

Joint Power Allocation and Network Slicing in an Open RAN System

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Abstract—

Index Terms—

I. SYSTEM MODEL AND PROBLEM FORMULATION

In this section, we consider the downlink of an ORAN system consisting of V services served by an enterprise deploying S slices. We denote $v \in \{1, 2, \dots, V\}$ and $s \in \{1, 2, \dots, S\}$ the set of services and slices, respectively. Each service v , contains U_v single-antenna UEs. Moreover, each slice s , consists of R_s multi-antenna RUs, which contains M antennas, K_s physical resource blocks (PRBs), one DU and one CU. Each DU and CU consist of $M_{s,1}$ and $M_{s,2}$ VNFs, with the computational capacity of μ_1 and μ_2 , respectively.

A. The Achievable Rate

Here, we want to obtain achievable data rate. The achievable data rate for the j^{th} UE in v^{th} service can be formulated as

$$R_{u(v,j)} = B \log_2(1 + \rho_{u(v,j)}), \quad (1)$$

where, $\rho_{u(v,j)}$ is the SNR of j^{th} UE in the v^{th} service that is described as

$$\rho_{u(v,j)} = \frac{p_{u(v,j)} \sum_{s=1}^S |\mathbf{h}_{R_s,u(v,j)}^H \mathbf{w}_{R_s,u(v,j)}|^2 a_{v,s}}{BN_0 + I_{u(v,j)}}, \quad (2)$$