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An r -regular graph has a line graph that is $2r-2$ regular. A Hamiltonian decomposition is a partition of these edges into $r-1$ Hamiltonian cycles. Can we determine which line graphs have Hamiltonian decompositions? The question is trivial for $r = 2$. We present a characterization for cubic graphs. For $r = 4$, we can guarantee a decomposition containing two Hamiltonian cycles and a third 2-regular component that may or may not be Hamiltonian. (Received September 24, 2012)