Let $M(b, n)$ be the complete multipartite graph with $b$ parts $B_0, \ldots, B_{b-1}$ of size $n$. A 4-cycle system of $M(b, n)$ is said to be a frame if the 4-cycles can be partitioned into sets $S_1, \ldots, S_z$ such that for $1 \leq j \leq z$, $S_j$ induces a 2-factor of $M(b, n) \setminus B_i$ for some $i \in \mathbb{Z}_b$. The existence of a $C_4$-frame of $M(b, n)$ has been settled when $n = 4$ \cite{?}. In this paper, we completely settle the existence question of a $C_4$-frame of $M(b, n)$ for all $b \neq 2$ and $n$. 