AGT-100D
Technical Specification

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AGT-100D – v1.0

AnyDATA
AnyTime AnyPlace Any Wireless Data Solutions™

AnyDATA CDMA AGT-100D
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1) Introduction

1.1 Revision History

Table 1.1 : Revision History

Version	Date	Description
v 0.1	Feb 2006	Initial Release – applicable AGT-100D
V 1.0	July 2006	1st Release

1.2 AGT-100D Overview

The design team of the Wireless Data Module, AnyDATA has successfully developed the AGT-100D to use a hybrid approach for position determination using signals from CDMA cell stations and GPS satellites to compute the user's location. The AGT-100D can be used as a wireless GPS tracking device to track a stolen vehicle, a package's journey from one destination to another and even to track your pet. By using the latest Location based services, or LBS, from CDMA cellular carrier, the AGT-100D with Geo Fencing technology will detect unauthorized movement of the vehicle within just 10 meters in virtually any direction: sideways, forward or backwards. When a vehicle is accessed illegally, the alarm immediately notifies the vehicle owner or computer the first 10 meters of unauthorized movement.

Features of the AGT-100D include programmable tracking, programmable fencing of theft and instant location of finding.

The long battery life on the AGT-100D means that you can track your package from start to the end of its journey. Attach it to a person and receive alarms on your phone outside the safety area. When monitoring from your cell phone or your web console, the AGT-100D will connect you to your asset quickly.

1.3 GPS Overview

The Global Positioning System (GPS) is a highly accurate. The GPS system has 24 Satellites in 6 Orbital planes. With 4 Satellites in each plan cover 20,200 Km Altitudes and 55 Degree Inclination, which were given very precise clocks that keep accurate time to within three nanoseconds .The gpsOne have been used this timing information for position location calculations.

The CDMA carriers use both mobile and network based technologies such as A-GPS and ALFT to determine a mobile's position.

MSC: Mobile Switching Center
PDE: Position determination Entity
BS: Base Station
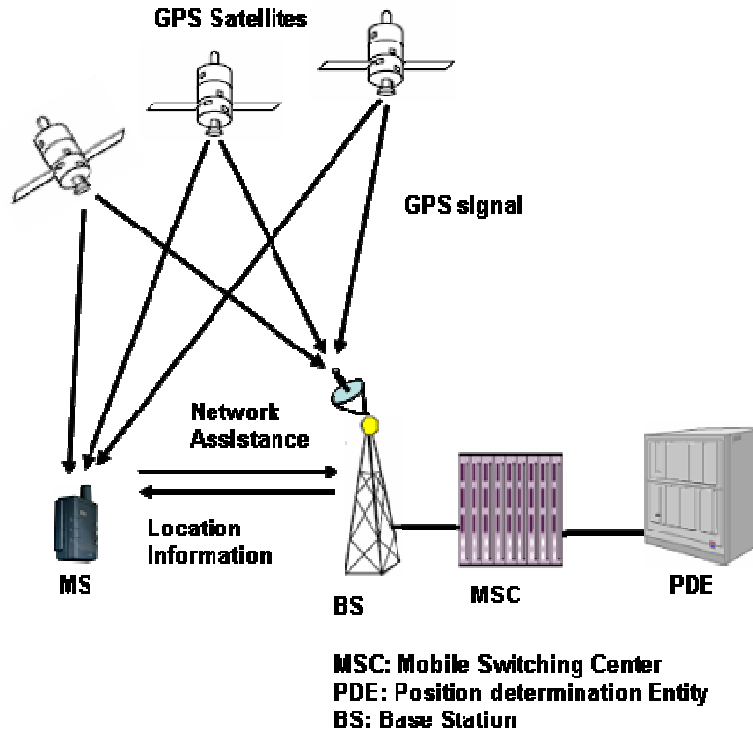
A-GPS wireless network infrastructure

**Figure 1.1 : A-GPS wireless network infrastructure**

In the case of A-GPS, the CDMA network assists the mobile by sending information about the position of the GPS satellites over the CDMA link. A-GPS receiver measures the distance from three satellites by measuring the time required for the signal travel from the satellite to the receiver. In a typical, a satellite signal's predicted time of arrival at the mobile is about $5\mu s$, which corresponds to 5 chips of the GPS C/A code. This is used to triangulate the position of the GPS receiver. A wireless network infrastructure contains a base stations, MSC mobile switching center and PDE position determination entity. The mobile can quickly make GPS pseudorange measurements and report them back to PDE through the CDMA network, which then calculates the mobile's location. This is called MS-assisted mode which is operating only in CDMA traffic state.

