

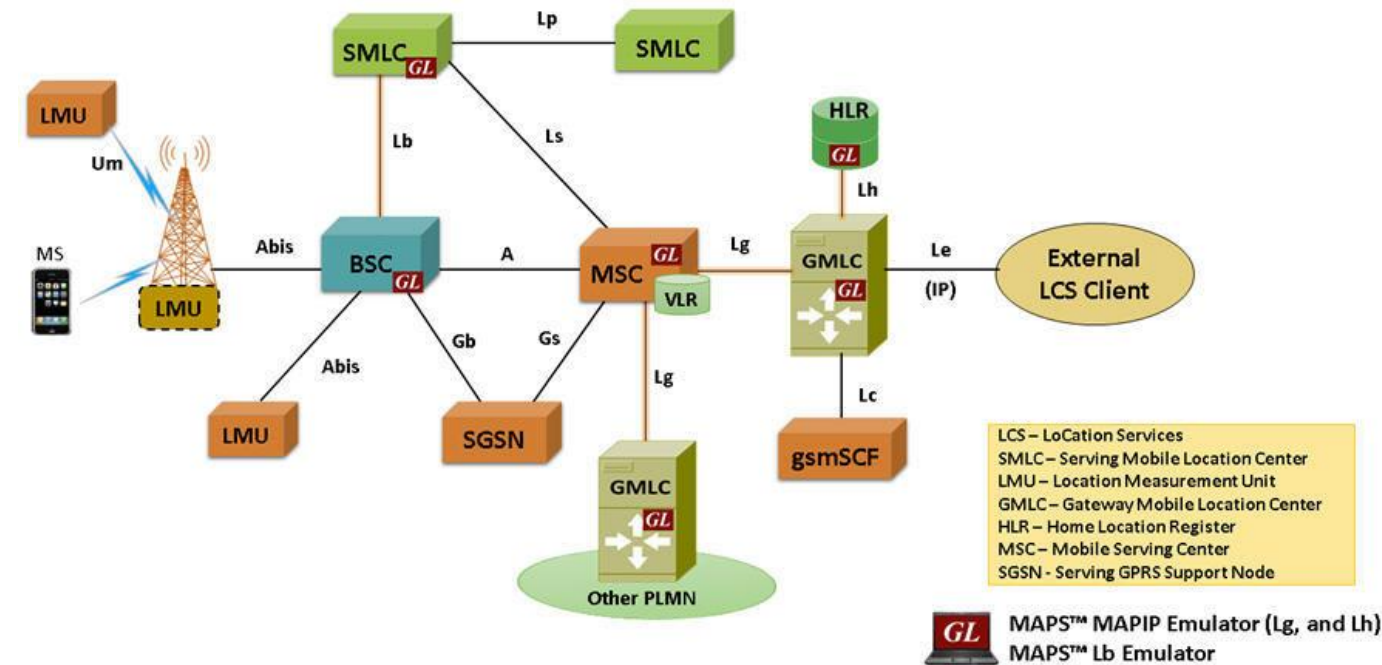
Simulation of Location Based Services in GSM Network

As depicted in the main diagram above, some of the important interfaces participating in the location request and response in the GSM network are:

- ❖ Lb interface – The BSC is accessible to the SMLC via the Lb interface
- ❖ Ls interface - The MSC/VLR is accessible to the SMLC via the Ls interface
- ❖ Lg interface - The MSC/VLR and SGSN is accessible to the GMLC via the Lg interface
- ❖ Lh interface - The HLR is accessible to the GMLC via the Lh interface
- ❖ Le interface - Interface between GMLC and LCS clients

The standard positioning methods used in GSM network are:

- ❖ Cell Global Identification (CGI) (network based)
- ❖ Uplink Time Difference of Arrival (U-TDOA) (network based)
- ❖ A-GNSS (handset based)
- ❖ Enhanced Observed Time Difference (E-OTD) (handset based)



