

# Noncoherent Decoding for Trellis Coded MPSK

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Noncoherent detection for MPSK is a detection technique that can be implemented without using carrier recovery. For uncoded signals, noncoherent detection is restricted to differential phase shift keying (DPSK) signals, and is called differential detection. For coded MPSK signals, noncoherent detection is not necessarily restricted to differentially encoded symbols. Noncoherent trellis coded modulation (NTCM), for which differential encoding is not used, was proposed in [1]. The optimal decoding trellis based on the Viterbi algorithm for NTCM is an augmented trellis, for which the number of states grows exponentially with the observation length. It is unpractical when the observation length is not small. Hence, basic decision feedback algorithm (BDFA) which uses the trellis diagram of the original code was proposed in [2]. The BDFA uses decision feedback to reduce the decoding complexity. However, it suffers from error propagation as well. Thus, modified decision feedback algorithm (MDFA) [2] modifies the BDFA by taking future metrics into account.

This paper proposes two decoding algorithms for noncoherent trellis coded modulation: further modified decision feedback algorithm (FMDFA) and delayed decision feedback algorithm (DDFA). Both the proposed algorithms use the trellis diagram of the original code. Decoding algorithms for different decoding metrics [1,3,4] are studied also. Error performance of decoding algorithms are verified by computer simulations.

## References

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