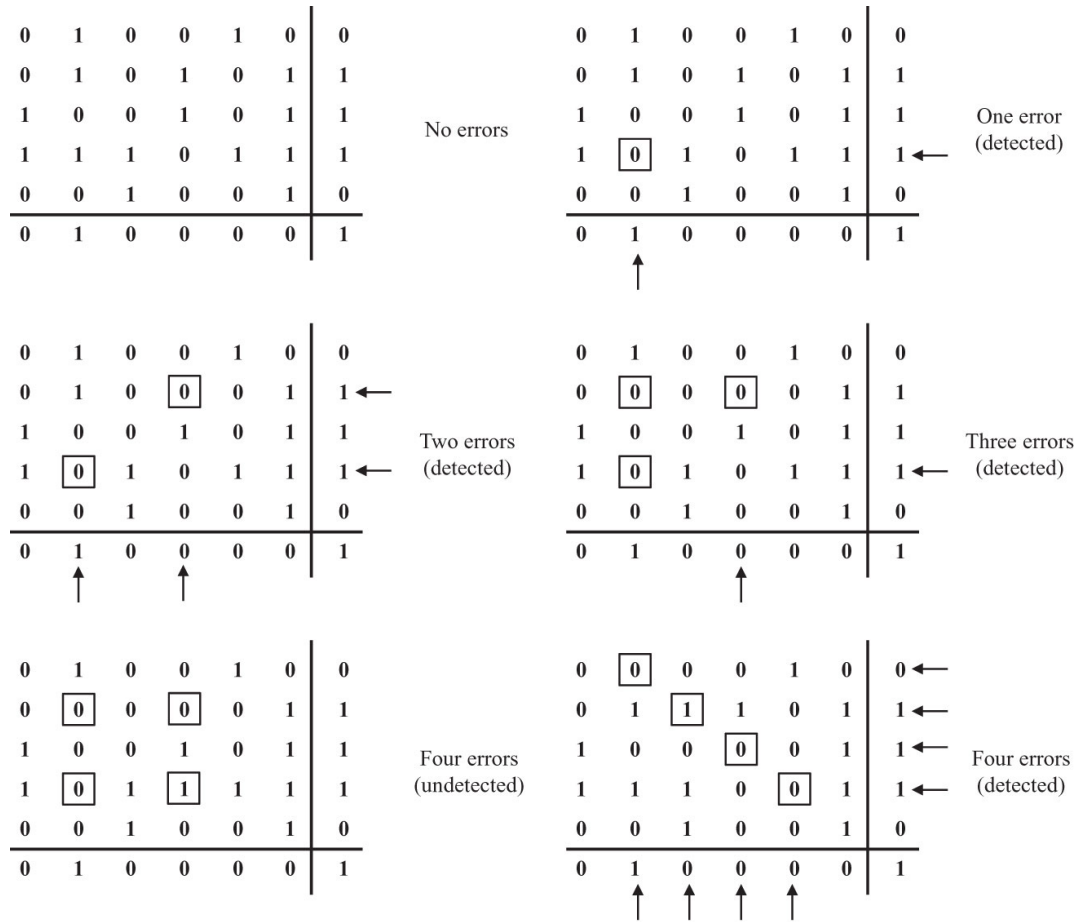


Chapter 10

Error-Control Coding



Note: Arrows indicate failed check bits

Figure 10.1 Examples of detectable and undetectable error patterns for two-dimensional parity-check code.

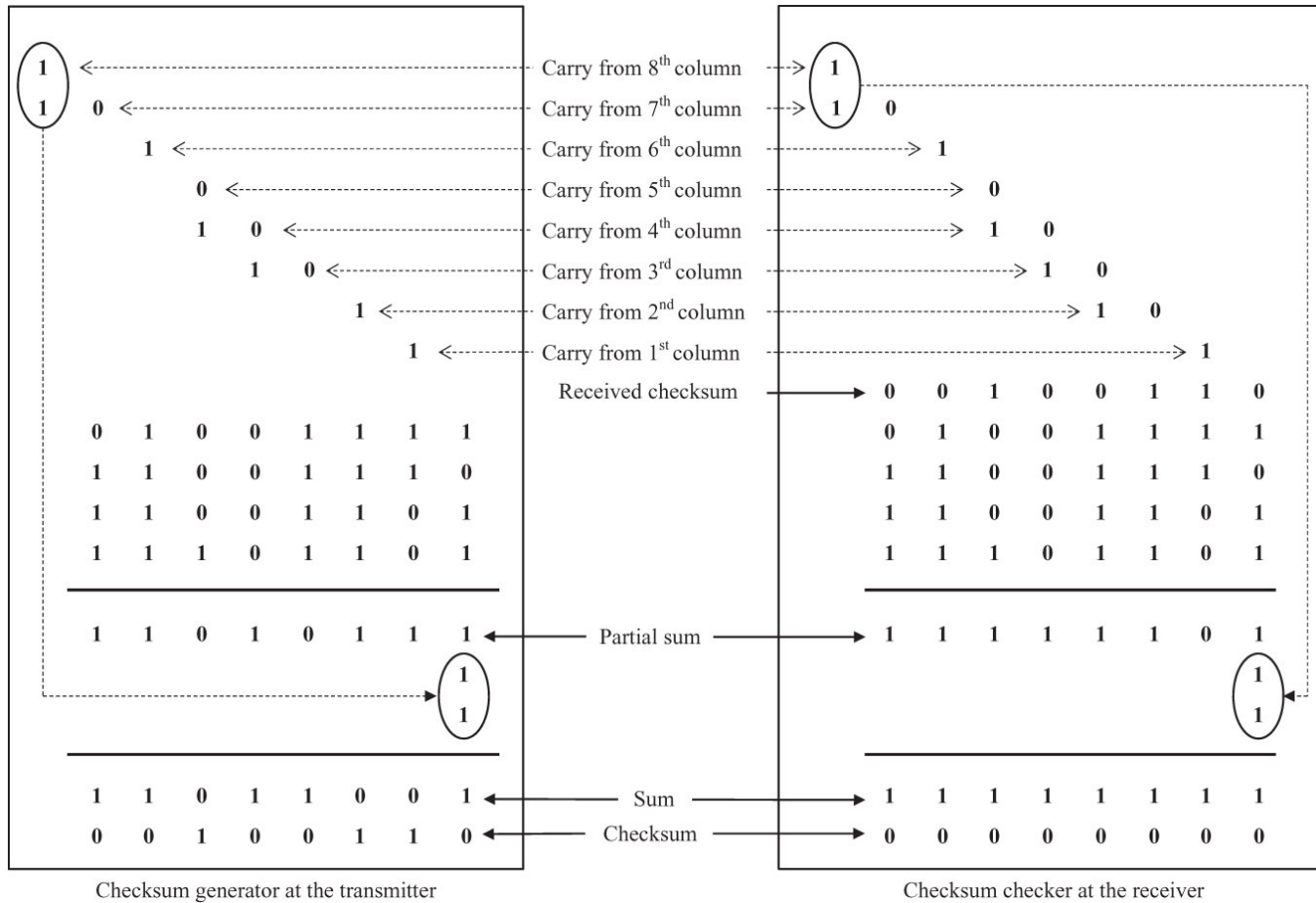
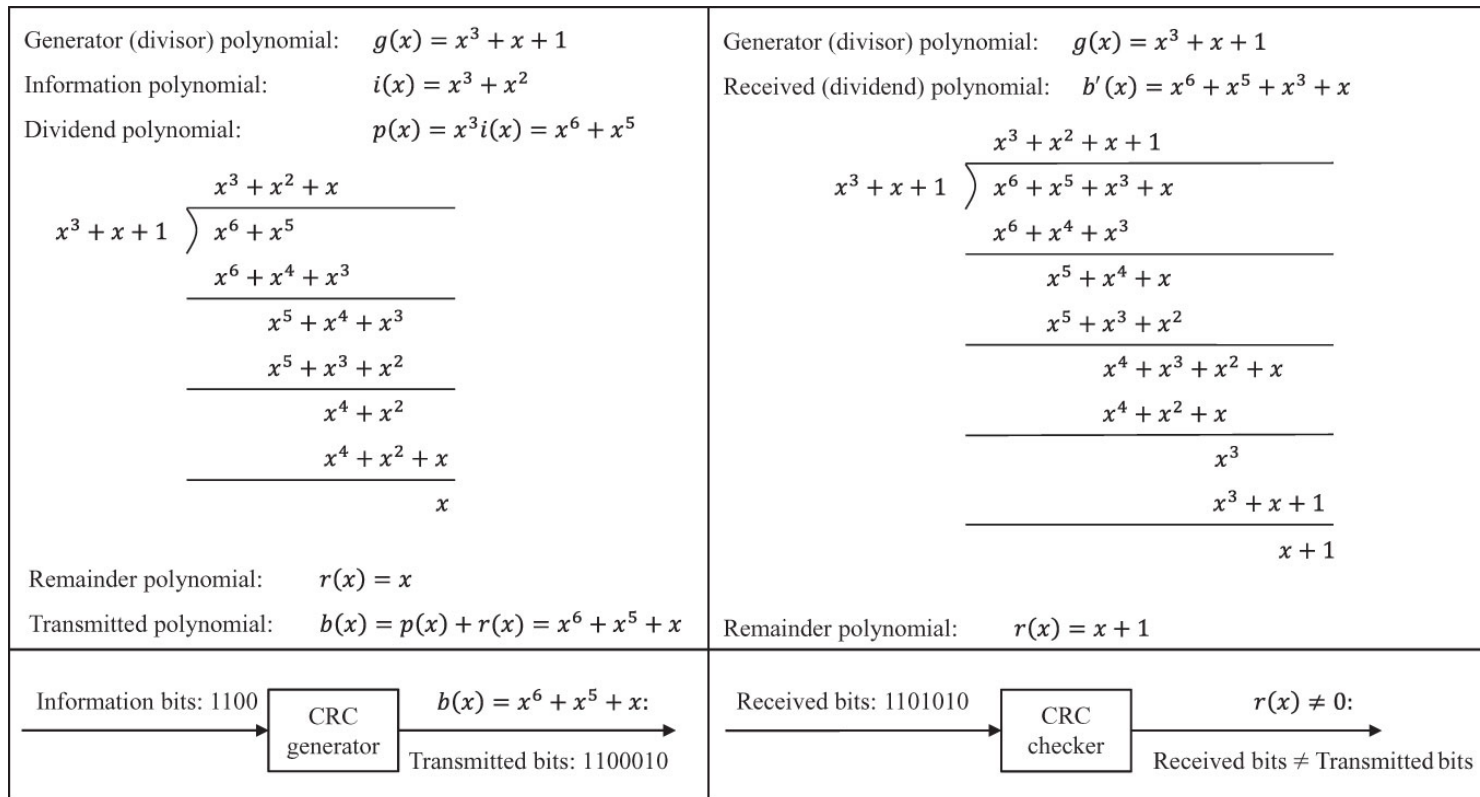


