Hybrid Positioning and CellLocate - Increased Reliability and Indoor Positioning

Although GPS is a widespread technology, GPS positioning is not always possible, particularly in shielded environments such as indoors and enclosed park houses, or when a GPS jamming signal is present. The situation can be improved by augmenting GPS receiver data with mobile network cell attributes to provide a level of redundancy that can benefit numerous applications.

u-blox, through its in-house development of wireless transceiver modules, has embedded cellular positioning technology, CellLocate, into its LEON family of 2G and LISA family of 3G wireless modules. The technology enables stand-alone location estimation based on surrounding GSM cell information in conjunction with GPS positioning data to improve positioning in several use cases:

• GPS signals are blocked: a GPS receiver cannot determine a position when satellite signals are unavailable, such as within tunnels, buildings, or metallic containers. For fleet and supply chain management, this condition can be unacceptable. In this case a cell-based positioning system using GSM cell information can provide an estimated position. This is attractive for vehicle or container tracking applications where an approximate location of valuable assets is preferable to no position fix at all. This system is functional within warehouses, rail stations, airports and tunnels.

• GPS signals are jammed: GPS jamming devices are easily obtained for less than a hundred dollars. These devices can neutralize GPS receivers, and are often employed during vehicle theft. A backup cell-based system in this case acts as a secondary system, as GSM cell signals are available even when satellite signals are blocked by jamming. The GPS receiver can also add intelligence to the system as u-blox GPS receivers can detect when a jamming signal is present, putting the system into an “attempted theft” condition.

• Machine-to-Machine (M2M) applications: Many M2M applications require positioning capability within a bounded area such as within a city, along main vehicle or rail links, or within specific venues such as an exhibition, entertainment or healthcare facilities. Positioning reliability in these areas can be improved by using cellular signals as well as GPS to provide accurate positioning. Based on an extension of u-blox' AssistNow Online GPS assistance service, u-blox' CellLocate technology is used to match cellular positioning data coupled with previously successful GPS fixes.

This "learning" solution can be practical for M2M applications where units are repeatedly used in specific areas such as a taxi fleet in a city, or containers and palettes travelling between warehouses. In these cases a specific database of useful cell data is quickly generated and the service is able to reliably give the current position to the user.
The above scenarios exploit the combination of Cellular and GPS positioning data (Hybrid positioning) to deliver better results than GPS technology could accomplish alone:

• Positioning performance can be improved and extended to areas where GPS satellite signals are 100% blocked, especially within buildings
• Eliminate "no-fix" scenarios by providing at least an approximate fix wherever cell phone coverage is available
• Overcome GPS jamming scenarios to improve antitheft system performance

u-blox' CellLocate cellular positioning technology is an embedded feature implemented in u-blox LEON 2.5G and LISA 3G wireless modem families.

www.u-blox.com [1]

Links:
[1] http://www.u-blox.com