Urban Positioning, Navigation, and Timing (PNT) Infrastructure for Smart Cities

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The PNT services are crucial infrastructure for economic development. The continuous availability of the GNSS means that a wide variety of sectors and industries rely on it, such as transportation (unmanned aerial systems and intelligent transportation systems), emergency services, electric power grids, cellular communications, agriculture, finance (stock exchange systems), government and various global/regional/national infrastructures that use geodetic features.

On the other hand, in a city level, GNSS coverage is significantly reduced, due to the fact that GNSS signals are blocked by buildings and most of human activities are in indoor environment where GNSS will not work. Moreover, GNSS signals are easy to be jammed. Therefore there is urgent need to develop an integrated urban PNT infrastructure to satisfy various applications, as diversified applications have different requirements.

In this presentation, the concept of resilient PNT services will be introduced and some recent development on seamless positioning technologies will be reported. Multiple GNSS constellations developed in recent years have significantly improved the coverage of GNSS services in urban areas. A new DGNSS service is introduced for mobilephone users which increase the positioning accuracy from 5-10 m to 2 m. Smart lamppost concept is also proposed to provide another layer of positioning infrastructure for seamless positioning in Hong Kong.

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