Figure 10.2 An example illustrating how checksum generator and checker work.



CRC generator at the transmitter

CRC checker at the receiver

Figure 10.3 An example illustrating how the CRC generator and checker work.

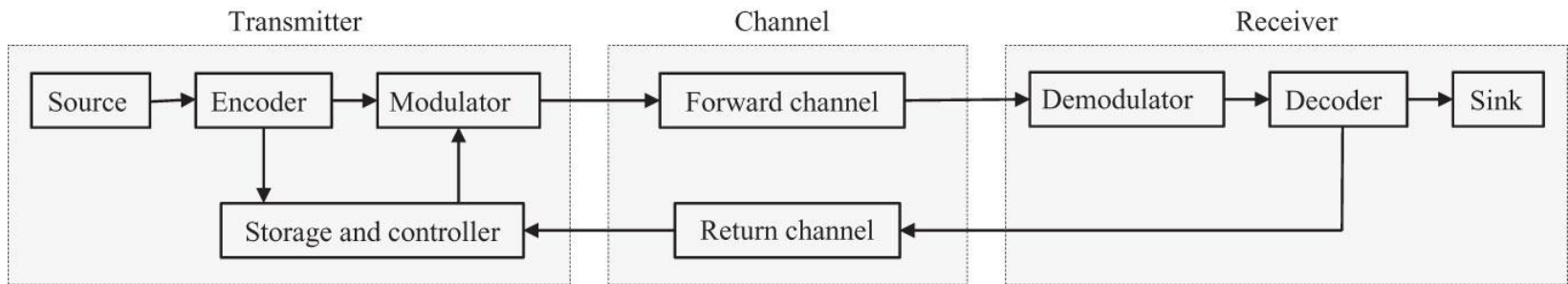
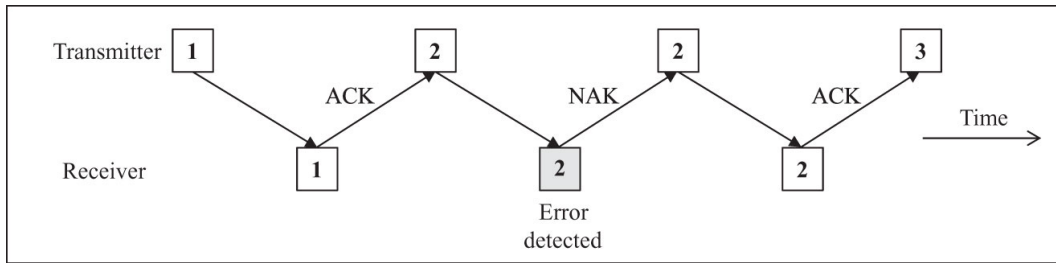
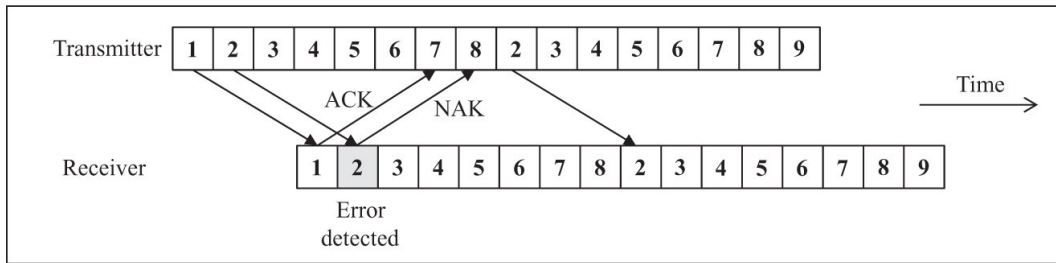


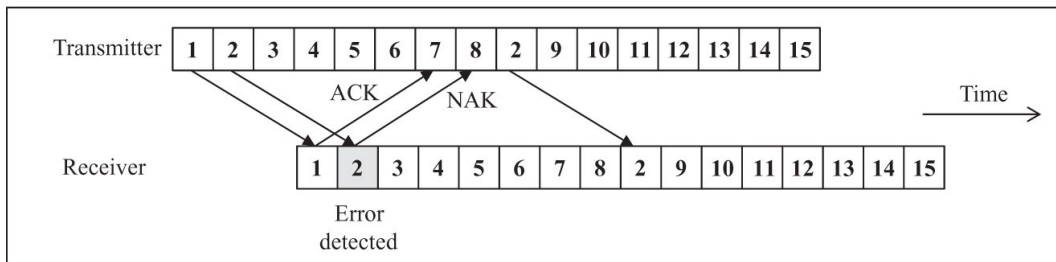
Figure 10.4 Block diagram for an ARQ system.



(a)



(b)



(c)

Figure 10.5 ARQ techniques: (a) stop-and-wait ARQ, (b) go-back-*N* ARQ, and (c) selective-repeat ARQ.

