

Development of Cognitive Software Receivers for the Multi-GNSS Satellite

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INTRODUCTION

Along with the launch of several kinds of GNSS satellites, the multi-GNSS age has already arrived. We are developing a software GNSS receiver which automatically switches the receiving parameters for the corresponding GNSS satellites. We succeeded in the implementation of the code acquisition of GPS, MSAS and E1B signal emitting from GIOVE-A of the Galileo Satellite. Usually it takes more time to acquire E1B signal than GPS's. We mainly investigated how to shorten the acquisition on GIOVE-A in this paper. We succeeded in shortening of acquisition on GIOVE-A. But, this method depends on SNR. To develop this method, we would pay careful attention on the acquisition correlated value. We expect that this methods apply for any kinds of GNSS satellites.

Current development status

Fig 1(a) and 1(b) shows the acquisition results of GPS signal and E1B signal, respectively. In our software, we mainly work in the frequency domain. It takes more time to process GIOVE-A data acquisition than GPS's one because GIOVE-A's and GPS's step numbers are 81 and 21 respectively.

Solution

The problems for acquisition of E1B signals are the following things.

- (1) Correlation steps should be 81 because frequency resolution is 250 Hz..
- (2) Because data length is 4 ms, we must deal with DFT of data of 4 ms to detect of the correlation value. And we should search the peak in this data length.

To improve this problem, we decide the input data period as 2 ms and circulate the local signal in the period of every 2 ms . We show about the result of correlation for 2ms to figure 2.

Conclusion

We have succeeded in the acquisition of GPS and GIOVE-A E1B signals and in the tracking of GIOVE-A E1B signals for 2ms shortened calculation process in this experiments. After the maintenance of Galileo, it will be possible that this experiment will be into our main theme for software GNSS receiver. Next challenge will be more shorting calculation time and to improve software to real time.

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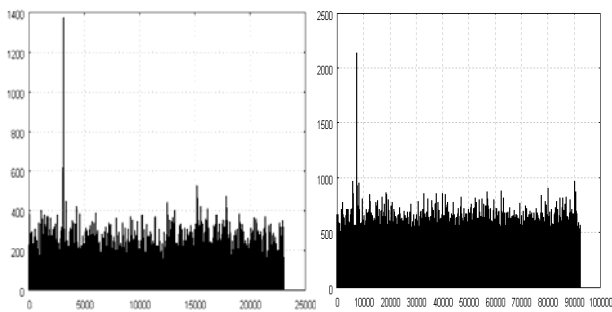


Fig 1(a) GPS acquisition Fig 1(b) Galileo acquisition

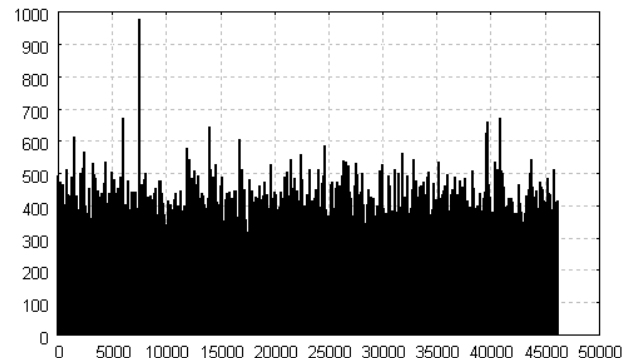


Figure 2 Galileo acquisition(2ms)