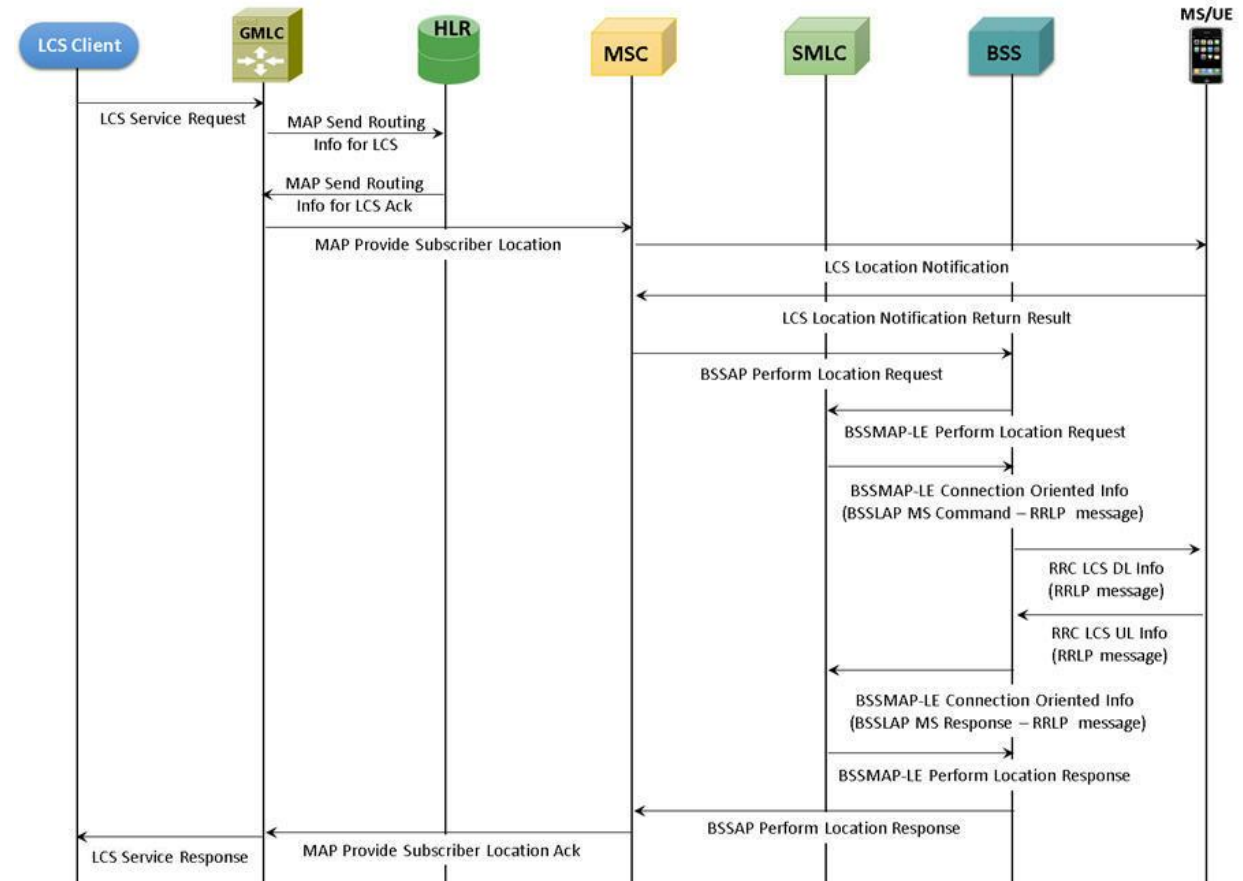
Simulation of Location Based Services in GSM Network

GL's MAPS™ LCS test suite comprises of multiple products working in tandem to support simulation of end-to-end location based services in GSM, UMTS, and LTE networks.

Specifically, to test location services in GSM network, GL's MAPS™ MAP IP signalling emulator is enhanced to simulate LCS procedures over Lg and Lh interfaces using MAP signalling protocol. MS initiated Location Report Procedure is supported over Lg Interface between GMLC and MSC and network initiated Location Retrieval Procedure is supported over Lh Interface between GMLC and HLR.

Further, the MAPS™ Lb interface emulator supports Location Service Request procedure over Lb interface between BSC and SMLC using BSSMAP-LE signalling protocol.