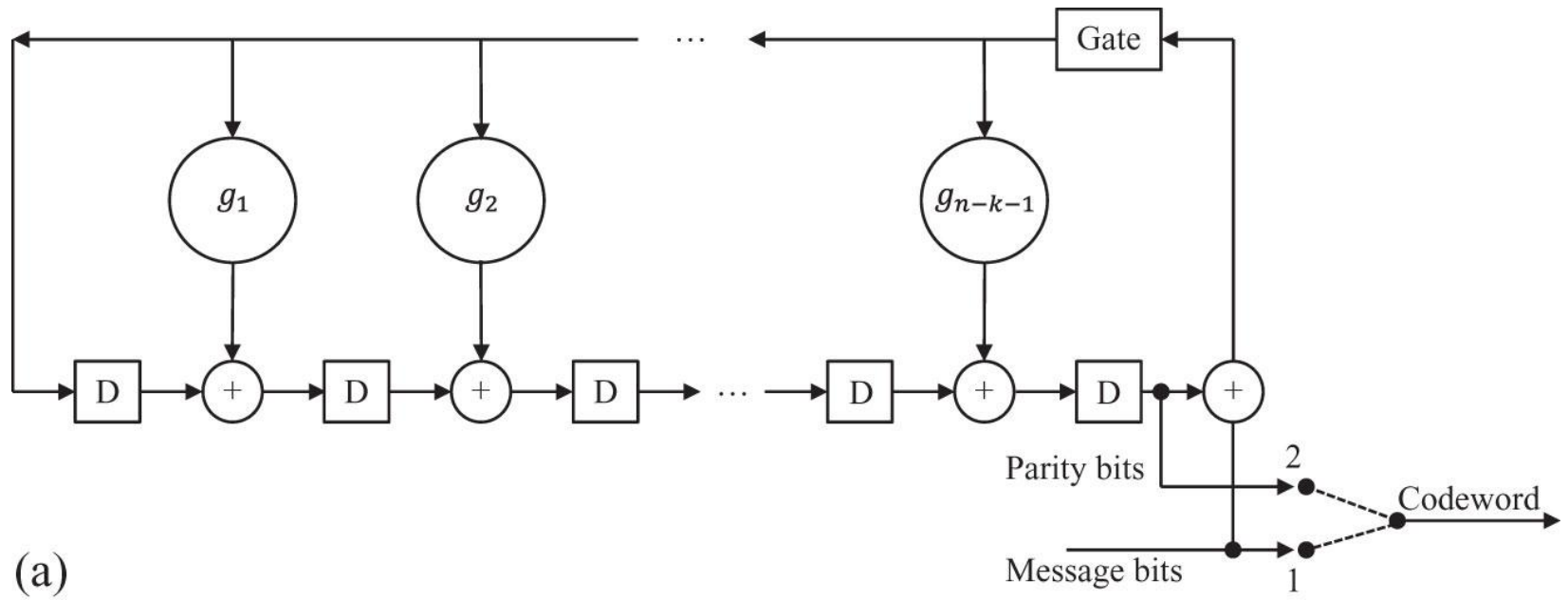


Figure 10.6a Encoder and decoder for an (n, k) cyclic code: (a) encoder and (b) syndrome calculator.

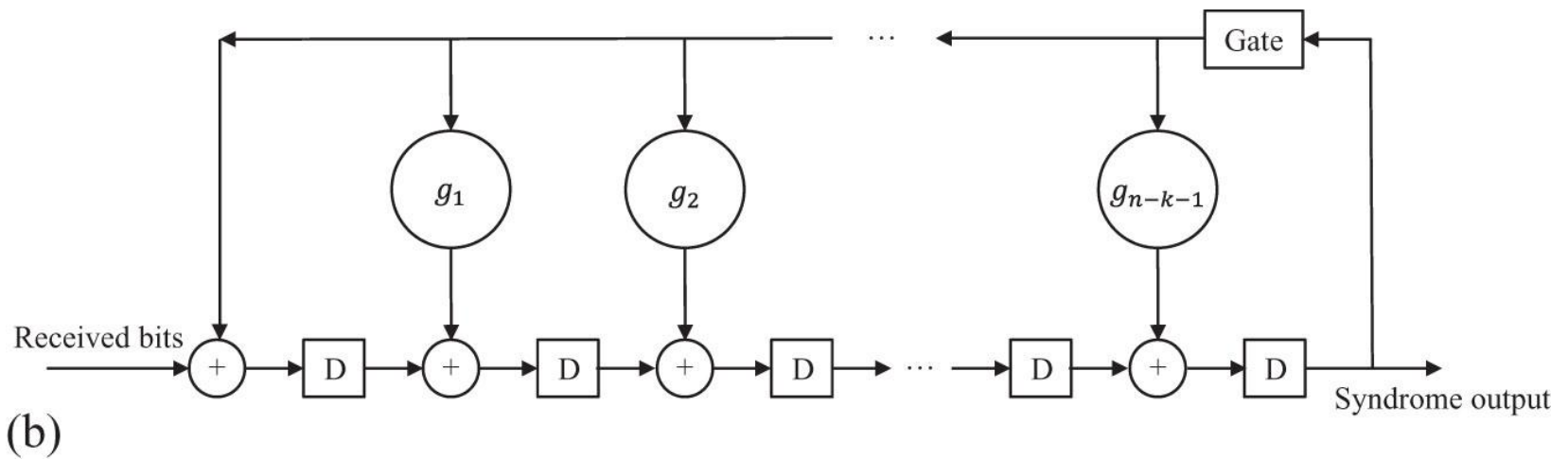


Figure 10.6b Encoder and decoder for an (n, k) cyclic code: (a) encoder and (b) syndrome calculator.

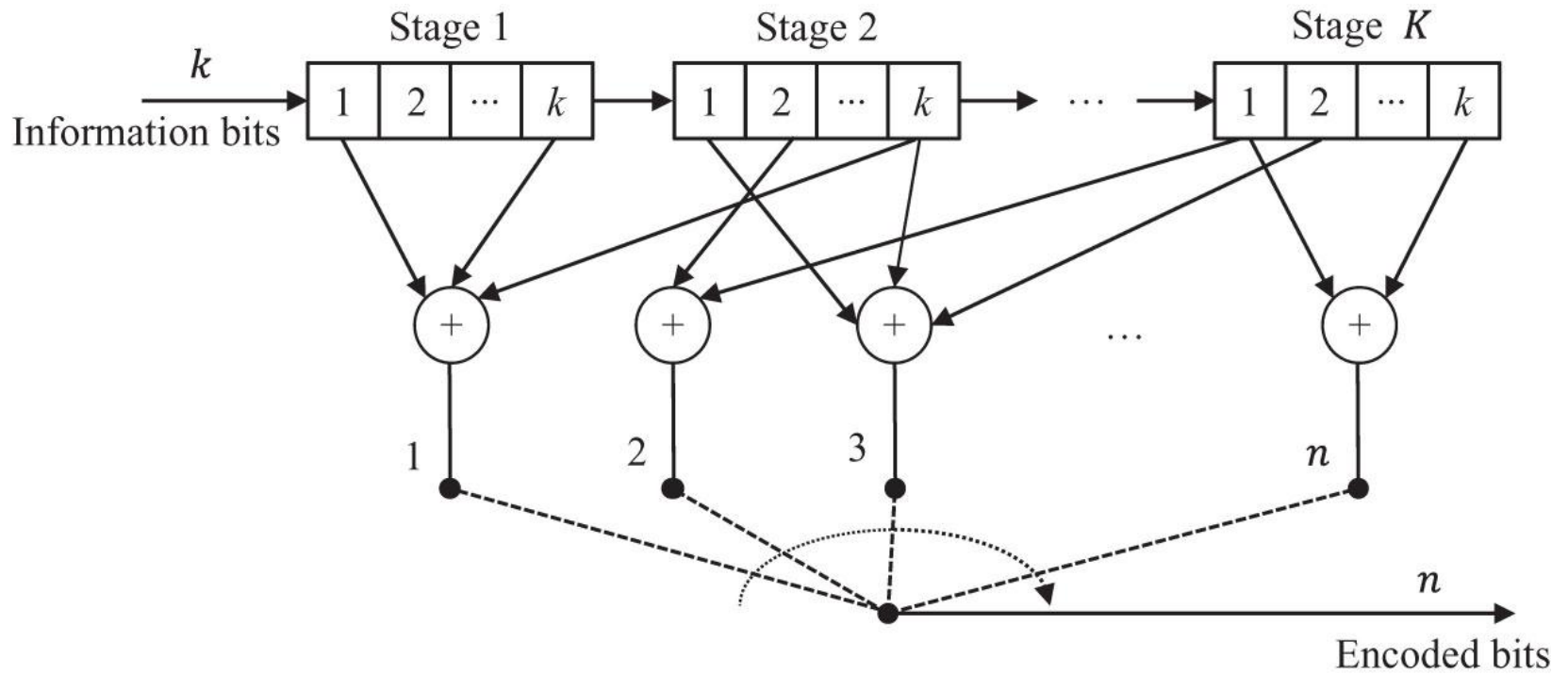


Figure 10.7 A block diagram of an (n, k, K) convolutional encoder.

