

On the Spectral Analysis of Discrete-Time Faster-Than-Nyquist Signaling

Sangwoon Kwak, Joungeil Yun, Hyoungsoo Lim and Namho Hur

*Department of Broadcasting System Research,
Electronics and Telecommunications Research Institute
Daejeon, 34129, South Korea*

s.kwak@etri.re.kr, sigipus@etri.re.kr, lim@etri.re.kr, namho@etri.re.kr

Abstract—The main purpose of the FTN signaling is to increase data rate without using additional bandwidth or transmission power. To analyze system characteristics of the FTN-based system, such as system capacity, there have been some studies on the power spectral density (PSD) of the FTN signaling. The present study analyzes the PSD characteristics of a discrete-time model of the FTN signaling, and compares it to those of the existing work. From the analysis, we obtain the following meaningful observations: a certain relation between the truncation of the FTN data spectrum and the optimal choice of the FTN factor in terms of achieving the highest system capacity, and a possibility to reduce the down-sampling rate of the receivers to avoid aliasing when the bandwidth of the transmission pulse is less than the symbol rate.

Keyword—FTN signaling, Discrete-time systems, Spectral analysis



Sangwoon Kwak received the B.S. degrees from Yonsei University, Seoul, Korea, and the M.S. degrees from Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea all in electronic and electrical engineering in 2012 and 2014, respectively. He has been with Electronics and Telecommunications Research Institute (ETRI), since 2014. He is currently a research in Media Transmission Research Group, Broadcasting-Media Research Laboratory.

His research activities are in the area of digital broadcasting system and communication technology which includes Faster-Than-Nyquist signaling, interference cancellation and iterative decoding.