Mobile Positioning in GSM Networks

Description: No attribute is more distinguishing and valuable to mobile network operators and their constituents (customers, suppliers, and investors) than customer location information. Location-based Services (LBS) are predicted to finally take off beginning in late 2005 to early 2006. Many people do not understand the underlying technologies necessary to position mobile cellular phones in GSM networks. This publication provides the user with an easy to understand, presentation that includes detailed notes (Notes View of PPT document) to facilitate understanding of mobile positioning systems for GSM. The publication includes illustrations of standard GSM architectures including the GMLC, SMLC, and LMU and discussion of positioning functionalities.

Target Audience

- Anyone desiring more illustrations and description of GSM positioning architectures and functions.
- Anyone tasked with understanding and/or teaching GSM positioning.

Contents: Introduction to Positioning
- Quality of Service
- LCS Procedures
- General Network Procedures
- GSM Positioning Methods
- 3G Positioning Methods

LCS Architecture
- Logical Reference Model
- Generic LCS Logical Architecture
- GSM LCS Reference Model
- GERAN/UTRAN Architecture
- Functional LCS Architecture in GERAN
- UTRAN Positioning Architecture
- External LCS Client
- Gateway Mobile Location Center (GMLC)
- Serving Mobile Location Center (SMLC)
- Location Measurement Unit (LMU)
- Service Control Function (gsmSCF)

Positioning Methods Overview
- UE-based vs. UE-assisted
- Cell ID and TA/RTT
- Time of Arrival Methods
- Angle of Arrival Methods
- Hybrid Methods: E-OTD
- Global Positioning System
- Summary and Evaluation of Methods

Security and Privacy
- Security
- Privacy
- MS Privacy Options
- Privacy Override Indicator (POI)
- LCS Subscription Data
- LCS Client Data
- Special Cases: Emergency Services
- Special Cases: Lawful Intercept

LCS Network Infrastructure
Network Element Function
- GMLC
- SMLC
- LMU
- gsmSCF
- HLR
- MSC/VLR
- BSC
- BTS
- LMU Type A
- LMU Type B

Network Element Interfaces
- Le
- Lc
- Lg
- Lh
- Ls
- Lp
- Lb
- A
- Abis
- Um

Cell ID
- MS/UE States
- CGI, LAI, SAI, URA
- Differences in Cell ID GSM vs. UMTS
- UE in Soft-handover (WCDMA)

Cell ID Procedures
- TA Positioning Procedures for NSS SMLC
- TA Positioning for BSS SMLC

E-OTD/OTDOA
- Analysis of DL-TDOA
- OTD, RTD, and GTD
- Hyperbolic Type Location
- Idle Period Downlink (IPDL)

E-OTD/OTDOA Procedures
- Positioning of BSS SMLC
- Positioning of NSS SMLC
- Assistance Data Delivery from BSS SMLC
- Assistance Data Delivery from NSS SMLC

A-GPS
- Introduction to GPS – DGPS
- GPS Navigational Signal GPS vs. A-GPS
- Assistance Data in GPS
- A-GPS Procedure
- UE-based/UE-assisted A-GPS
- Other Satellite-based Positioning Systems

Emergency Services
- GSM NA – FCC E-911
- Phase II
- J-STD-036-A
- GSM CGALIES
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