短文与研究通讯

多频GNSS射频采样接收机设计与实现

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摘要：

针对多频GNSS接收机采用模拟射频前端存在的缺陷，研究基于直接射频采样技术的多频GNSS接收机设计与实现。根据当前公开导航频段，设计了一种可配置、可兼容的前端数字信号处理结构，将模数转换器件紧接在天线后端，直接在射频域对导航信号进行数字化，射频以下的所有处理功能全部采用软件模块来实现，使接收机通过参数设置就可以兼容多种导航系统。对采样频率选择、本振频率选择、抽取滤波等关键技术进行了分析，基于可编程片上系统平台给出一种射频采样GNSS接收机的实现方案，分析了其中各功能模块的实现框图与工作流程，通过测试给出接收机的性能指标。

关键词： 多频GNSS接收机；直接射频采样；可编程片上系统

Design and Implementation of Multi-Frequency GNSS Receiver Using Direct RF Sampling

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Abstract:

Multi-Frequency GNSS receiver using direct RF sampling is designed and implemented to solve defects existing in analog RF front-end, which places the analog digital convertor behind the antenna to digitize the signal in RF domain leaving the rest of signal processing implemented in software module. This special receiver could be adapted to GNSS signal from different navigation system by simply parameter setting and is very convenient for upgrading and updating. Multi-frequency front end is designed to accommodate the public navigation bands. The key techniques is analyzed in detail including sampling frequency design, local oscillator selection, decimate and filtering. The receiver architecture is presented based on SoPC (System on Programmable Chip). The implementation diagrams and sequences of function modules are analyzed. Test using GNSS simulator is operated to evaluate the performance of this new receiver.

Keywords: Multi-frequency GNSS receiver　direct RF sampling　System on a Programmable Chip

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