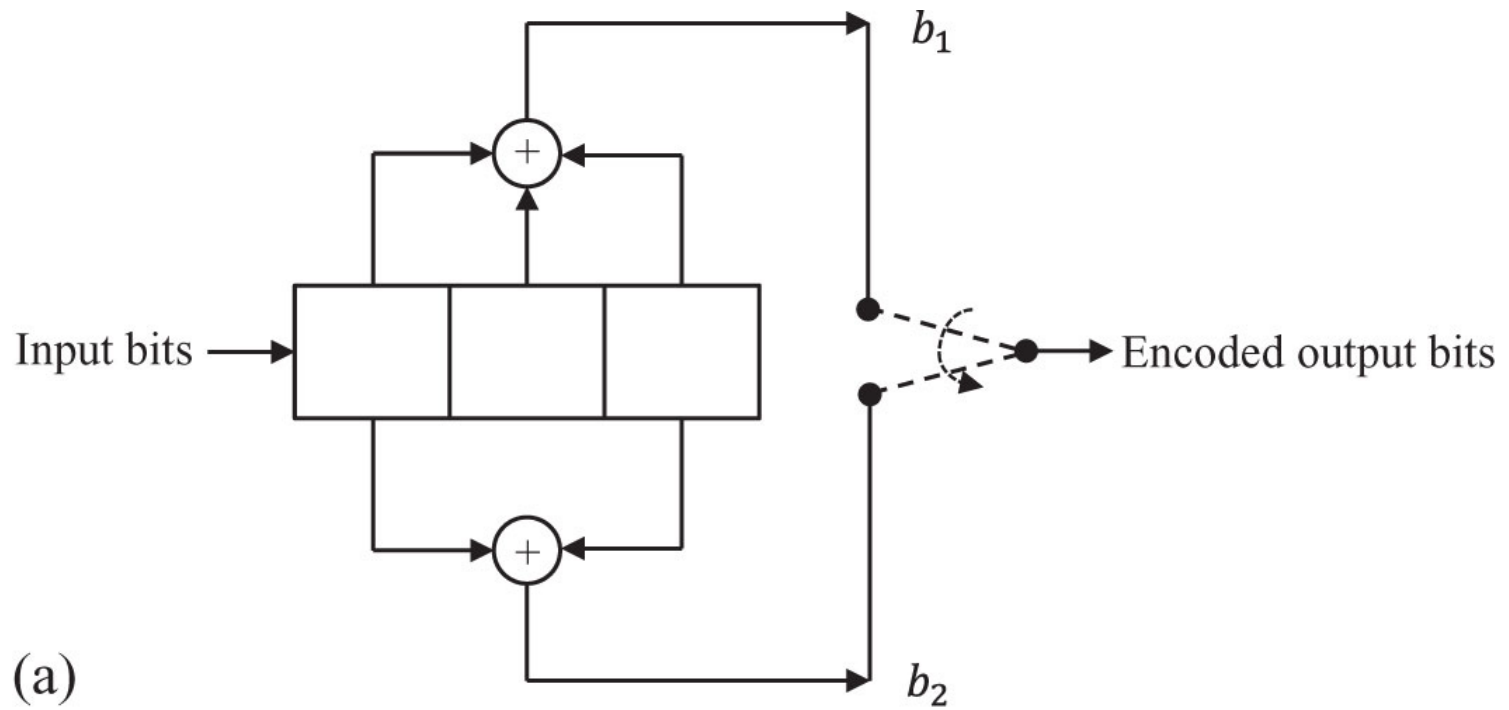


Figure 10.8a Convolutional encoding for Example 10.10: (a) encoder, (b) state transition diagram, (c) tree diagram, and (d) trellis diagram.

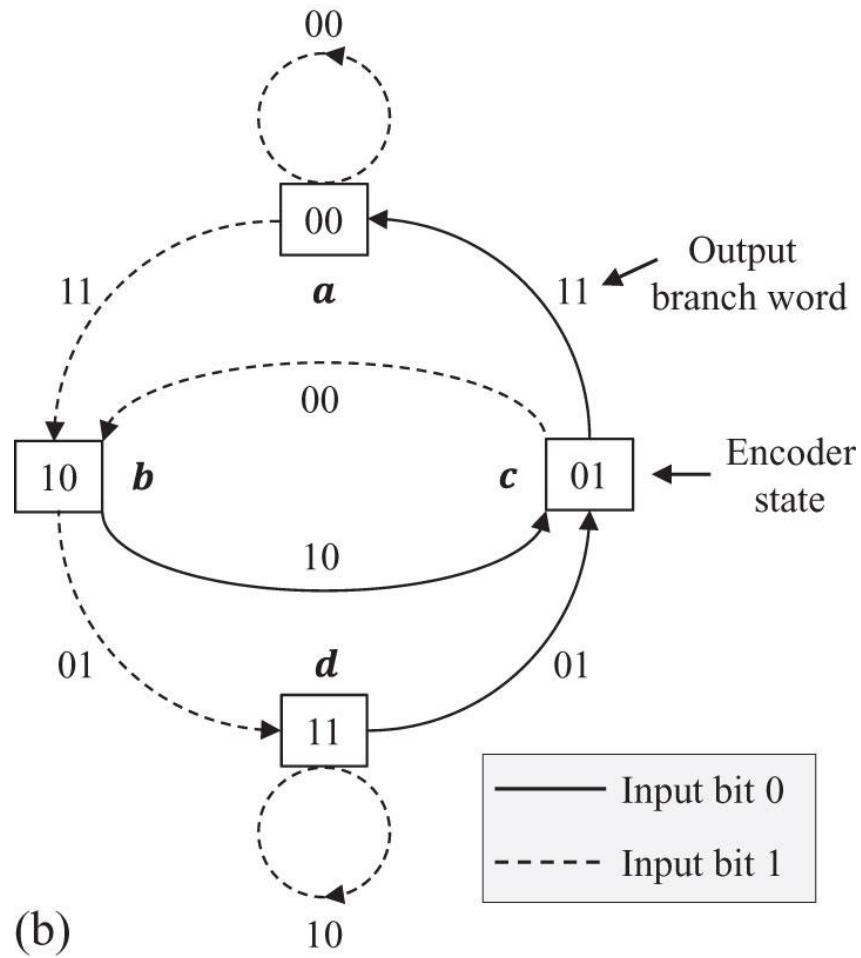


Figure 10.8b Convolutional encoding for Example 10.10: (a) encoder, (b) state transition diagram, (c) tree diagram, and (d) trellis diagram.

