

We consider the problem of distributed binary hypothesis testing in a parallel network topology where sensors independently observe some phenomenon and send a finite rate summary of their observations to a fusion center for the final decision. We explicitly consider a scenario under which (integer) rate messages are sent over an error free multiple-access channel, modeled by a sum rate constraint at the fusion center. This problem was previously studied by Chamberland and Veeravalli, who provided sufficient conditions for the optimality of one bit sensor messages. Their result is, however, crucially dependent on the feasibility of having as many one bit sensors as the (integer) sum rate constraint of the multiple access channel, an assumption that can often not be satisfied in practice. This prompts us to consider the case of an a priori limited number of sensors, and we provide sufficient condition under which having no two sensors with rate difference more than one bit, so-called rate balancing, is an optimal strategy with respect to the Bhattacharyya distance between the hypotheses at the input to the fusion center. We further discuss explicit observation models under which these sufficient conditions are satisfied.