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A class of multimode transmultiplexers based on the Farrow structure.

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Summary: This paper introduces multimode transmultiplexers (TMUXs) in which the Farrow structure realizes the polyphase components of general lowpass interpolation/decimation filters. As various lowpass filters are obtained by one set of common Farrow subfilters, only one offline filter design enables us to cover different integer sampling rate conversion (SRC) ratios. A model of general rational SRC is also constructed where the same fixed subfilters perform rational SRC. These two SRC schemes are then used to construct multimode TMUXs. Efficient implementation structures are introduced and different filter design techniques such as minimax and least-squares (LS) are discussed. By means of simulation results, it is shown that the performance of the transmultiplexer (TMUX) depends on the ripples of the filters. With the error vector magnitude (EVM) as the performance metric, the LS method has a superiority over the minimax approach.

Keywords: multistandard communications; transmultiplexers; sampling rate conversion; Farrow structure
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