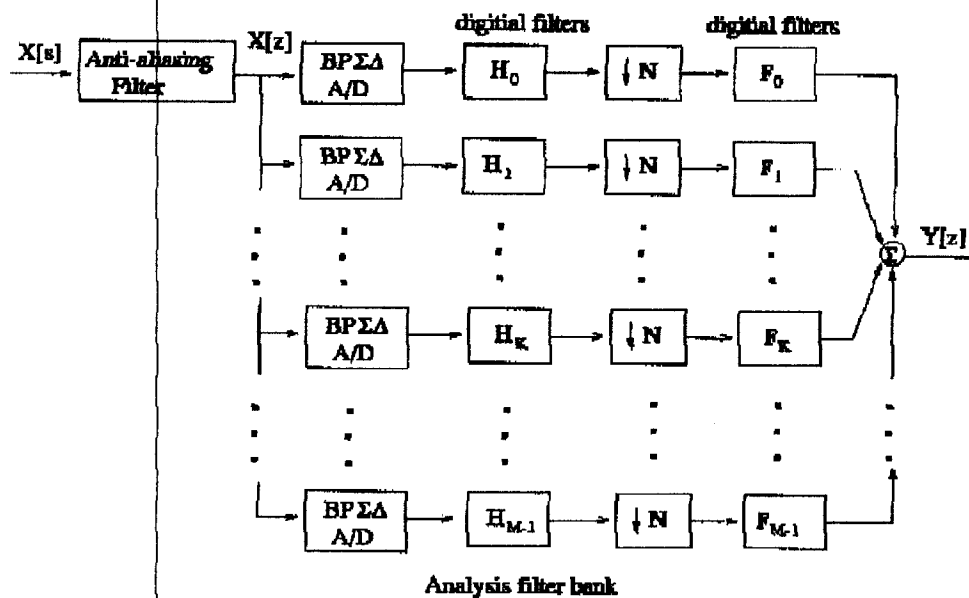


A Sub-band Decomposition Delta-Sigma A/D Converter System for Wide-band RF Receiver

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Bandpass delta-sigma A/D converters are well suited for use in the front end of radio receiver, allowing direct conversion to digital at either intermediate- or radio frequency. But the primary motivation for the development of bandpass converters is the simplicity they impart to systems dealing with narrow-band signals. For narrow-band signals away from DC, the band-reject noise-shaping of a bandpass delta-sigma converter results in high signal-to-noise ratio (SNR) at significantly lower sampling rates than required for low-pass delta-sigma converters. Can we use bandpass delta-sigma converters in the wide-band system, like UMTS, Infopad, or GSM equivalent? The answer is "yes".

In this project, we will go to build a parallel delta-sigma A/D converter system using sub-band decomposition for wide-band RF receiver. The new A/D is based on the M-channel Quadrature Mirror Filter (QMF) bank structure. And the basic ideal of a M-channel filter bank is to decompose a given band-limited signal into a number of contiguous frequency bands so that each band may be processed separately. The structure of the whole A/D system is shown below:



From the structure shown above, we can see that the bandpass A/D converter only needs to convert the sub-band of interest for each branch. For this project, we only choose 2 sub-bands for simplicity.