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Title: Location services for UMTS  
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## 1. Introduction

Location technology in UMTS will enable important new location dependent services (eg. location dependent billing, emergency service location) and hence important new revenue streams. In addition, location technology can be used to enhance the system operation of UMTS (eg. location assisted handover).

Key factors in successfully deploying location services (LCS) include:

- location fix accuracies and user delays attainable; and
- location equipment infrastructure costs.

The provision of location services which will be of use in emergency situations requires low location fix user delays (typically around 1 second) and sufficient accuracy. Work on LCS in TSG RAN assumes location services should be synergistic between GSM (following the work being carried out in T1P1) and UMTS. Such synergy will be important if seamless location services are to be provided with inter-system and inter-regional roaming. Thus, the FCC requirements for location service accuracy provide an important initial basis for ongoing work in 3GPP.

Deployers of UMTS networks will face excessive economic burdens if high densities of location enabling equipment are required in the access and core networks. Solutions which mitigate against high network cost deltas will be extremely attractive in the roll-out of new location service enabled UMTS networks.

TSG RAN is making good progress in specifying requirements for the assisted GPS method for location services in UMTS. Layer 1 requirements for Release '99 have already been approved in RAN WG1 [1] and TS 25.305 is being developed in RAN WG2 [2].

The attached paper, recently discussed by T1P1, highlights some of these issues. It is suggested that all work on LCS now be transferred to 3GPP without delay so that appropriate decisions are made on technology and architecture.

**TITLE:**       **Proposal for a Wireless Assisted GPS That Does Not Require Location Measurement Units (LMUs) and Improves Service Availability**

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**ABSTRACT:**       This contribution proposes the authors' request for changes to GSM LCS baseline text in the area of wireless-assisted GPS in order to support as options: a) sensitivity assistance; and b) LMU-less architectures.

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## Support for an LMU-less LCS Architecture Option

Commercial Location Services and technologies are in their infancy, and so it is desirable that the T1P1.5 LCS SWG provide appropriate flexibility for carriers, vendors and subscribers to benefit from technologies that balance performance and economics. As presently drafted, GSM LCS standards *require* deployment of LMUs as a *prerequisite* for deployment of GPS-based positioning methods. This places a great economic burden on carriers as they proceed with scaled introductions of Location Services.

The authors recommend that the T1P1.5 LCS SWG support an LMU-less architecture option. The authors recognize that there are technical consequences as concerns time stamping. The authors note that recent submissions detail one possible alternative [1,2]. The authors do not recommend one specific method over another. However, we urge T1P1.5 LCS SWG to consider these and any related technical submissions in support of an LMU-less LCS architecture option.

## Support for Sensitivity-Assistance

Further, as commercial Location Services are undergoing rapid definition and evolution, it is desirable that the T1P1.5 LCS SWG take appropriate and reasonable steps to ensure that the best performing technology is made available to the GSM community. It has been demonstrated theoretically and empirically that sensitivity plays a key role in the overall performance of GPS-based positioning methods.

The authors recommend that the T1P1.5 LCS SWG adopt the proposed optional sensitivity-assistance message as discussed in several recent submissions [3-5].

## References

- [1] T1P1.5/99-225r2. Time Recovery via Pattern Match Technology.
- [2] T1P1.5/99-288r1. Proposal for a Software-Based Time Stamping Method for GPS That Does Not Require Location Measurement Units (LMUs).
- [3] T1P1.5/99-551r0. Sensitivity Assistance for Enhanced GPS Availability.
- [4] T1P1.5/99-823r0. Proposed Changes to GSM 04.31 (for Sensitivity Assistance).
- [5] T1P1.5/99-824r0. Proposed Changes to GSM 09.31 (for Sensitivity Assistance).