



# Research Letters in Communications

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### Research Letter

## Combining Coded Signals with Arbitrary Modulations in Orthogonal Relay Channels

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Abstract

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### Abstract

We consider a relay channel for which the following assumptions are made. (1) The source-destination and relay destination channels are orthogonal (frequency division relay channel). (2) The relay implements the decode-and-forward protocol. (3) The source and relay implement the same channel encoder, namely, a convolutional encoder. (4) They can use arbitrary and possibly different modulations. In this framework, we derive the best combiner in the sense of the maximum likelihood (ML) at the destination and the branch metrics of the trellis associated with its channel decoder for the ML combiner and also for the maximum ratio combiner (MRC), cooperative-MRC (C-MRC), and the minimum mean-square error (MMSE) combiner.