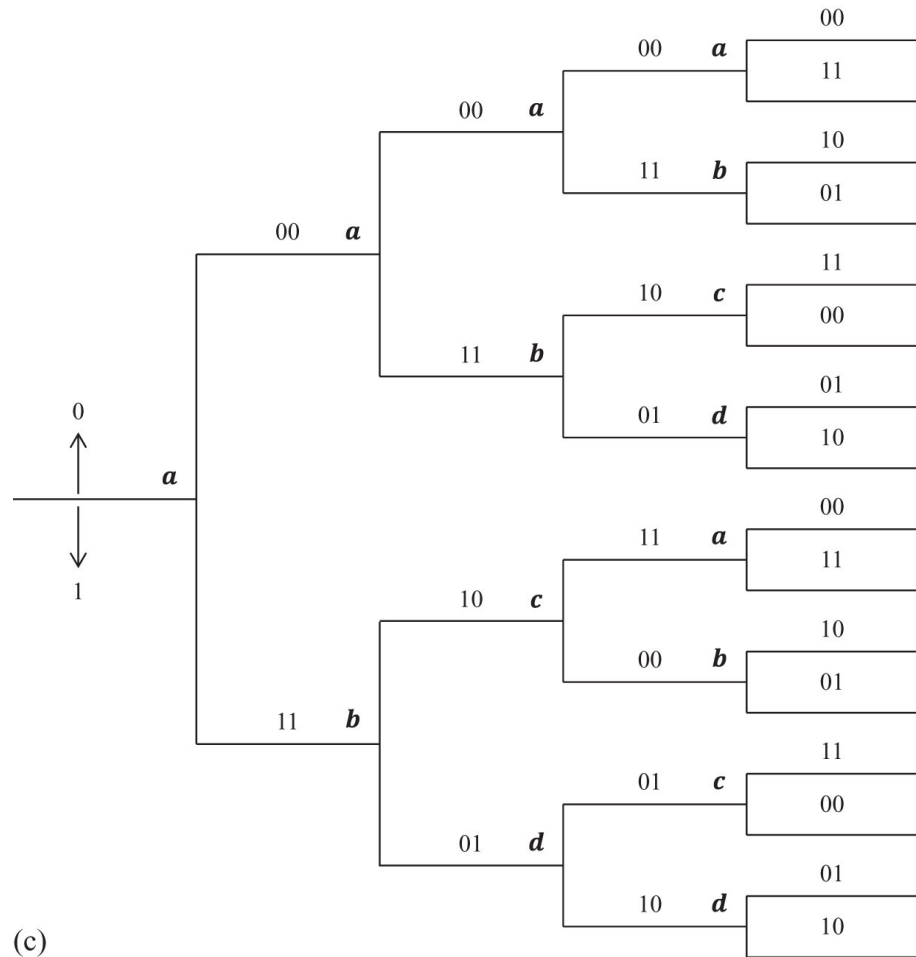


Figure 10.8c Convolutional encoding for Example 10.10: (a) encoder, (b) state transition diagram, (c) tree diagram, and (d) trellis diagram.

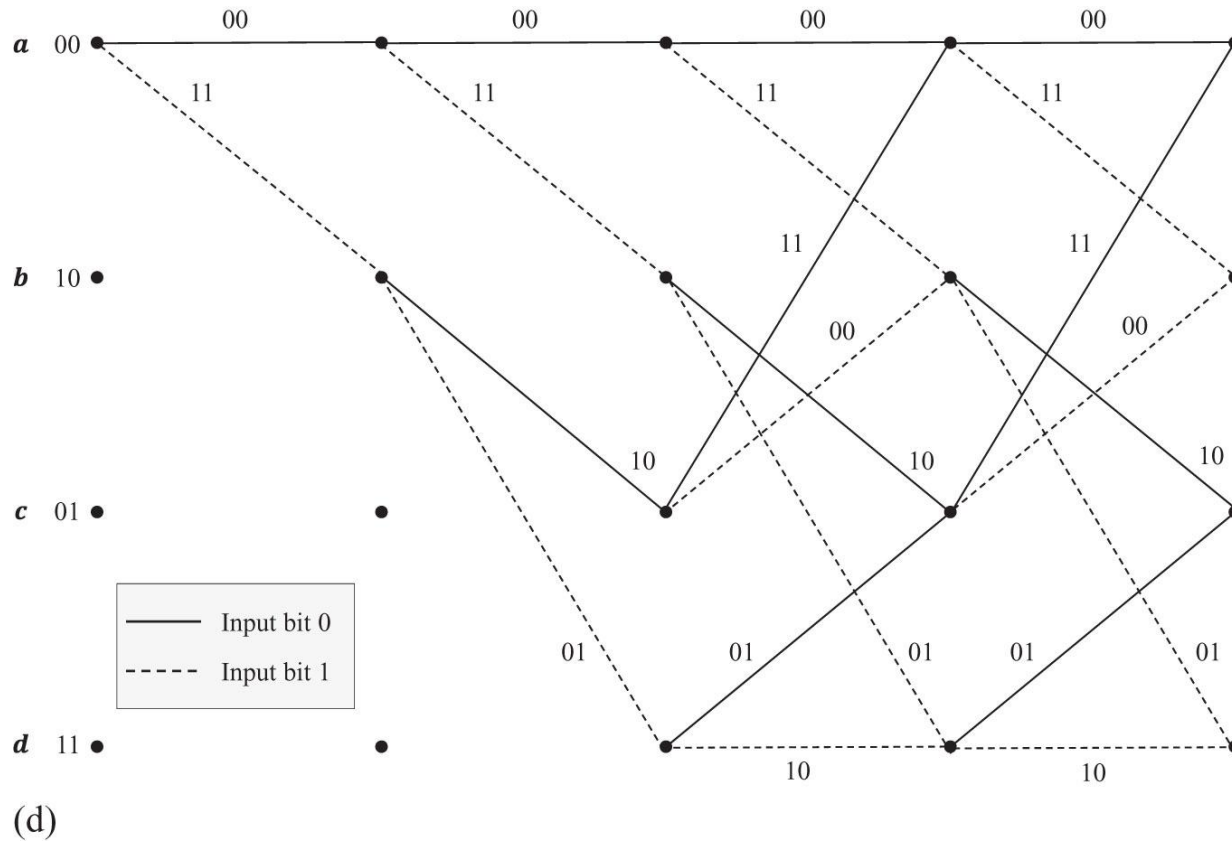


Figure 10.8d Convolutional encoding for Example 10.10: (a) encoder, (b) state transition diagram, (c) tree diagram, and (d) trellis diagram.

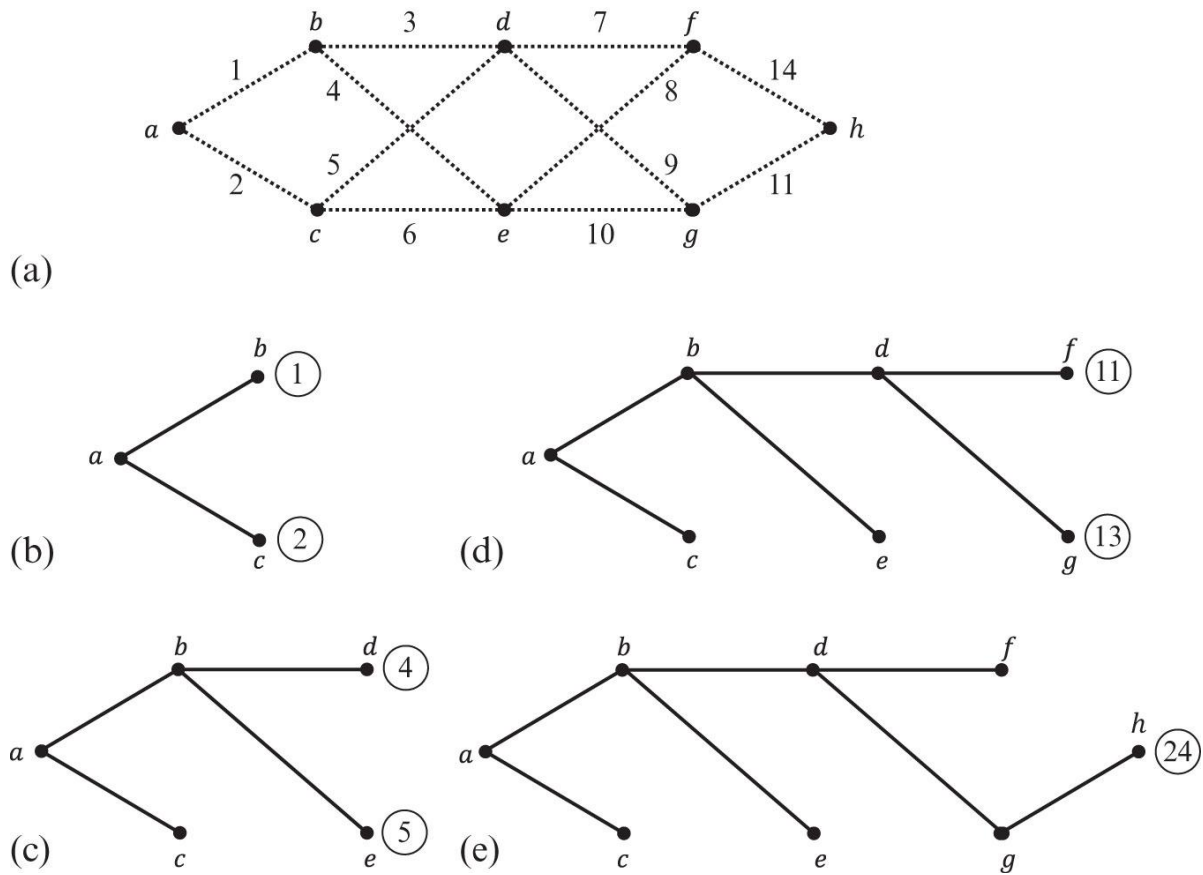


Figure 10.9 Illustrating step in the Viterbi algorithm for Example 10.11.

