Sub-band processing with over-sampled filter banks (Technion)

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Critically sampled uniform DFT filter banks are well known in signal processing while oversampled uniform DFT filter banks are less known. In this invention, oversampled filter banks are used in an innovative way to perform nearly perfect multiplex frequency division (FDM) over a broadband contiguous communication spectrum occupying the full band. The banks are capable of synthesizing this spectrum from independent sub channels, each occupying a single frequency sub band, without requiring any spectral guard-bands between the sub bands, i.e., with nearly 100% spectral efficiency. They are also capable of separating the contiguous broadband spectrum (which may also be generated by other methods) into individual sub-channels, near perfectly reconstructing the individual sub channels. The filter banks are structured in a novel way such that the complexity of hardware processing is significantly reduced without compromising performance.

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