When GPS receiver runs out of coverage or CDMA idle, the AGT-100D module is operating in MS base mode. The GPS receiver can calculate position and send to PDE. There are minimum of four GPS satellites must be visible by GPS receiver in MS base mode.

For AFLT, a mobile makes pilot phase measurements on base stations and reports them back to the network using IS-801-1 signaling. The exact location of each base station, the exact time at which the base station is transmitting, and the time of arrival of the base station's signal at a mobile station (e. g. cell phone) can be used to triangulate the position of the mobile station. This technique is referred to as Advanced Forward Link Trilateration.

AFLT excels in urban (i.e. high base station density) and in-building applications while A-GPS proves useful in rural (i.e. low base station density) environments. By using A-GPS and AFLT hybrid, AnyDATA

has successfully developed the AGT-100D with gpsOne solution for both mobile and network based technologies to provide high accuracy position approximate 5 ~ 50m , latitude, longitude, and altitude for all terrain coverage.
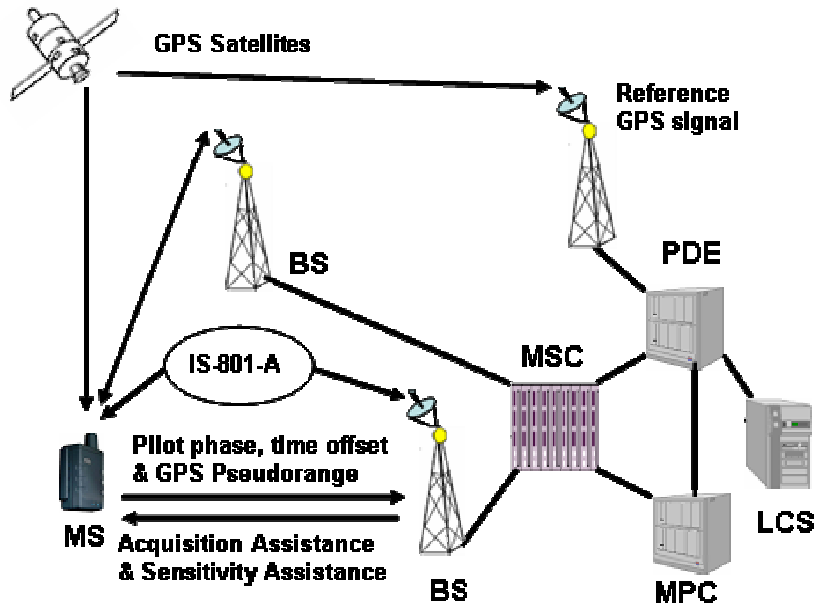
LCS: Location Service
MSC: Mobile Switching Center
MPD: Mobile Positioning Center
PDE: Position determination Entity
BS: Base Station

GpsOne system architecture in control plan

Figure 1.2 : GPSOne system architecture in control plan

The AGT-100D contains not only a complete digital modulation and demodulation system for CDMA standards as specified in IS-95 A/B, IS-2000 but also gpsOne position location solution which offers wireless callers their location wherever and whenever they need it. The AGT-100D module fully provide Location Base Services throughout CDMA carrier with supported gps mode: MS Assisted mode, MS Based mode

2) Technical Details

The AGT-100D is a dual-band device that operates on both Code Division Multiple Access (CDMA) frequencies: cellular services at 800 MHz, and Personal Communication Services (PCS) at 1.9 GHz. CDMA technology uses a feature called DSSS (Direct Sequence Spread Spectrum) that enables the phone to keep communication from being crossed and to use one frequency channel by multiple users in the same specific area. This results in a 10-fold capacity increase when compared with analog mode. In addition, features such as soft / softer Handoff, hard Handoff, and dynamic RF power control technologies combine to reduce call interruptions. The Cellular and PCS CDMA networks consist of MSO (Mobile Switching Office), BSC (Base Station Controller), BTS (Base station Transmission System), and MS (Mobile Station). The following table lists some major CDMA standards.

