**III.C.2 Antialiasing Noise Filter**

Figure 12 illustrates our antialiasing noise filter approach. If a single inductor used, filter Q () becomes smaller, causing a bandwidth spreading, when we decrease capacitance to get a higher resonance frequency. To cope with the tradeoff, we will use three filters in parallel. Each filter will be switchable and be optimized to be operated for a specific finite frequency interval over 2-18 GHz. Our strategy is to limit each filter’s frequency coverage to about an octave bandwidth so that capacitance variation can be confined to ~4x range. In such way, the theoretical filter-Q variations will be limited to ~2x, which can be easily compensated by the HBT cross-coupled pair in Fig. 12.



**Figure 12.** An example of the three-band antialiasing bandpass noise filter approach in the proposal.

A larger Q variation needs larger negative transconductance (or stronger positive feedback) from the cross-coupled pair, leading to increased non-linearity from the negative gm-cell. From our initial investigation, by limiting the Q variation to ~2x range, each filter’s 1-dB gain compression point can be maintained to ~ 10 dBm range, which should be an adequate power handling capability. In our system approach (Fig. 1), an attenuator will proceed the filter bank so that dynamic range of the overall system can be increased further in case more stringent requirement would be imposed on the phased array applications.

In our filter topology, the emitter-followers isolate the individual LC-tanks from theirs input and output so that the ‘*paralleling*’ does not load each other. The cascading stage also increases isolation from the supply line to minimize any coupling from the following mixer arrays. We achieve a continuous frequency tuning in the same manner as in standard VCO tuning: switched capacitors tunes the filters’ center frequency coarsely in a discrete manner, and varactor will be used for continuous tuning between the discrete frequency steps.