$\mathcal{N}$	The set of all users	$\mathcal{W}$	The set of all BSs
$\mathcal{K}$	The set of all channels	$\mathcal{K}_w$	The set of channels belongs to BS w
$|h_i^k|^2$	The channel gain of user i on channel k	p_w^k	The transmit power of BS w on channel k
$\bar{p}_w$	The power budget for BS w	β_w^k	The user assignment of BS w on channel k
$\mathbf{a}$	The association profile	$\mathbf{a}_{-i}$	The association profile without user i
$r_i(\mathbf{a})$	The rate assigned to user i	$R_w(\mathbf{a})$	The optimal throughput of BS w under $\mathbf{a}$
$R(\mathbf{a})$	The optimal system throughput under $\mathbf{a}$	$\mathcal{N}_w(\mathbf{a})$	The set of users associated to BS w
$U_i(\mathbf{a})$	The utility of user i	$T_i(\mathbf{a})$	The tax imposed on user i