## 7.2.1 Integrating Location Services and Embedded Road Network Data with Linear Referencing Systems on Smart Mobile Devices

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Linear Referencing System (LRS) is a cornerstone of transportation GIS. Although the majority of mainstream smart mobile devices support mapping and Location Services, they do not have built-in LRS data and functions. Historically, mobile devices were lacking storage capacity, processing power and network bandwidth that can deal appropriately with the size of LRS data. Recent progress and innovation in hardware technology have made it possible for mobile devices to store, manipulate, and display LRS data locally.

Traditional method of using LRS on a mobile device is through conventional Client and Server architecture. Computationally intensive tasks are performed on the server, which sends the result to mobile clients via network connection. This approach has two distinct disadvantages: Poor system scalability and inability to function when network connectivity is limited or non-existent. Reliance on server makes scalability accommodation potentially very costly, while requirement on network availability will render the system unusable in the field where wireless signal is weak or non-existent.
While convenient, built-in Location Services of mobile devices tend to lack the accuracy and consistency of dedicated GPS devices. The results of those Location Services alone are often not adequate enough to be used with LRS data.

This paper describes how to embed a LRS on mobile device that can function without reliance on server. It also introduces some techniques to use the built-in Location Services in conjunction with LRS data. As an example, the state road network data is embedded on mobile devices to assist the field data collection for the Traffic Monitoring System (TMS) of New Jersey Department of Transportation.