A development of software defined FMCW ionosonde based on the GNU Radio

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NICT's portable and low-power FMCW (Frequency Modulated Continuous Wave) ionosonde system has been under operation for over 10 years at 5 sites in 4 countries in Southeast Asia: Chiang Mai and Chumphon (Thailand), Kototabang (Indonesia), Bac Lieu (Vietnam) and Cebu (Philippines). This ionospheric observation network, called as the Southeast Asia Low-latitude Ionospheric Network (SEALION), has basically been operated remotely via the internet. However, because of system deterioration and frequent lightning damages in Southeast Asia monsoonal region, it becomes difficult to maintain the system and keep observations. In addition, supply of some of important ICs, such as the FPGA embedded in FMCW ionosonde, will be stopped in the near future. The development of a new ionosonde system is necessary to improve the SEALION. We have started developing a GNU Radio based software defined FMCW ionosonde system using the Ettus Research USRP X300 as a software defined radio (SDR) platform. The additional frontend unit is also necessary to keep using peripheral units of current FMCW ionosonde system.

As for the receiving system, we have successfully gotten ionograms using the transmitting system of current FMCW ionosonde and the Ettus Research USRP X210 in place of X300. In this presentation, we will present the progress of the system designing and development of the software defined FMCW ionosonde system.