Table 2.1 : CDMA Specification

CDMA standard	Descriptor	Description
Basic Air Interface	TIA/EIA-95A TSB-741 ANSI J-STD-008 TIA/EIA-IS2000	CDMA Dual-Mode Air Interface 14.4kbps radio link protocol and inter-band operations IS-95 adapted for PCS frequency band cdma2000 1XRTT Air Interface
Network	TIA/EIA/IS-634 TIA/EIA/IS/651 TIA/EIA/IS-41-C TIA/EIA/IS-124	MAS-BS PCSC-RS Intersystem operations Nom-signaling data comm.
Service	TIA/EIA/IS-96-B TIA/EIA/IS-99 TIA/EIA/IS-637 TIA/EIA/IS-657 IS-801	Speech CODEC Assign data and fax Short message service Packet data Position Determination Service (gpsOne)
Performance	TIA/EIA/IS-97 TIA/EIA/IS-98 ANSI J-STD-018 ANSI J-STD-019 TIA/EIA/IS-125	Cellular base station Cellular mobile station PCS personal station PCS base station Speech CODEC

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[1] Protocol between an IS-95A system and ANSI JSTD-008 1xRTT system receives twice as many subscribers in the wireless section as IS-95. Its battery life is twice as long as IS-95. High-speed data transmission is also possible.

3) H/W Specifications

3.1 Electrical

- Full TIA/EIA/IS-98D Compliance
- Operating Voltage: Battery 3.4 ~ 4.3v
- Max Output Power: 23dBm ~ 26dBm (200mW ~ 400mW)
- Current Consumption:
    - GPS MS-assisted mode: 350mA
    - GPS MS-base mode: 120 mA
    - CDMA Idle mode: 100mA
    - CDMA Traffic: 750mA max.
- Sensitivity: less than -104dBm
- Receive Frequency: 869.04 ~ 893.97 MHz
                          1931.25 ~ 1988.75 MHz
- Transmit Frequency: 824.04 ~ 848.97 MHz
                          1851.25 ~ 1908.75 MHz
- GPS Band: 1575.42 MHz, L1 Carrier
- Gps One® Service
- Battery: 1220mAh typ. LITHUM-POLYMER
    - Receive message and report case
        - 20 days(stand-by)
        - 3.5 hours(continuous tracking)
        - 9 days (Position fix and report to server every hour)
        - 7 days (Position fix and report to server every 30 minutes)
    - Deep Sleep and Report Only Mode
        - 68 Days (deep sleep)
        - 3.5 hours (continuous tracking)
        - 12 days (Position fix and report to server every hour)
        - 9 days (Position fix and report to server every 30 minutes)

3.2 Mechanical

- Dimension: 81mm x 47mm x 20.5mm
- Weight: 77.4g

3.3 Environmental

- Operating Temperature: -30 ~ +60°C without battery
                         -20 ~ +60°C with battery
- Storage Temperature: -40 ~ +80°C without battery
                       -30 ~ +70°C with battery
- Humidity(Operating): 5% ~ 95% no condensing @60°C

3.4 External Interface

- Serial cable
- External battery (Not currently available)

- Battery charger
- Power On/Off
- Power LED and Set LED
- Reset hole

3.5 Serial Interface

This module contains serial interface to provide an efficient interconnection between the mobile device and a personal computer (PC) in host mode.

Table 3.1 : Pin Description

Pin #	Name	Dir-Pol	Description
1	+5V	I	+5Vdc Input
2	TXD	O	Transmit Data. 3V TTL
3	RXD	I	Receive Data. 3V TTL
4	GND	GND	Ground