that will be included in the zip file.

|  |  |
| --- | --- |
| Filename | Description |
| N/A | N/A |

# Software Compatibility Matrix

|  |  |  |
| --- | --- | --- |
| Firmware | Sierra Wireless Software Suite | Plug-Ins |
| ALL | N/A | N/A |

# Support

For direct clients: contact your Sierra Wireless FAE

For distributor clients: contact your distributor FAE

For distributors: contact your Sierra Wireless FAE

# Document History

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| 001 | February 14, 2012 | Creation |
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|  |  |  |

# Legal Notice

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

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Do not operate the Sierra Wireless modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless modem **MUST BE POWERED OFF**. The Sierra Wireless modem can transmit signals that could interfere with this equipment. Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.

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