Typical call flow simulation of location based service messages by MAPS™ is as shown in the figure.



MAPS™ LCS Test Suite for GSM

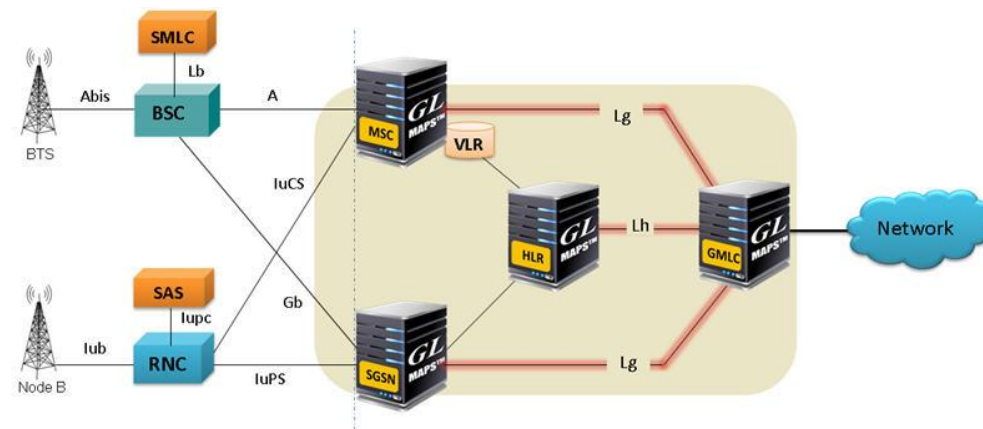
Lg, Lh Interfaces

MAPS™ MAP IP supports testing LCS functionality between SGSN/MSC and GMLC network elements within UMTS network. The Lg, Lh Interface enable LCS in the GPRS/UMTS to provide support for specialized mobile location services for operators, subscribers, and third party service providers. Both LCS server and LCS client simulation are supported Lg, Lh Interface.

Lb Interface (GSM Network)

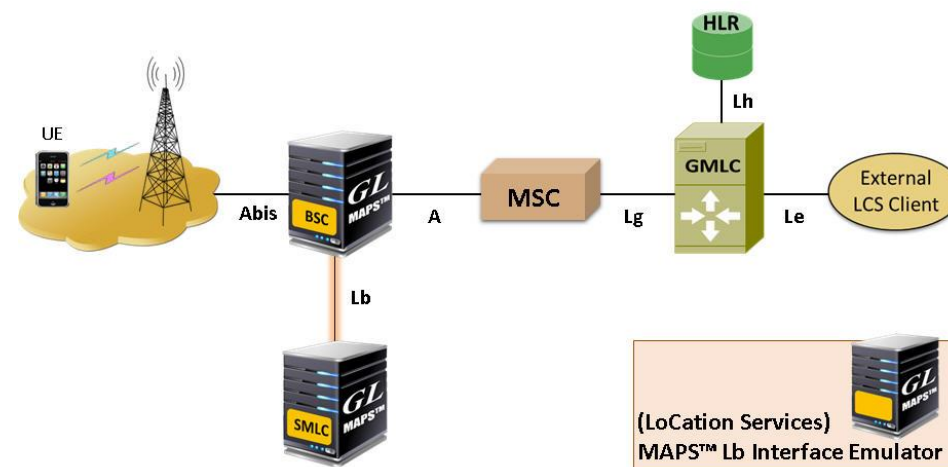
MAPS™ Lb interface emulator can simulate LCS positioning procedures over GSM Lb interface by simulating SMLC (Serving Mobile Location Center) and BSC (Base Station Center) network elements.

MAPS™ Lb supports BSSMAP-LE message exchange between BSS and SMLC as per 3GPP TS 49.031 specification. The Lb interface, is transparent to all UE related and LMU (Location Measurement Utility) related positioning procedures.



Lg and Lh LCS Interfaces Simulation
MAPS™ MAP (Mobile Application Part)

SMLC – Serving Mobile Location Center
GMLC – Gateway Mobile Location Center
SAS – Stand Alone SMLC



(LoCation Services)
MAPS™ Lb Interface Emulator