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Studies on Navigational Satellite Visibility and Signal Strength of Different GNSS Sensor

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Abstract:
This paper investigates the performance of multi-GNSS systems using Android smartphones. By comparing signal strength (SNR) and satellite availability across different devices and constellations (GPS, GLONASS, Galileo, BeiDou, and QZSS), the study highlights the capability of smartphones in capturing high-quality GNSS signals. Results show that modern smartphones, particularly those with single/dual-frequency GNSS chipsets, track nearly 50 satellites simultaneously, with BeiDou and GPS generally offering the strongest signals. Additionally, smartphone GNSS sensors demonstrated signal strength values closely matching those of high-grade receivers, underscoring their growing reliability for precise positioning in various applications.

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I. Introduction

Global Navigation Satellite System (GNSS) is a widely used geolocation technology that provides precise, global solutions for military and civilian applications. Multi-GNSS systems, utilizing signals from multiple satellite constellations, calculate Position, Velocity, and Time (PVT) with high accuracy. Since the 1980s, various constellations have been developed, with t lar. Other global systems include Russia's GLONASS, Europe's Galileo, and China's BeiDou. Regional systems like India's IRNSS/NavIC and Japan's QZSS offer localized coverage [1]–[5]. In addition to GNSS, many countries have developed Satellite-

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