Convergence of cellular communication and positioning in M2M

Thomas Nigg, VP Product Marketing
Intel M2M Day, November 12, 2012
u-blox at a glance

• **Swiss high technology company**
  • Founded in 1997
  • Listed on the SIX Swiss Exchange since 2007

• **Core competencies**
  • GPS, GLONASS, GALILEO, Compass and QZSS positioning technologies
  • GSM, UMTS, CDMA & LTE wireless communications technologies

• **Product offering**
  • GPS/GNSS chips and modules
  • Wireless modules
  • Positioning and wireless services, 4G protocol stack licensing

• **Business model**
  • Fabless operation
  • Commercial, off-the-shelf products
Key figures

Employee breakdown (June 2012)

- Research & development: 59%
- Sales, marketing, support: 28%
- Logistics, admin: 13%

65% of employees based outside Switzerland (spread over 10 countries)

373 employees total

Revenue history

- u-blox is profitable and cash-flow positive

* Note: official reporting in Swiss Francs
The significance of convergence

Products

Positioning

Wireless

Technology

AssistNow*
- Accelerated positioning

CellLocate*
- Indoor positioning
- Positioning based on cell attributes

Internet

Applications

Recreational devices, Vehicle navigation
Femtocells, Cellular base stations
Machine control, Marine

Fleet management*
Personal Navigation Devices *
In-vehicle navigation *
Location based services *
People & asset tracking *
Smart phones *
Radar detectors *

Automatic meter reading, Mobile Internet
Surveillance, Remote automation & control
Telehealth, Point-of-Sales terminals
Location not required in telemetry?

Location information more and more desired for security or efficiency …
Location Technologies: Satellite Positioning

• Several GNSS:
  • **GPS**: US GNSS with very high reliability for 20 years
  • **GLONASS**: Russian GNSS, full operation since 2011
  • **QZSS**: Japanese GPS augmentation system
  • **Beidou**: Chinese GNSS. Specification not yet public
  • **Galileo**: European GNSS. 4 satellites available
  • Deployment of new GNSS is politically motivated:
    • Primary target is independence from US DoD

• Satellite positioning:
  • Worldwide available
  • Outdoor accuracy in meter level
  • Limited indoor coverage
  • Continuous or intermittent operation
Location Technologies: CellLocate

- Cell tower visibility is mapped using crowd sourcing
- New position is determined by matching observed cell towers against data base

CellLocate
- Available worldwide
- Independent from network operators
- Works indoors and outdoors
- Typ. accuracy of 100 … 1000m
- Intermittent operation
CellLocate - Learning from the cloud …

Step 1: Historic observations of cell A are reported and locations stored on CellLocate server.

Step 2: CellLocate server defines area of cell visibility (Geofence).

Step 3: New device observes cell A. The device is probably around …

Visibility of multiple cells: even better coverage and accuracy.
CellLocate: Positioning even without GPS

1. WL module reports parameters of visible cells to server
   - Normal scan: serving cell + home network neighbor cells
   - Extended scan: also neighbor cells of other operators are reported
     - WL module keep on being connected to the network
2. CellLocate server calculates position
3. Position reported back to WL module
CellLocate Performance

Accuracy depends on
• algorithms and
• database quality
CellLocate advantages

• Position available even in areas of poor or no GNSS
• Adds location awareness to all cellular devices
• No additional hardware required
• Free best-effort service
• Network operator independent
• Crowd-sourcing keeps database up-to-date despite changes in networks
Hybrid Positioning

- GNSS is fast and accurate but …
  - GNSS does not work indoors,
  - Can be jammed
- CellLocate works indoors and outdoors but …
  - Does not achieve GNSS accuracy
  - Works only within cellular coverage
- Hybrid positioning is the answer …
  - 100% availability
  - Position is derived from optimal source

*) Dead Reckoning augments GNSS in areas of no or limited reception with sensor data from the car, typically from the CAN bus.
Synergies between cellular communication and positioning

- **Ease-of-use:**
  - Full access to GNSS receiver via wireless module
- **Performance**
  - AssistNow, CellLocate and Hybrid Positioning
- **Lower costs:**
  - Resource sharing leading to reduced GNSS BOM
u-blox product portfolio: modular and scalable

**GNSS**
- Form factor roadmap
- GPS, GLONASS, QZSS, Galileo, Beidou & SBAS
- Pin compatibility between GNSS and Dead Reckoning solutions
- Available as chip or module
- Available in standard and automotive grades

**Wireless Modem**
- Form factor roadmap
- Layout & software compatibility between u-blox wireless modules
- Free CellLocate and AssistNow services
- eCall support
- Available in standard and automotive grades
Easy migration between form factor

• Various modules can be alternatively mounted on same board space:
  • One board for GSM, WCDMA, CDMA and LTE

• Advantages
  • Optimal solution for cost, size and wireless technology
  • Easy migration between wireless technologies and module generations
Why customers choose u-blox

• **Dependable**
  - Financially stable company: solid, profitable 15 year history
  - Low risk and fast time-to-market: software and form factor compatibility roadmap

• **Proven technology**
  - Established supplier to market leaders: over 3500 customers worldwide
  - Chip and module approach addresses any project type
  - Outstanding performance and tight integration of positioning and wireless technologies

• **Highest quality throughout entire product life cycle**
  - ISO 9001 & ISO TS 16949 certified processes
  - End-to-end control over the entire manufacturing chain
  - Structured life cycle management
  - Dedication to automotive grade products

© u-blox AG
locate, communicate, accelerate

Thank you!