A multi-channel real-time GNSS software receiver using a general purpose graphics processing unit

\# Thomas Hobiger[1]; Tadahiro Gotoh[1]; Jun Amagai[2]; Yasuhiro Koyama[1]; Tetsuro Kondo[3]

[1] NICT; [2] KSP, CRL; [3] KSRC,NICT

GPS/GNSS software radios have become an attractive and cheap alternative to hardware receivers. Such software implementations can be easily adopted to handle new GNSS signals and allow for rapid testing of new algorithms. Although modern CPUs are more and more evolving to multi-core processors, the performance from a single chip is usually not sufficient to fulfill the needs of real-time GNSS tracking. On the other hand, Graphic Processing Units (GPUs) have undergone a tremendous development in the recent years and deployed electronic components have become powerful parallel systems which can be utilized for a variety of applications. We have utilized this parallel computing power and implemented a real-time GNSS software receiver running on an off-the-shelf graphics board, using digitized GNSS IF signals with a bandwidth up to 32 MHz. We are going to present details of this project, a comparison between XF and FX strategies for the correlation engines as well as advantages and caveats of the GPU implementation. Moreover, we are going to discuss about possible fields of application and we are trying to give an outlook on future GNSS software receiver developments.