The User-Irrepressibility of CRT-based Sequences

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Abstract

As the ultra-reliability and low-latency are essential requirements for grant-free access, in this talk we revisit the Chinese reminder theorem (CRT) based sequences, which are binary and periodic sequences used for deterministic multiple-access without feedback. Some CRT-based sequences are proved to have user-irrepressible (UI) property, which means they are able to provide a hard guarantee that each user has a successful transmission within a fixed period of time. In this talk, we investigate the sequence structures of such a CRT-based construction in more detail. We characterize the cross-correlation function between one sequence and a set of other sequences by the help of rainbow matchings in graph theory, provide a general sufficient condition of UI property under CRT-based construction, and show the obtained sufficient condition is necessary in some cases. We also provide an example to claim that our approach is a potential way to find UI sequences with a shorter common period. Finally, the reliability issue is concerned in the case when the UI property is not guaranteed.

Keywords: CRT sequences, user-irrepressible, URLLC

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