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A PAR SELF-CANCELLATION METHOD FOR MULTI-CARRIER OFDM SIGNALING IN SATELLITE MOBILE COMMUNICATION SYSTEM

Abstract

A multi-carrier OFDM signaling scheme is commonly featured with a higher spectrum utility and a larger channel capacity, which becomes more important to satellite application considering a gradually rarer frequency resource limitation and increasingly higher data transmitting rate requirement to various satellite fixed and mobile communication and broadcasting services.

It is known that the multi-carrier OFDM system is extremely sensitive to a higher PAR [Peak to Average (power) Ratio], especially a PAR of over 30dB in the case of over 2,000 multi-carrier modulated in satellite mobile communication system, which would deteriorate the system transmitting performance. As the multi-carrier OFDM signals may be retransmitted by telecommunication satellite as well as amplified by TWTAs on-board, it is required that the amplifier should be provided with a much wider linear range against such higher PAR, However, TWTA with wider linear range will depress efficiency itself. Thus, it has to perform a back-off adjustment to the TWTA output; nevertheless, overmuch back-off may decrease the power distributed to multi-carrier.

As the PAR value always fluctuates along with the carrier number (N). Normally, PAR falls as N reduces. This paper will study a novel self-cancellation method by using group truncated coding algorithm to solve the problems of high PAR and overmuch back-off. Above all, an introduction to the group truncated coding algorithm will be presented and studied in this paper, the newly proposed method will analyze the power distribution among multi-carrier OFDM signal, and then pick up those codes whose peak power is largest (maximum PAR value), afterwards, those codes will be truncated and coded into several groups, each group of codes would decrease the PAR value as carrier number reduces. For the case of larger N situation, such as N=2,048 in DVB-S2 broadcasting system, those codes need to be truncated and coded into cascading groups, each group consists of several subgroup by implementing identical group truncated coding algorithm. Finally, this paper performs a simulating evaluation by modeling a typical 36MHz C-band TWTA, variable N (N=256, 512, 1024, 2048), as well as diverse back-off situation. The simulating result will present an analysis on the relation between the group truncated coding and the back-off value for each case of N.

This paper work is a further study upon one last paper on 64th IAC 2013. As the PAR problem is generally regarded as one important issue, the proposed method in this paper would help to solve such problem.