Supplementary Appendix S1

1 DERIVATION OF SINR

Using Eq. (3) in the paper, the total received signal by k-th UE, y_k, can be written as

$$\begin{aligned} y_k &= \mathbf{H}_{k:}\sqrt{G_{RF}}\mathbf{p} + n_k \\ &= \mathbf{H}_{k:}\sqrt{G_{RF}}\mathbf{W}\mathbf{x} + n_k \\ &= \underbrace{\mathbf{H}_{k:}\sqrt{G_{RF}}\mathbf{W}_{:k}x_k}_{\text{received signal}} + \underbrace{\sum_{k'\neq k}^{K}\mathbf{H}_{k:}\sqrt{G_{RF}}\mathbf{W}_{:k'}x_{k'}}_{\text{interference}} + \underbrace{n_k}_{\text{noise}}, \end{aligned} \tag{S1}$$

where $\mathbf{H}_{k:}$ is the k-th row of matrix $\mathbf{H}$ and $\mathbf{W}_{:k}$ is the k-th column of matrix $\mathbf{W}$. The transmit signals x_k are uncorrelated and have unit power. Therefore, the power of a received signal by k-th UE can be written as

$$\mathrm{E}\left\{|y_k|^2\right\} = \underbrace{G_{RF}\left|\mathbf{H}_{k:}\mathbf{W}_{:k}\right|^2}_{\text{received signal}} + \underbrace{G_{RF}\sum_{k'\neq k}^{K}\left|\mathbf{H}_{k:}\mathbf{W}_{:k'}\right|^2}_{\text{interference}} + \underbrace{\sigma_n^2}_{\text{noise}}. \tag{S2}$$

Hence the SINR for k-th UE can be written as

$$\begin{aligned} \mathrm{SINR}_k &= \frac{S_k}{I_k + N_k} \\ &= \frac{G_{RF}\left|\mathbf{H}_{k:}\mathbf{W}_{:k}\right|^2}{G_{RF}\sum_{k'\neq k}^{K}\left|\mathbf{H}_{k:}\mathbf{W}_{:k'}\right|^2 + \sigma_n^2} \end{aligned} \tag{S3}$$

By replacing the ZF's precoding matrix definition in Eq. (4) of the paper, into Eq. (S3), as following:

$$\begin{aligned} \mathbf{y} &= \mathbf{H}\sqrt{G_{RF}}\mathbf{W}\mathbf{x} + \mathbf{n} \\ &= \sqrt{G_{RF}}\frac{\mathbf{H}\mathbf{H}^{\dagger}\left(\mathbf{H}\mathbf{H}^{\dagger}\right)^{-1}}{\left\|\mathbf{H}^{\dagger}\left(\mathbf{H}\mathbf{H}^{\dagger}\right)^{-1}\right\|_F}\mathbf{x} + \mathbf{n} \\ &= \sqrt{G_{RF}}\frac{\mathbf{I}_K}{\left\|\mathbf{H}^{\dagger}\left(\mathbf{H}\mathbf{H}^{\dagger}\right)^{-1}\right\|_F}\mathbf{x} + \mathbf{n}, \end{aligned} \tag{S4}$$

where $\mathbf{I}_K$ is the identity matrix of size K, the received signal by k-th UE can be written as,

$$y_k = \frac{\sqrt{G_{RF}}}{\left\|\mathbf{H}^{\dagger}\left(\mathbf{H}\mathbf{H}^{\dagger}\right)^{-1}\right\|_F}x_k + n_k. \tag{S5}$$

This equation shows that using the ZF precoding, there will be no interference at the UE locations.