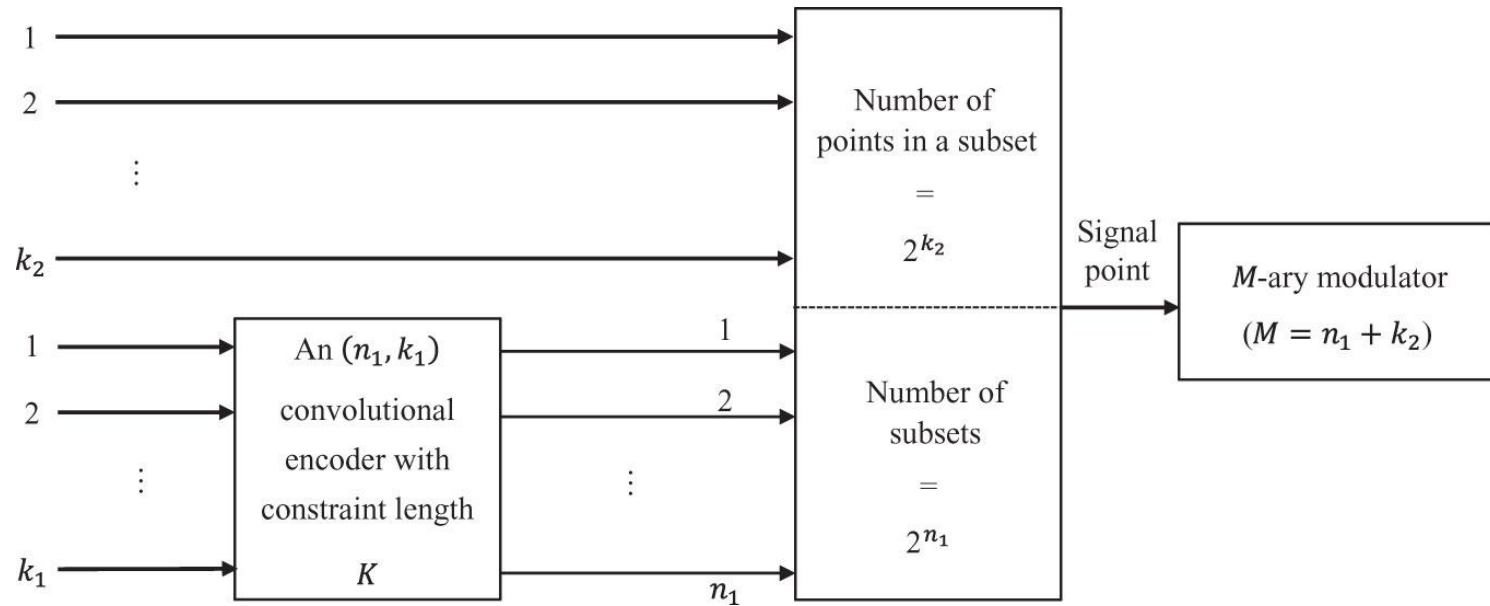


Figure 10.10 Block diagram of a TCM scheme.

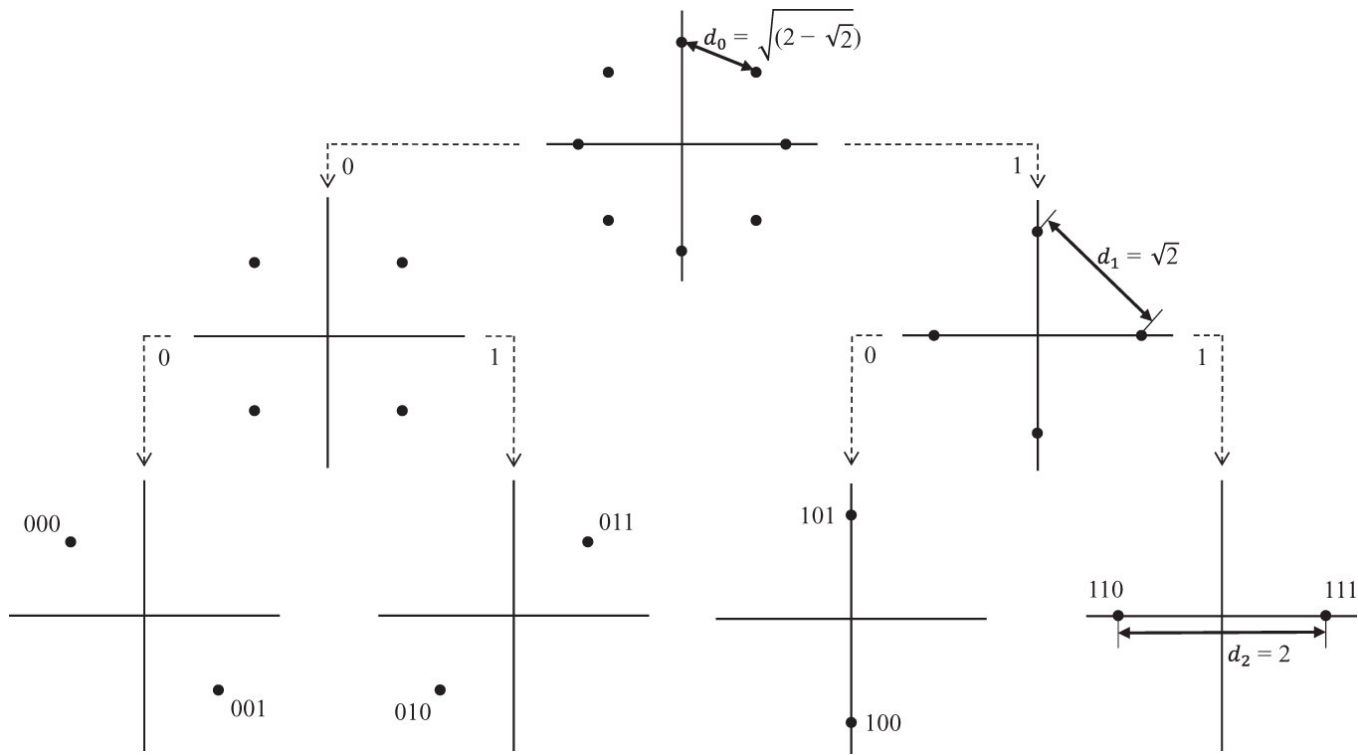


Figure 10.11 Partitioning of 8-PSK constellation for Example 10.12.

