Supplementary Material for "Capacity of Wireless Channels Under Transceiver Hardware Impairments and Adaptive Transmission Techniques"

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Table I: Capacity of the THZ link under THI

Transmission Technique	Capacity Expression
OPRA	$C_{\text{OPRA}} = -\frac{\Lambda \ln\left(\gamma_0 k^2\right) \gamma_0{}^{\frac{v}{2}}}{\ln(2)(1-k^2\gamma_0)^{\frac{v}{2}}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0{}^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(1-\frac{v}{2},\frac{\alpha}{2})\\ (-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right] - \frac{\Lambda\alpha\gamma_0{}^{\frac{v}{2}-1}}{2\ln(2)k^2(1-k^2\gamma_0)^{\frac{v}{2}-1}} H_{1,1:2,2;1,2}^{1,0:2,1;2,0}\left[\begin{matrix}\frac{\beta\gamma_0{}^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\\ \frac{\left(k^2\gamma_0\right)^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\end{matrix}\middle\vert \begin{matrix}(2-\frac{v}{2},\frac{\alpha}{2}):(1,\frac{\alpha}{2}),(2,\frac{\alpha}{2});(1,1)\\ (1-\frac{v}{2},\frac{\alpha}{2}):(1,\frac{\alpha}{2}),(1,\frac{\alpha}{2});(0,1),(C,1)\end{matrix}\right], \quad k \neq 0.$ The optimal cut-off SNR γ_0 must satisfy $\frac{\Lambda\left(\frac{1}{\gamma_0}-k^2\right)\gamma_0^{\frac{v}{2}}}{(1-k^2\gamma_0)^{\frac{v}{2}}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(1-\frac{v}{2},\frac{\alpha}{2})\\ (-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right] - \frac{\Lambda\gamma_0^{\frac{v}{2}-1}}{(1-k^2\gamma_0)^{\frac{v}{2}-1}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(2-\frac{v}{2},\frac{\alpha}{2})\\ (1-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right] = 1.$
TIFR	$C_{\text{TIRF}} = \frac{1}{\ln(2)} \frac{\ln\left(1+\mathcal{I}^{-1}\right)\Lambda\gamma_0{}^{\frac{v}{2}}}{(1-k^2\gamma_0)^{\frac{v}{2}}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(1-\frac{v}{2},\frac{\alpha}{2})\\ (-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right],$ $\mathcal{I} = \frac{k^2\Lambda\gamma_0{}^{\frac{v}{2}}}{(1-k^2\gamma_0)^{\frac{v}{2}}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(1-\frac{v}{2},\frac{\alpha}{2})\\ (-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right] + \frac{\Lambda\gamma_0^{\frac{v}{2}-1}}{(1-k^2\gamma_0)^{\frac{v}{2}-1}} H_{2,3}^{3,0}\left[\frac{\beta\gamma_0^{\frac{\alpha}{2}}}{(1-k^2\gamma_0)^{\frac{\alpha}{2}}}\middle\vert \begin{matrix}(1,1),(2-\frac{v}{2},\frac{\alpha}{2})\\ (1-\frac{v}{2},\frac{\alpha}{2}),(0,1),(C,1)\end{matrix}\right].$
CIFR	$C_{\text{CIFR}} = \frac{1}{\ln(2)}\ln\left(1+\mathcal{V}^{-1}\right), \quad \mathcal{V} = k^2 + \frac{2\Lambda\beta^{\frac{-v+2}{\alpha}}}{v-2}\Gamma\left(C+\frac{v-2}{\alpha}\right).$
ORA	$C_{\text{ORA}} = C_{\text{ORA}}^{(1)} - C_{\text{ORA}}^{(0)},$ $C_{\text{ORA}}^{(j)} = \frac{\Lambda\,\omega_j{}^{-\frac{v}{2}}}{\ln(2)} H_{4,3}^{1,4}\left[\beta^{-1}\omega_j{}^{\frac{\alpha}{2}}\middle\vert \begin{matrix}(1+\frac{v}{2},\frac{\alpha}{2}),(1+\frac{v}{2},\frac{\alpha}{2}),(1,1),(1-C,1)\\ (1+\frac{v}{2},\frac{\alpha}{2}),(0,1),(\frac{v}{2},\frac{\alpha}{2})\end{matrix}\right], \; \omega_j = j + k^2 \text{ for } j \in \{0,1\}.$