STARTUP & AUXILIARY BIAS CIRCUIT

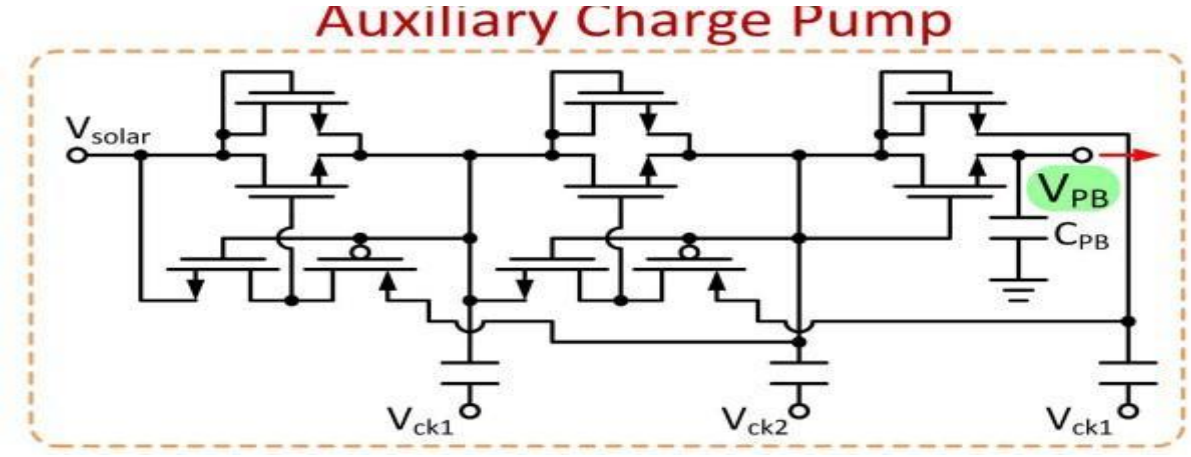
To eliminate external biases and realize the self-sustaining feature for an energy harvesting system, a startup and auxiliary bias circuit is proposed to provide supply voltages and driving signals once the PV cell is connected to the harvester.

The size of auxiliary charge pump is nearly $1/8^{th}$ of that of the NESTED VOLTAGE TRIPLER circuit and it provides the Vpb for bias and supply voltage of level shifter.

A non-overlapping clock generator is used for generating clock signal of 250KHz and PV as peak voltage of clock signal.

Different from the conventional non-overlapping clock generator, a delay line is placed in the feedback path(a series of inverters). Therefore, the forward drivers are designed to maximize their fan-out capability and minimize their power consumption. The non-overlapping time is tuned by the delay line independently.

However, these circuits are directly supplied by Vs, which is not capable of driving the 3× charge pump. Thus, an auxiliary three-stage Dickson charge pump is used to generate a higher supply voltage as Vpb = 3Vs.



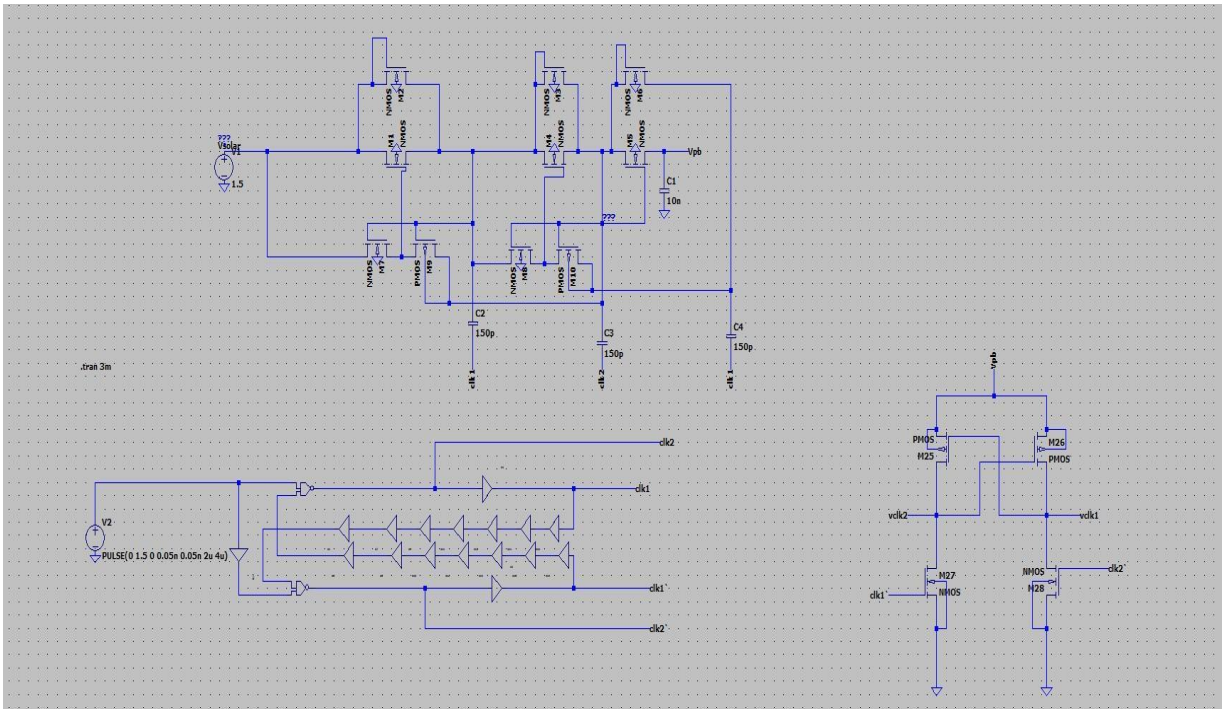


Fig : Auxiliary charge pump, NOCG & Level shifter