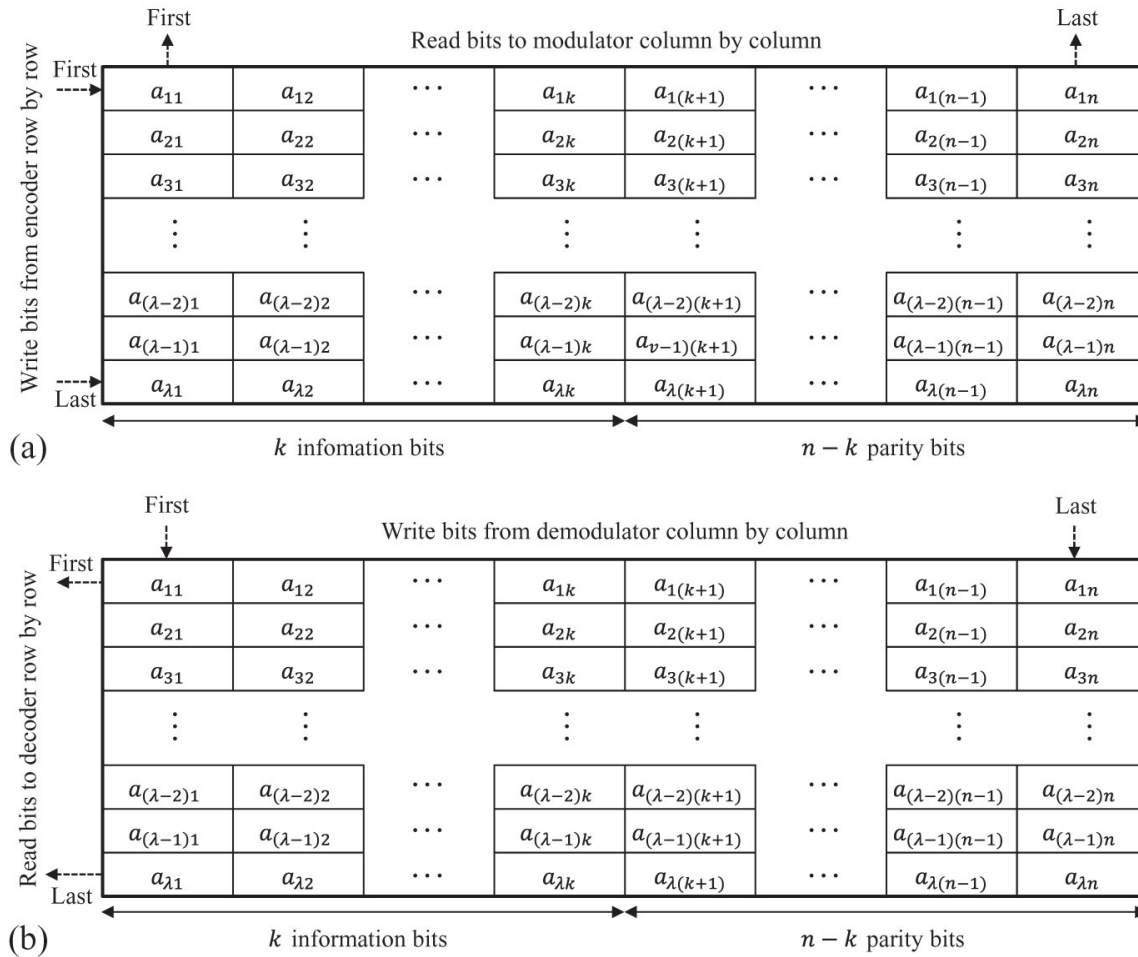


Figure 10.12 Block interleaving: (a) interleaver and (b) deinterleaver.

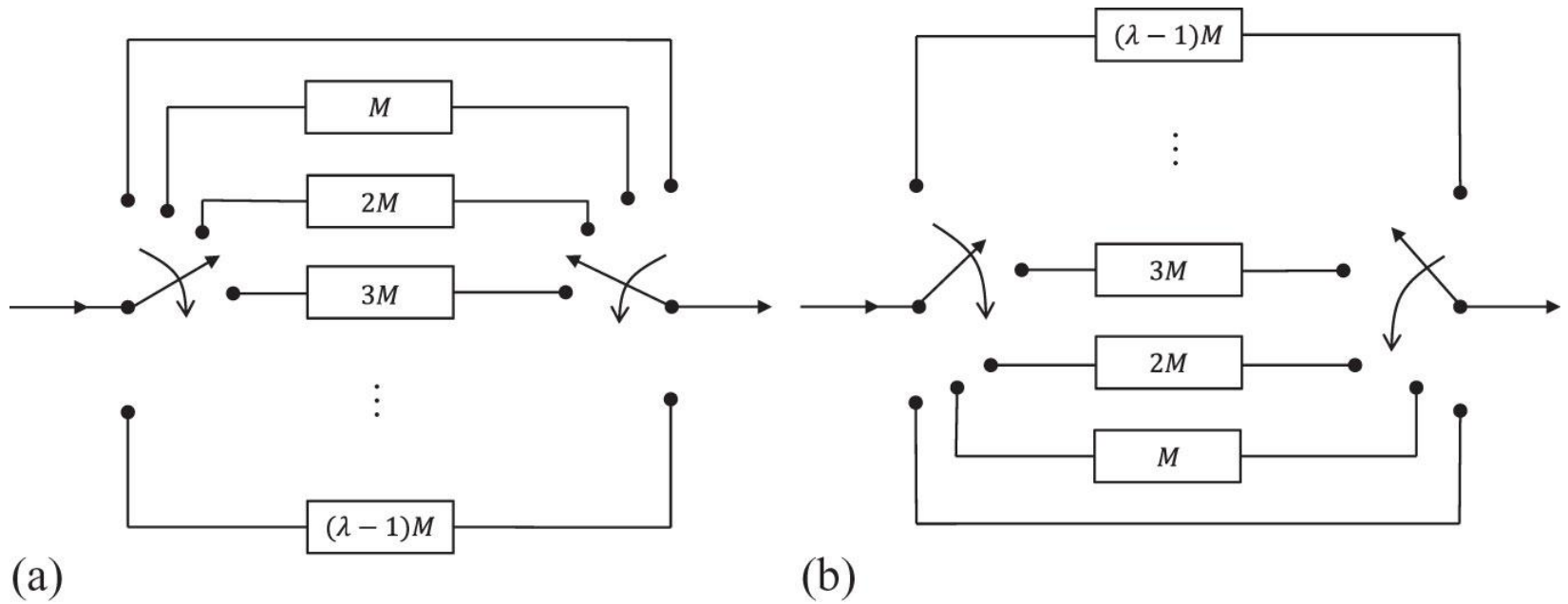


Figure 10.13 Convolutional interleaving: (a) interleaver and (b) deinterleaver.

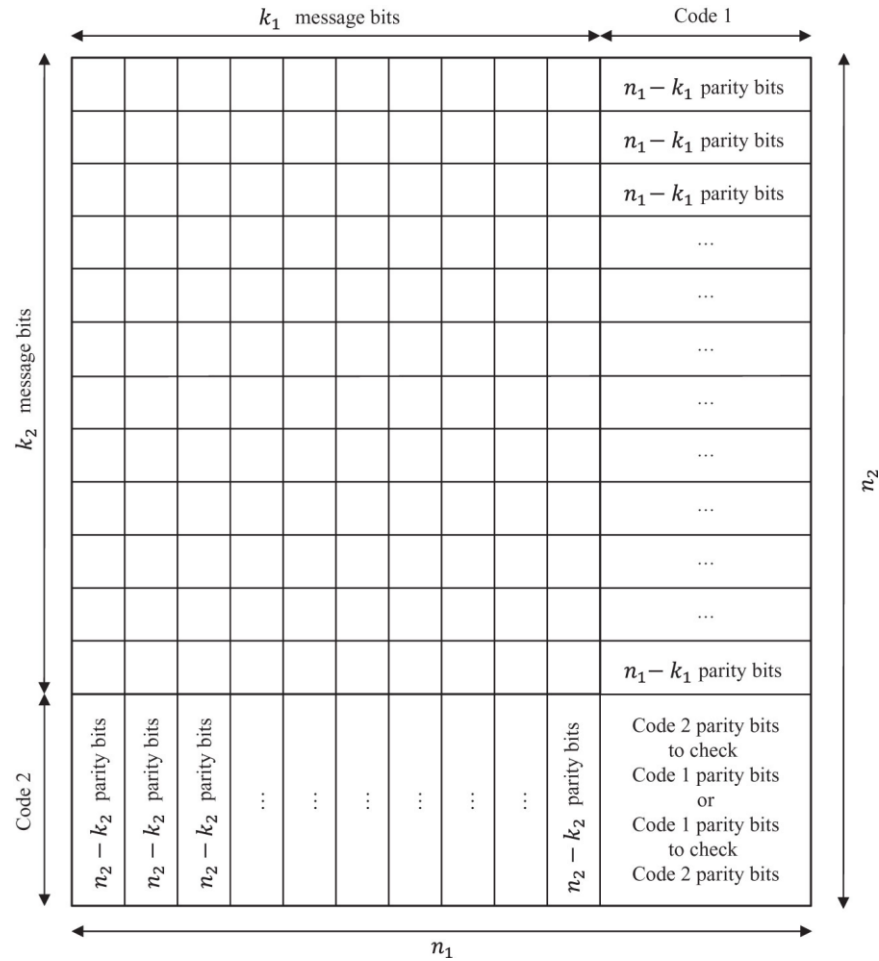


Figure 10.14 Structure of a product code.

