

We consider a downlink multi-cell multiple-input multiple-output (MIMO) interference broadcast channel (IBC) using orthogonal frequency division multiplexing (OFDM) with multiple users contending for space-frequency resources in a given scheduling instant. The problem is to design precoders efficiently to minimize the number of backlogged packets queuing in the coordinating base stations (BSs). Conventionally, the queue weighted sum rate maximization (Q-WSRM) formulation with the number of backlogged packets as the corresponding weights is used to design the precoders. In contrast, we propose joint space-frequency resource allocation (JSFRA) formulation, in which the precoders are designed jointly across the space-frequency resources for all users by minimizing the total number of backlogged packets in each transmission instant, thereby performing user scheduling implicitly. Since the problem is nonconvex, we use the combination of successive convex approximation (SCA) and alternating optimization (AO) to handle nonconvex constraints in the JSFRA formulation. In the first method, we approximate the signal-to-interference-plus-noise ratio (SINR) by convex relaxations, while in the second approach, the equivalence between the SINR and the mean squared error (MSE) is exploited. We then discuss the distributed approaches for the centralized algorithms using primal decomposition and alternating directions method of multipliers. Finally, we propose a more practical iterative precoder design by solving the Karush-Kuhn-Tucker expressions for the MSE reformulation that requires minimal information exchange for each update. Numerical results are used to compare the proposed algorithms to the existing solutions.