

Optimal Design of GNSS Satellite Link Emulator Architecture and Adaptive Channel Calibration Algorithm

Li Pengpeng

Satellite Navigation and Positioning R&D Center, School of Electronic Science and Engineering, National
Univ. of Defense Technology, Changsha, China

lipp0808@163.com

Abstract: This paper improve GNSS satellite link emulator architecture. It through analysis the disadvantage of traditional satellite link emulator architecture, this paper presents an new architecture, that is, direct RF sampling. and the performance of satellite link emulator significantly improved. Relative to the traditional architecture, the new ideal innovation that direct RF sampling , self-calibration for both analog local-oscillator(LO) frequency-drift and RF channel non-ideal characteristics . The simulation and experimental results show that, it has obvious advantages. This article analyzed the traditional architecture would introduce errors into the amount of Doppler shift, targeted proposed a method to improve the design, that contains direct RF sampling and channel self-calibrating architecture. Based on the new system architecture it proposed a set of adaptive channel self-calibration algorithm. Derived by the model, simulation and experimental verification, the new architecture of satellite link emulator and the adaptive channel self-calibration algorithm, which solves the problems of the traditional architecture effectively, while effectively enhance the adjustment accuracy for delay and frequency resolution of satellite link emulator.

Keywords: satellite link emulator; direct RF sampling; adaptive channel self-calibration