Ergodic Theory: Home Assignment 4

Let $(X, \mathcal{B}, T, \mu)$ be a probability preserving transformation. Prove the following corollary of Von-Neumann's ergodic theorem:

$$\mu \text{ is ergodic } \leftrightarrow \forall A, B \in \mathcal{B}, \frac{1}{n}\sum_{k=0}^{n-1} \mu(A \cap T^{-k}[B]) \xrightarrow{n\to\infty} \mu(A) \cdot \mu(B).$$

That is, a measure is ergodic if and only if it is "mixing on the average".

Good luck!