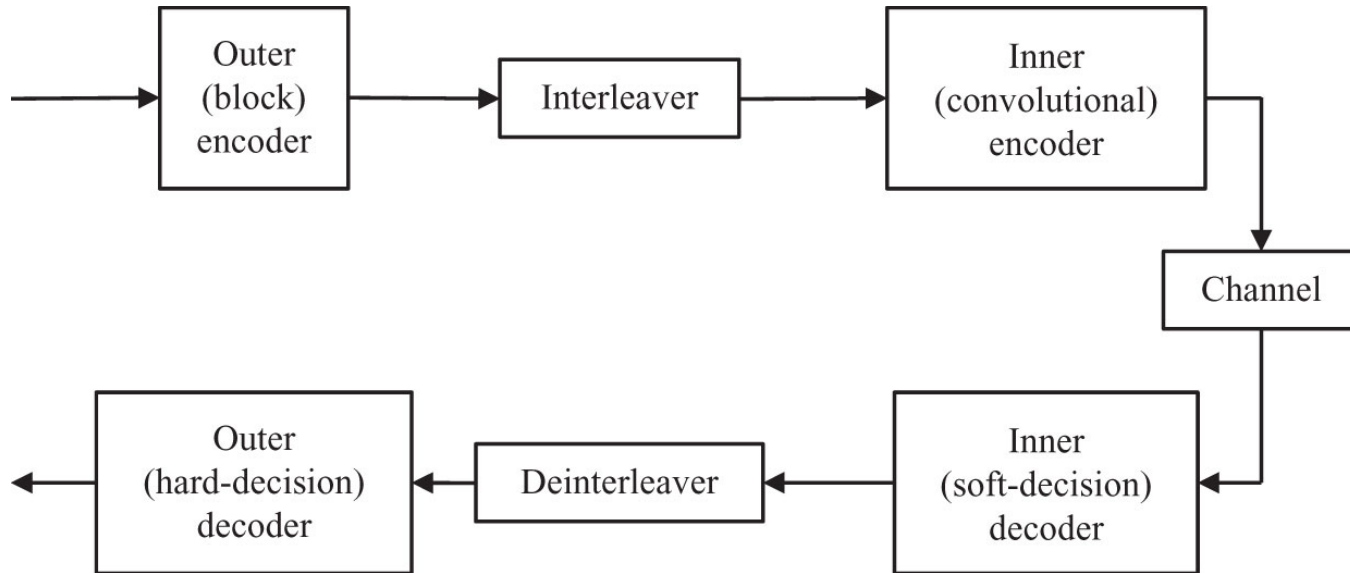


Figure 10.15 Block diagram for concatenated coding.

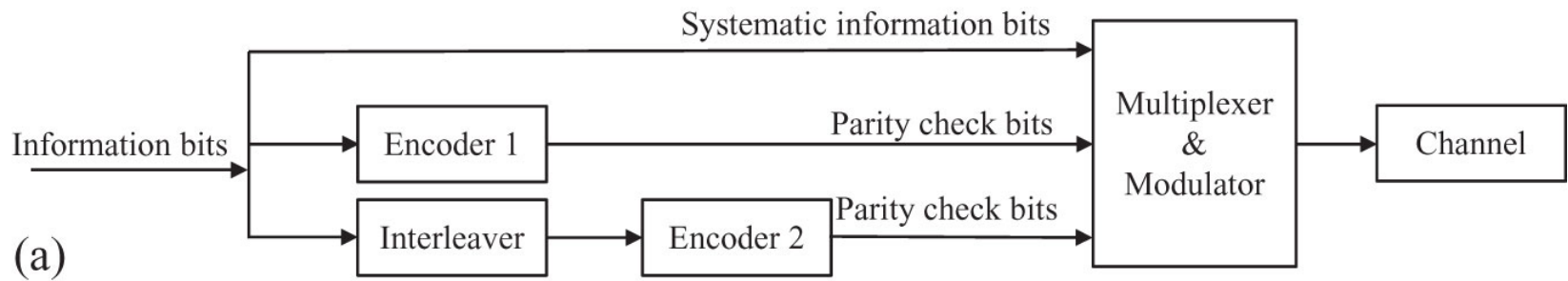


Figure 10.16a Block diagram for turbo coding: (a) encoder and (b) decoder.

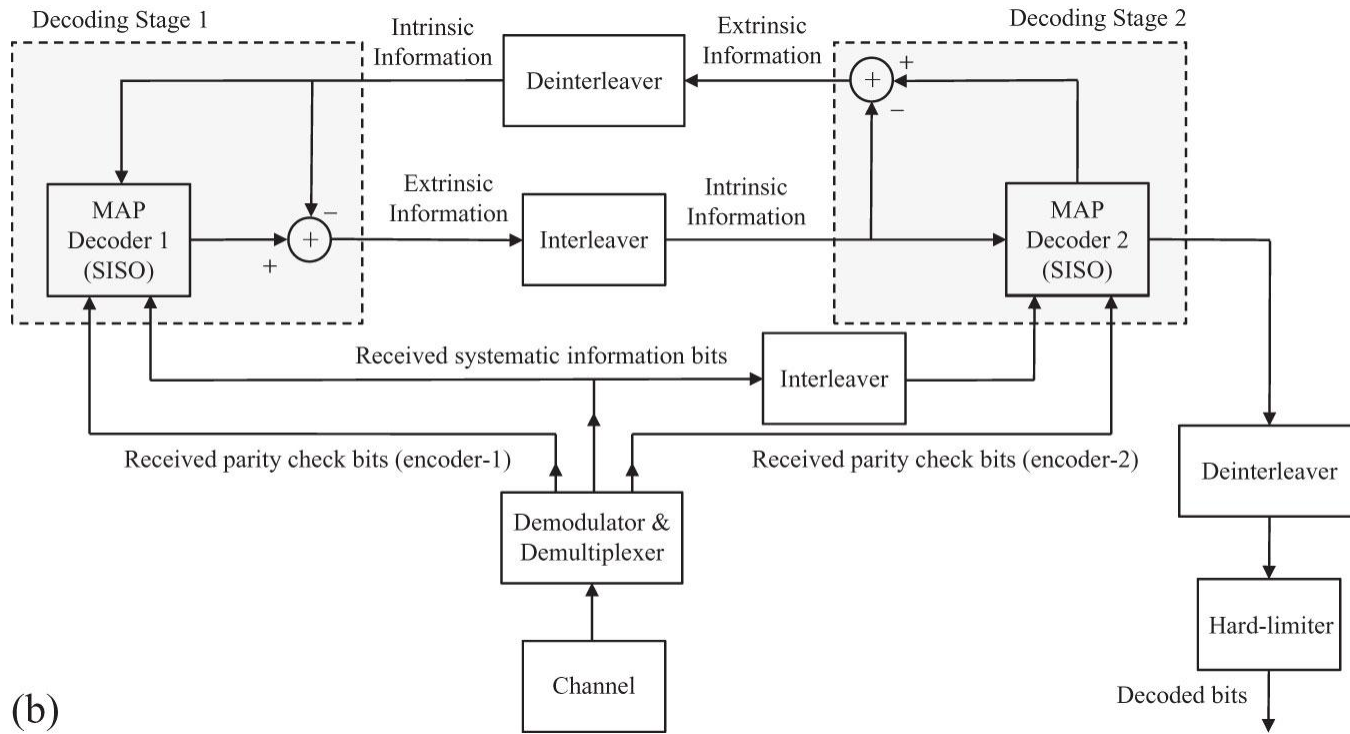


Figure 10.16b Block diagram for turbo coding: (a) encoder and (b) decoder.