the leaves is significant. This could have been expected by taking into account the facts that (i) the links are shorts and, therefore, nearly not subject to interference and (ii) the amount of concurrent transmissions remains limited. Since there are numerous relay nodes, the throughput at the relays is very low, because of the presence of multiple access collisions. Furthermore, the reflections off the environment reduce drastically the throughput at the sink when the relay probability of transmission increases. It can be observed that the value of $\tau_{\text{sink}}$ rapidly reaches a maximum for $q \approx 0.05$, before decreasing rapidly for increasing values of the parameter $q$.

\section{Energy Depletion Rate}

First, regarding a BAN deployed in an \textit{outdoor} environment, The energy consumption rate $E$ in \textit{outdoor} scenarios, considering the three configurations of interest, is shown, as function of $q$, in Fig. 13 as a function of the sensor probability of transmission and for the three configurations of interest. It can be observed that the energy consumption rates of the three configurations present clearly different profiles. More precisely, Configuration A outperforms Configuration B which, in turns, is more energy efficient than Configuration C. Also, it can be observed that this remains true for any value of the node probability of transmission $q$. The energy consumption rate in \textit{indoor} scenarios is shown in Fig. 14. It is noticeable that the values of the energy consumption in Fig. 13 and Fig. 14 are approximately the same. Also, the relative performances of the three configurations

\begin{figure}
\centering
\includegraphics[width=0.4\textwidth]{fig12a.png}
\caption{(a) Configuration A: 7 leaves at each of the 2 relays ($N_1 = 7, N_2 = 2$).}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=0.4\textwidth]{fig12b.png}
\caption{(b) Configuration B: 3 leaves at each of the 4 relays ($N_1 = 3, N_2 = 4$).}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=0.4\textwidth]{fig12c.png}
\caption{(c) Configuration C: 1 leaf at each of the 8 relays ($N_1 = 1, N_2 = 8$).}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=0.4\textwidth]{fig13.png}
\caption{Energy consumption rate $E$ of an \textit{outdoor} hierarchical BAN with 16 nodes as a function of the sensors’ probability of transmission and for different hierarchical configurations.}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=0.4\textwidth]{fig14.png}
\caption{Energy consumption rate $E$ of an \textit{indoor} hierarchical BAN with 16 nodes as a function of the sensors’ probability of transmission and for different hierarchical configurations.}
\end{figure}