CellLocate™ and Hybrid positioning

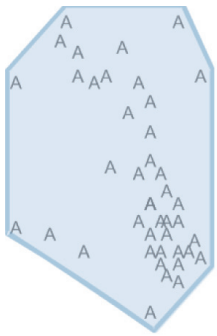
mobile network-based positioning

Increased reliability and indoor positioning based on mobile network information

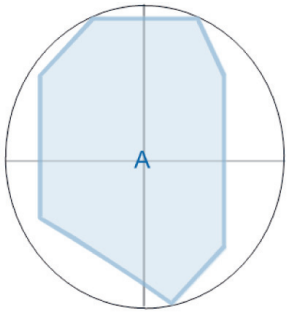
Although it is a widespread and very effective technology, Global Navigation Satellite System (GNSS) positioning is not always possible, particularly in challenging signal environments such as urban canyons, indoors, in enclosed park houses, or when GNSS jamming signals are present. Performance can be improved by complementing the GNSS receiver data with information from mobile network cells that can benefit numerous applications. u-blox, through its in-house development of wireless data modules and GNSS receivers, has developed and embedded a cellular positioning technology, CellLocate™, into its LEON family of GSM/GPRS and LISA family of W-CDMA wireless modules. This technology enables stand-alone location estimation based on surrounding mobile network information in conjunction with GNSS positioning data to improve positioning.

For any given location with wireless network coverage (GSM/GPRS and/or W-CDMA), a specific combination of wireless cells will be visible. The proprietary CellLocate feature allows u-blox GSM/GPRS and W-CDMA wireless modules to report to the CellLocate server those cells which are visibile at any specific location. This enables the server to estimate a coarse position on the basis of previous observations from other modules reporting the same cell visibility pattern, and this position is reported back to the module. The estimated position is then output by the module to the host processor via its serial port.

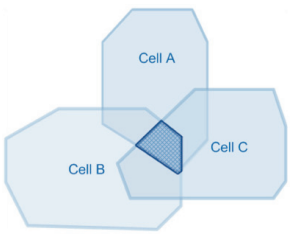
CellLocate database contains historic observations of cell A reported by several devices



CellLocate server defines area of cell visibility



New device observes cell A, position is estimated from the previous observations



Visibility of multiple cells provides even better coverage and accuracy

Cellular location

Wireless cells are widely available in urban and rural environments enabling the CellLocate service to provide a position estimate virtually everywhere and under any conditions.

The service is offered free of charge on a best effort basis and the performance depends on the density of network cells and database population. A self learning mechanism is implemented allowing continuous database improvement and update in order to increase performance over time and prevent database aging.

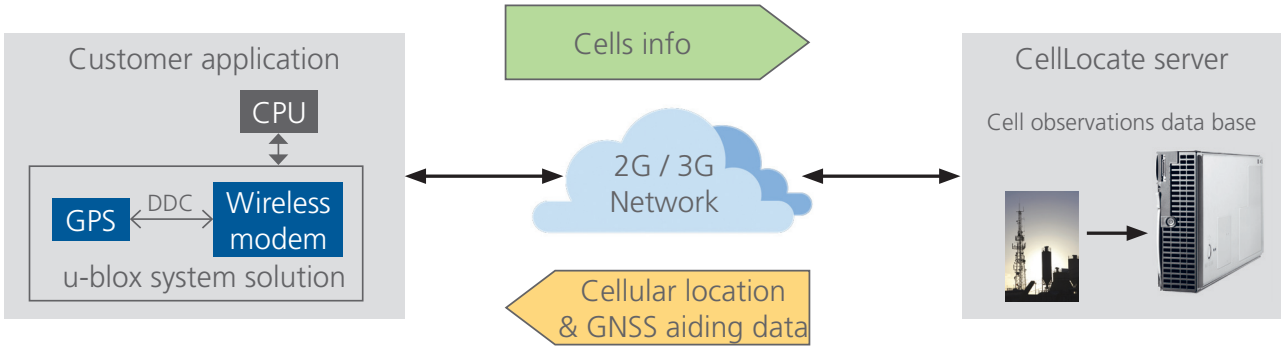
CellLocate and Hybrid positioning

CellLocate and Hybrid positioning are u-blox' end-to-end services for OEM customers and their end-users. These services enhance and complement stand-alone GNSS acquisition performance when u-blox wireless modules and GNSS modules or chips are used.

u-blox implementation provides a single AT command interface enabling full control of the GNSS receiver and cellular positioning functionality in order to maximize performance and virtually eliminate any "no position scenario". Through the single AT command interface it is possible to define all the positioning settings (cellular, stand-alone GNSS, GNSS aiding data) and enable the wireless module to optimize positioning performance. CellLocate and Hybrid services are fully integrated into u-blox wireless modules and work in parallel to normal module functionality.

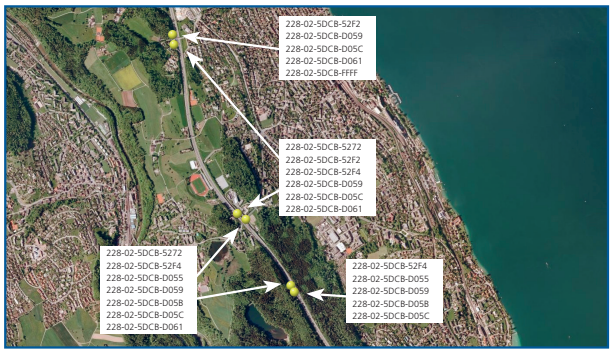
While stand-alone CellLocate is able to estimate position even when the GNSS signal is completely absent, hybrid positioning technology provides even better performance by using a combination of complementary positioning methods.

CellLocate and Hybrid positioning architecture



Benefits of CellLocate and Hybrid positioning

- Position available even in areas of poor or no GNSS
- Network operator independent
- Easy to integrate into end applications
- No additional hardware required
- Free best-effort service
- Supported by all u-blox GSM/GPRS and W-CDMA modules



CellLocate enabled devices	**LEON-G100 (from version 06 onwards)** **LISA-U1x0 (from version 01 onwards)** **LISA-U2x0 (from version 01 onwards)**
Supported network technologies	**GSM/GPRS** **W-CDMA**
GNSS aiding settings	**Stand-alone, AssistNow Online/Offline/Autonomous**
Data size *	**Uplink: 100-200 Bytes** **Downlink (position only): 150 Bytes** **Downlink (including GNSS aiding data): 1 - 3 kB**

(*) Data size depends on the number of visible cells and user selected GNSS aiding data

Ordering information

Please contact u-blox for more information.

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